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Effect of Neighborhood Features on BMI of African American adolescents in South Los Angeles

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Abstract

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Dissertation Submitted in Partial Fulfillment

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Abstract

Childhood obesity is a major national and worldwide public health crisis. The occurrence of childhood obesity, caused to large extent by an imbalance between caloric intake and caloric expenditure, has increased in the last 30 years. Although the prevalence of obesity has stabilized in recent years, it remains a top public health concern in the United States, especially in urban centers. The purpose of this study was to examine the associations between diet, physical activity, and the built environment in relation to the mean body mass index (BMI) of adolescents aged 12 to 17 years living in South Los Angeles, California. The research design, methods, and data analysis were based on the California Health Interview Survey 2007-2013 dataset. This database was mined for the independent variables: physical security, food insecurity, parental education and income, and availability of recreational facilities necessary for a healthy lifestyle; the dependent variable was BMI. Descriptive statistics and multiple regression analysis were used in analyzing for the association between the dependent variable and the independent variables. The outcomes of this study showed no associations between neighborhood physical security, recreational facilities, adolescent's physical activity, parents' education level, parents' income level, and BMI. However, the results did show a significant correlation between adolescent's dietary intake, food security, and BMI. This study will contribute to positive social change by informing public health officials and policy makers of the benefits of food security to healthier eating habits and BMI among the adolescents studied. Resulting actions could result in collaborative efforts toward reduction and prevention of childhood obesity.

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Dedication

I dedicate this dissertation to my loving husband, Nwachukwu Ike, for his unconditional love and patience without which this doctorate of philosophy would not have been attained. I also dedicate my dissertation to my late father, David Obiora, who believed in the power of education. I salute his memory. To God be the glory.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

As a part of a child's built environment, neighborhood insecurity, that encompasses and unsafe neighborhood and lack of supermarkets and access to parks, gives rise to a child being overweight and obese (Larson, Story, & Nelson, 2009; Sallis & Glanz, 2009). According to some researchers, there are conclusive links between proximity to parks, presence of certain types of food outlets, neighborhood sidewalks, and physical inactivity and body mass (Casagrande, Whitt-Glover, Lancaster, Odoms-Young & Gary, 2009; Rundle et al., 2009). The environment where children and adolescents live can impact their food and physical activity behaviors (Centers for Disease Control and Prevention [CDC], 2012a). There is some evidence that children living in affluent neighborhoods have better access to supermarkets with a wide range of nutrient-dense foods and better prices when compared to children living in poor areas with more access to small grocery and convenience stores (Gittelsohn & Sharma, 2009).

Overweight and obesity are leading risks for global deaths (Ebbert, Elrashidi, & Jens, 2014; World Health Organization [WHO], 2013). The WHO (as cited in Nemiary, Shim, Mattox, & Holden, 2012) described overweight and obesity as an abnormal or excessive accumulation of body fat that may impair health. Worldwide, the percentage of overweight children under the age of 5 as of 2009 was likely to be over 42 million (WHO, 2009). In the United States, changes in the immediate environment and other influences have contributed to overweight and obesity over the past 30 years (BeLue, Francis, Rollins, & Colaco, 2009; Sallis & Glanz, 2009). Notably the prevalence and severity of obesity has increased among African American and Hispanic children

(Spruijt-Metz, 2011). Evidence regarding the means through which the built environment is linked to childhood obesity is still emerging (Sallis & Glanz, 2009). In 2012 there were 73.7 million children ages 0 to 17 in the United States (Federal Interagency Forum on Child and Family Statistics, 2013) and about 12.5 million of children and adolescents aged 2 to 19 years old were obese (Ogden, Carroll, Kit, & Flegal, 2014). In their 2014 study of obesity trends in the United States using the 2011-2012 National Health and Nutrition Examination Survey (NHANES), Ogden et al. (2014) found that 20.5% of adolescents aged 12 to 19 years were obese.

It is important to investigate further the many different aspects of the built environment to which children are exposed throughout their lives because these have a vital role to play in sustaining human health as part of daily living. Identifying these aspects of the built environment could form an essential basis for correcting and/or personalizing interventions. Encouraging appropriate interventions at school, neighborhood, and other organizational levels has been recommended in the literature as the key to winning the battle against childhood obesity (White House Task Force on Childhood Obesity [WHTFCO], 2010). Furthermore, an investigation of the built environment and obesity among children and adolescences could be advantageous in understanding the life-course stage (Dixon, Peña, & Taveras, 2012; Lee, Harris, & Lee, 2013; Park, Sovio, Viner, Hardy, & Kinra, 2013; Scharoun-Lee, Kaufman, Popkin, & Gordon, 2009). The life-course method examines an individual's life history and how early events influence future decisions and events, especially the association between individuals and the historical and socioeconomic environment in which they lived.

Because the events during childhood could have lifelong consequences, social change will be seen in terms of change in the environment that can bring about changes in the structure of society and relationship of the individuals. A reduction of 150 calories per day (one can of soda) can result in a loss of 5 extra pounds of weight in 1 year and 50 pounds in a decade (Hall et al., 2011).

Chapter 1 includes background to support the problem statement and purpose of the study; it offers an in-depth description of the research questions and hypotheses and theoretical and/or conceptual framework for the study, describes the nature of the study, defines terms used, and discusses assumptions, scope and delimitations, and limitations. Study on childhood obesity among African American is needed to address disparities among members of racial and ethnic minority groups and strategies for reducing disparities among these groups.

Background of the Study

Childhood obesity has been linked to the built environment (Singh, Siahpush, & Kogan, 2010). In this section, I give a detailed account of the causes of childhood obesity. This includes genetic defects, many aspects of built environment, and sedentary lifestyle. The subheadings in this section are helpful to examine the link between childhood obesity and many aspects of built environment. Also, where appropriate, information on Los Angeles County is discussed as this was the location of interest for this study.

Obesity Etiology

The origins or bases of obesity are not completely understood. Obesity is a complex, multifactorial, and chronic disease that results from an interaction between a child's environment and genetics (Crawford et al., 2010, CDC, 2012a; Segal & Sanchez, 2001). Childhood obesity is caused by both modifiable and non modifiable influences. The modifiable influences include children's lack of regular exercise, over consumption of high-calorie foods, high frequency of television viewing, low family income, and snacking while watching television or doing homework. Other influences include non-working parents, and over exposure to advertisement of high calorie foods (Deckelbaum & Williams, 2001; Huffman, Kanikireddy, & Patel, 2010). Obesity is a preventable and treatable disease. In children, this disease is an effect of numerous influences at the individual, family, community, and societal levels. Overweight and obesity in children and adolescents is mostly caused by physical inactivity and unhealthy eating, which bring about excess energy consumption, or a combination of the two, resulting in positive energy balance (CDC, 2014a). Ang, Wee, Poh, and Ismail (2013) described overweight and obesity in children and adults as the buildup of excessive body fat as well as the growth of excess fat cells.

Obesity is favorably predisposed by genetics. Genes linked with obesity have been detected, with the disparity in body mass index (BMI) being supported by genetic influences (Fawcett & Barroso, 2010). Genetic influences alone are however insufficient to rationalize the rapid escalation in the prevalence of obesity observed in several developed nations (Llewellyn, Trzaskowski, Plomin, & Wardle, 2013). Parental obesity

is the strongest risk factor for childhood and adolescent obesity (Jiang, Yang, Guo, & Su, 2013). This is especially true if both parents are obese (Vos & Welsh, 2010). The strongest association between genetics and obesity is the fat-mass and obesity-related gene (FTO; Cheung & Mao, 2012; Speliotes et al., 2010; Vos & Welsh, 2010).

O'Rahilly and Farooqi (2008) and Llewellyn, van-Jaarsveld, Boniface, Carnell, and Wardle (2008) indicated in the Twins' Early Development Study (TEDS) that 40% to 77% of the studied difference in human body weight can be due to inherited factors. Other genes such as BDNF, SH2B1, and NEGR1 (all implicated in aspects of neuronal function) support the idea that obesity is a disorder of hypothalamic function (Cheung & Mao, 2012).

Genetic defects associated with hypothalamic function have been found to impair satiety, influencing the performance of appetite control centers in the brain (Farooqi & O'Rahilly, 2005). Llewellyn et al. (2013) reported that 32 genes have been detected as risk factors for obesity, and these genes together account for only 2% of individual differences in childhood body weight. By means of the Genome-wide Complex Trait Analysis (GCTA), researchers concluded that influences of numerous genes are responsible for 30% of variance in a child's body weight (Llewellyn et al., 2013). These discoveries are vital as they validate the observation that in children genes play very vital roles in regulating body weight (Llewellyn et al., 2013). Also, they underline the importance of genetic influences in childhood obesity, supporting the current thinking that children of obese parents are most at risk of becoming obese. Llewellyn et al. (2013)

did not mention control for influences such as the foods eaten within the households and the exercise habits of the families in their investigation.

Built Environment

The environment in which individuals live influences the choices that they make about eating healthy and being physically active. According to Maitland, Stratton, Foster, Braham, and Rosenberg (2013), the home environment is one of the key influences on the physical activity and sedentary behavior of children. The built environment (accessible food sources, neighborhood security, buildings, recreation facilities) has been implicated in the etiology of childhood obesity (Rahman, Cushing, & Jackson, 2011; Singh et al., 2010). In recent times, features of neighborhood environment (example: proximity of parks and recreation facilities, the physical state of sidewalk, safety, walkability, income) have also been considered as determinants of physical inactivity (Bracy et al., 2014; Sallis et al., 2011).

Behavioral risk factors early in a child's life have been notably linked to the prevalence of childhood obesity (Han, Lawlor, & Kimm, 2010). Several unhealthy behaviors can promote weight gain including unhealthy diet and sedentary behaviors. Obesity in children occurs when energy from food and drink intake is greater than energy utilization through the body's breakdown and physical activity, over a prolonged period, leading to a buildup of excess body fat. Energy-dense foods and beverages have become more inexpensive, forcefully marketed, and are more easily accessible than in the past 30 years, and serving sizes continue to increase (Chandon & Wansink, 2012). Good or poor dietary habits start at home. Parents are influential primary role models for healthy eating

(Anzman, Rollins, & Birch, 2010; Moore, Harris, & Bradlyn, 2012). Diamant, Babey, Jones, and Brown (2009) found that each day, more than 2 million California adolescents (62%) consumed soda and 1.4 million (43%) consumed fast food; however, only 38 % ate five or more portions of fruits and vegetables. Sugar-sweetened beverages, primarily soft drinks and also fruit juice, which constituted approximately 11% of children's total calorie intake (Ledikwe, et al., 2006), have been strongly associated with weight gain (Hu & Malik, 2010). According to Ludwig, Peterson, and Gortmaker (2001), any additional sugary beverage a child consumes each day increases his or her chances of becoming obese by 60%. Sugar-sweetened beverages are carbonated and noncarbonated drinks that contain sugar or high-fructose corn syrup (Brownell & Frieden, 2009). Reedy and Krebs-Smith (2010) have shown that sugar-sweetened beverages offered the major source of daily calories for 2- to 18-year olds. They found that an average daily intake of energy from added sugars in sweetened beverages was 365 kcal. Odoms-Young, Zenk, Karpyn, Ayala, and Gittelsohn (2012) found that children from racial and ethnic minority groups, including African Americans, consumed an excess of sugar-sweetened drinks and fast food, and had a suboptimal habit of eating fruits and vegetables, compared to their White counterparts.

Income is another likely contributor to obesity. Higher income could prevent weight gain by enabling consumers to substitute healthier, more costly food for cheaper energy dense food or by increasing demand for good health or an attractive appearance. Low-income individuals generally reside in distressed and deprived neighborhoods characterized by physical and social disorder. Lower socioeconomic status (SES) has

been frequently associated with poorer health in childhood (Nikiema, Spencer, & Sequin, 2010; Singh, Siahpush, & Kogan, 2010). SES is also assessed by parental educational level, occupational status, and income level. Individuals in lower SES groups are more likely to live in "food deserts" where fresh fruits and vegetables are not as accessible when compared to more affluent neighborhoods (Ver Ploeg et al., 2009). Social environments or situations such as unemployment and poverty, as well as crime, may negatively impact recreational access and be related to obesity (Dahmann, Wolch, Joassart-Marcelli, Reynolds, & Jerrett, 2010).

Access to food suppliers in the built environment can affect body weight (Gibson, 2011; Laska, Hearst, Forsyth, Pasch, & Lytle, 2010; Michimi & Wimberly, 2010; Powell, Han, & Chaloupka, 2010). The food environment and the accessibility of healthful or unhealthy foods in an individuals' local neighborhood can play an important role in choices of food they consume (Hill, Wyatt, Reed, & Peters, 2003; Mellor, Dolan, & Rapoport, 2011; Sturm, Powell, Chriqui, & Chaloupka, 2010). It has been debated that food eaten away from home, especially fast- food is linked with weight gain and the obesity epidemic (Spence, Cutumisu, Edwards, Raine, & Smoyer-Tomic, 2009). As relevant to Los Angeles, the Los Angeles Regional Foodbank (2010) reported that more than one million people or one in ten families go without food or face food insecurity in Los Angeles County in spite of the fact that Southern California is the most productive agricultural region in the country.

According to the California Department of Food and Agriculture (2012) people living in underserved neighborhoods either travel to buy healthy food or buy less healthy

food from fast-food restaurants and convenience stores. There are 2.3 times more supermarkets per household in low-poverty areas of Los Angeles as compared to high-poverty areas. Likewise, mostly white neighborhoods have 3.2 times as many supermarkets as African American neighborhoods and 1.7 times as many as Latino neighborhoods (Treuhaft & Karpyn, 2010). This inequity in access to healthy foods is considered to be one of the causes of the obesity epidemic (Treuhaft & Karpyn, 2010; Ver Ploeg et al., 2009). Before the opening of the East Los Angeles and South Los Angeles (Watts) Healthy Farmers' Markets, the nearest farmers' markets in East Los Angeles were to be found 5 miles and 13 miles outside the community respectively (Ruelas, Iverson, Kiekel, & Peters, 2012).

Ver Ploeg et al. (2009) investigated access to supermarkets in the United States in a food desert study and concluded that 23.5 million individuals cannot access a supermarket within a one mile radius of their home. About 71.8 % of the restaurants in South Los Angeles area are fast food-based. South Los Angeles is a food desert. Neighborhoods with high numbers of fast-food restaurants could negatively influence the resident food environment. Mellor, Dolan, and Rapoport (2011) and Currie, Della-Vigna, Moretti, and Pathania (2010) found that the concentration or nearness of fast-food restaurants is positively associated with higher rates of obesity and overweight, a finding that suggests that increased obtainability of fast food may significantly contribute to the obesity epidemic. The childhood obesity rate in South Los Angeles (Compton and Gardena) is 50.8% and 49.9% respectively (Babey, Wolstein, Diamant, Bloom, & Goldstein, 2012, p. 3) and higher than the national average of 31.8% (Ogden et al., 2014).

Although it may appear counterintuitive, obesity and food insecurity can occur together in the same individual, family, or community. Eighty five percent of U.S. households are food secure and 15% food insecure (Nord, Coleman-Jensen, Andrews, & Carlson, 2010). The food insecurity, of members of racial/ethnic minority groups and low-income households overly impacts this population which is at highest risk for obesity (Nord et al., 2010; Robert Wood Johnson Foundation, 2010). Food insecure households have higher poverty rates, higher unemployment and hunger rates. Since food insecure households have higher poverty rates, higher unemployment and hunger rates, it is vital to understand the link between food insecurity and obesity and how to address these issues.

There are many studies on the relationships between obesity and food insecurity, but they present mixed findings (Eisenmann, Gundersen, Lohman, Garasky, & Stewart, 2011; Larson & Story, 2011). Researchers in the United States have established positive correlations between food insecurity and overweight/obesity (Casey et al., 2006; Townsend, Peerson, Love, Achterberg, & Murphy, 2001). Others have observed no correlation, or a lower risk of obesity, with food insecurity (Jones, & Frongillo, 2007; Rose & Bodor, 2006). According to Larson, and Story (2010) and Dinour, Bergen, and Yeh (2007), the strongest and most reliable evidence is for a higher risk of overweight/obesity among food insecure women. While the research for children has not been as consistent as it has been for adults, some researchers have found a significant correlation between food insecurity and childhood overweight and obesity (Eisenmann et al., 2011; Townsend & Melgar-Quinonez, 2003). A selection of studies showed a

correlation between food insecurity and a greater risk of overweight/obesity (Brewer et al., 2010; Laraia, Siega-Riz, & Gundersen, 2010).

Fast food is a common issue in studies looking at increased BMI. It has also been connected with higher intakes of energy, fat, sodium, added sugars and sugar-sweetened beverages, and lower intakes of fruits, vegetables, fiber and milk in children (Reedy & Krebs-Smith, 2010). Regular consumption of fast food is linked to increase BMI because fast foods are inexpensive and convenient. They are also high-calorie and low in alimentary value (WHTFCO, 2010). Fast-food restaurants are more common in ethnic-minority neighborhoods (Fleischhacker, Evenson, Rodriguez & Ammerman, 2011) and the fast food industry overly markets to ethnic minority youth (Harris, Schwartz, & Brownell, 2010), making these children prone to increased BMI. Larson et al. (2009) in a review on U.S. community ecosystems showed that fast food restaurants are more common in low-income and ethnic minority areas, conceivably impacting obesity rates among different ethnic groups.

Physical activity, an important factor to obesity prevention is impacted by the built environment, as is food access for healthy eating. The U.S. Department of Health and Human Services (2008) advocates that children have 60 minutes or more of physical activity each day and that this exercise should include aerobic, bone strengthening activities, and muscle strengthening. The National Association of School Nurses and the American Academy of Pediatrics also advocate that each schoolchild from kindergarten through Grade 12 participate in daily physical activity (Taras et al., 2004). According to the CDC (2014c), participation in regular physical activity improves bone and muscle

health, increases endurance, reduces stress and anxiety, regulates weight and enhances self-confidence. In contrast, lack of physical activity has reverse influences and is connected to the epidemic of childhood obesity. A number of researchers have shown that built environmental influences (public resources, urban sprawl, and land use) could have an effect on the attainability of this recommendation (Dunton, Kaplan, Wolch, Jerrett, & Reynolds, 2009; Galvez, Pearl, & Yen, 2010; Razani & Tester, 2010). Babey, Hastert and Brown (2007) using data from the 2003 California Health Interview Survey (CHIS) showed that teenagers living in communities with higher rates of poverty had limited access to parks and lower levels of participation in physical activity than those teenagers residing in neighborhoods with reduced poverty rates.

A major source of inactive behavior in children is time spent watching television or movies, playing video games, and using computers. Overall between 1955 and 2005 Americans become less physically active (Brownson, Boehmer, & Luke, 2005). Children's physical activity has declined in the last 20 years from 1991-2011 (CDC, 2012c). Daily physical education classes decreased from 42% in 1991 to 25% in 1995 among high school students who attended physical education classes but remained steady at 31% up until 2011(CDC, 2012c). Since 2011, a linear increase in physical activity from 55.1% to 58.4% among students nationwide has been reported (CDC, 2012c). Often these children are not provided with sufficient time or access to physical activities or exercise routines to stay healthy and physically fit. Adolescent boys have been found to be more likely to participate in frequent physical activity than girls (Pearson, Atkin, Biddle, Gorely, & Edwardson, 2009). Researchers have shown that residing in walkable

neighborhoods and having parks or having recreational amenities close by have been linked with an increased participation in physical activity by individuals including children (Floyd, Spengler, Maddock, Gobster, & Suau, 2008; Gordon-Larsen, Nelson, Page, & Popkin, 2006).

Demographics

Childhood obesity, especially among ethnic minorities, has become widespread in recent years (Spruijt-Metz, 2011). Minority and low-income children are disproportionately affected by childhood obesity. Also, racial and ethnic differences are noteworthy with respect to the prevalence of childhood obesity and exist as early as the preschool years (Ogden & Carroll, 2010; Taveras, Gillman, Kleiman, Rich-Edwards, & Rifas-Shiman, 2010).

Wang (2011) using data from NHANES and the Youth Risk Behavior Surveillance System (YRBSS) showed that African American girls had the highest prevalence of childhood obesity among ethnic minorities. African American adolescents are also more likely to be overweight or obese compared to White children (Anderson & Whitaker, 2009; Harris, Perreira, & Lee, 2009; Ogden, Carroll, Kit, & Flegal, 2012b). Using 2010 NHANES data, Ogden et al. (2012b) reported that 41.3 % of African American and 38.6 % of Hispanic girls were overweight or obese compared to 25.6 % of White girls. Elsewhere, the observation has been made that these differences in childhood obesity prevalence exist as early as the preschool years (Taveras et al., 2010). Minority is defined as Black, African American, Hispanic, Latino, American Indian, Alaska Native, Asian American, Native Hawaiian, or other Pacific Islander (CDC, 2012d). The rate of

obesity is greatest for 12-19 year old Black girls and 12-19 year old Hispanic boys (Ogden et al., 2012b). Of concern to the current study are the high rates of overweight and obesity, at 38% and 35% respectively, of African American adolescents living in lower income neighborhoods in Los Angeles County where the residents are primarily African American and/or Latino (Ruelas et al., 2012).

In recent years, researchers have shown that parental education affects children's weight status owing to tastes and preferences the child carries into adulthood (Fiorito, Marini, Mitchell, Smiciklas-Wright, & Birch, 2010; Oken & Gillman, 2012). Lee, Harris, and Gordon-Larsen (2009) reported that individuals whose parents have lower educational accomplishments go into adulthood with high BMI due to the inverse relationship between parental educational attainment and childhood or adolescent weight. Clarke, O'Malley, Johnston, and Schulenberg (2009) reported that BMI increased at a faster rate among the less schooled Blacks and Hispanics transitioning to mid-life. Because of this, the largest BMI differences by education and race/ethnicity occurred at mid-life. Also Clarke et al. (2009) observed that respondents whose parents' achieved less than a college degree reported higher BMI at age 18 and at a faster rate.

Furthermore, levels of parental educational attainment affect parental income. Obtainment of a college degree is not a guarantee of a good life or even of financial security. However, there is overwhelming evidence that for most people, education beyond high school is a necessity for a secure lifestyle and this potentially increases the likelihood of employment and having a stable career with an encouraging salary trajectory. Education also enables individuals to have healthier and fit lives, to set up

opportunities for their children and contribute positively in civil society. According to the Bureau of Labor Statistics and U.S Department of Labor (2014) full-time employees aged 25 and over without a high school diploma had median weekly earnings of $468, compared with $648 for high school graduates or no college and $1,219 for those holding a bachelor's degree. According to Baum, Ma, and Payea (2010) individuals with college degrees report being in better health, having lower death rates and higher public commitment, and are not likely to take money from their social safety net.

The health effects of obesity are significant. Excess weight in children has both immediate and with long-term effects and demands a call for action. According to Tirosh and colleagues (2011), childhood obesity is linked to overweight and obesity in adulthood. The disease is associated with escalating rates of chronic diseases and premature death. For example, these children are more liable to show risk factors for cardiovascular disease (CVD) including high blood pressure (hypertension), high cholesterol, dyslipidemia, type 2 diabetes, bone and joint problems, social and psychological problems, stigmatization and poor self-esteem, sleep apnea, asthma, compared with normal weight children (CDC, 2012a; Office of the Surgeon General, 2010). Obesity in children and adolescents leads to accelerated atherosclerotic development and can be affected virtually all organ systems resulting in life-threatening medical problems (Han et al., 2010).

Los Angeles

Of interest to the current study is the neighborhood of South Los Angeles. Ranked the fourth largest city in California, South Los Angeles is a city with a population of

about 884,000 persons or 10% of the Los Angeles County population in 2006 (Ong, Firestine, Pfeiffer, Poon, & Tran, 2008). Despite the fact that South Los Angeles is traditionally known as an African American neighborhood, there have been population shifts for the past twenty years that have altered the racial dynamic in the area. Children in this neighborhood live in more poverty than children in the entire State of California at 32% versus 27% (Ong et al., 2008). As noted in the introduction, poverty and obesity are linked; 40 % of children and 34 % of toddlers in Los Angeles are obese or overweight (Los Angeles County Department of Public Health, 2009). Because of the overall economic situation and potential crime, there is a scarcity of supermarkets and high-quality fresh food outlets in South Los Angeles. Most chain supermarkets have deserted South Los Angeles and other low-income communities for more affluent communities, leaving entire communities with little or no access to affordable, high quality food (Ong et al., 2008).

Most residents in low income communities such as South Los Angeles are not food secure (Muirhead, Quiñonez, Figueiredo, & Locker, 2009). Prospective grocery store developers are discouraged by the perception that the cost of opening a store in South Los Angeles is higher owing to pilfering and escalated security needs (Bassford, Galloway-Gilliam, Flynn, & Community Health Councils Food Resource Development Workgroup, 2010). The reputation of high crime rates and urban decay associated with South Los Angeles has impinged on the area's ability to attract full-service grocery stores (Bassford, Galloway-Gilliam, & Flynn, 2010). There are no health food stores in this vast neighborhood and even regular supermarket stores are in short supply (Vallianatos,

Azuma, Gilliland, & Gottlieb, 2010). In contrast, there is a preponderance of fast food outlets.

In Los Angeles, redlining by banks and inequitable progress have resulted in the sale of poor quality and insufficient food in many low-income ethnic minority neighborhoods (Bassford et al., 2010). Particularly, residents of South Los Angeles report accessible food to be of poor quality and because of this situation of unhealthy food choices in South Los Angeles, residents of this neighborhood are prone to higher body-mass index scores (Treuhaft, & Karpyn, 2010). Also lack of access to a safe environment for physical activity promotes sedentary lifestyle, which in turn leads to childhood obesity. When a neighborhood lacks safe spaces to play, children are inclined to spend more time being inactive indoors.

South Los Angeles is notorious for its deep concentration of gangs (such as the Blood, the Crips, and Surenos) and gang violence. Because South Los Angeles neighborhoods are unsafe, children who live in these communities tend to spend long leisure hours indoors and engage in limited physical activity (Amorim, Hallal, & Azevedo, 2010). Parents who perceive their neighborhood as unsafe may limit their children's time in outdoor independent play, which can reduce the child's chances for spontaneous play and adventure (WHTFCO, 2010). Records acquired from the Los Angeles Police Department (LAPD) reveal that the rate of crimes in South Los Angeles (Compton and Gardena) was 6.7 per 10, 000 people and 148.7 crimes per 10,000 people in a six month span (June 8 and June 14, 2013; LAPD, 2013a, 2013b). In contrast, the crime rates in neighboring communities within a 25 mile radius range from 2.4-5.2

crimes per 10,000 people. As a result of the high crime rate in South Los Angeles, parents residing in this neighborhood are reluctant to encourage their children's involvement in outdoor physical activities (Rossen et al., 2011). Consequently, children may spend most of their free time playing video games and viewing television rather than being physically active, a situation that increases their risk for overweight or obesity (Amorim et al, 2010). According to Rideout, Foehr, and Roberts (2010) children between 8 and 18 years old spend an average of 7.5 hours a day playing with computers, video games, cell phones, and movies or watching television; about 4.5 hours is devoted to watching television. The childhood obesity rate in South Los Angeles (Compton and Gardena) is 50.8% and 49.9% respectively (Babey et al., 2012, p 3), compared to the national average which is 31.8% (Ogden et al., 2012).

In this study, I examined the associations between food intake, physical activity, the built environment and the mean BMI of adolescents aged 12 to 17 years living in South Los Angeles. Findings from this study could be used by policy makers to advocate for necessary policy and security measures to help make neighborhoods safer for children and their families. In addition, they and others may find the results useful to advocate for improved economic opportunities for parents in these neighborhoods as a necessary step toward improving children's access to healthier food choices and weight reduction. Even small changes in the built environment or calorie expenditure may equate to significant weight loss.

Problem Statement

Obesity in children is a worldwide problem, the incidence of which has increased in the last 30 years (WHO, 2011b). Correspondingly, there has been an increase in changes to the environment that have contributed to a rise in sedentary behavior and a decrease in physical activity and obesity (Owen, Healy, Matthews, & Dunstan, 2010). As stated in the background section, neighborhood insecurities have been implicated in childhood obesity. According to Singh et al. (2010), the likelihood of a child being overweight or obese was 20% to 60 % higher among children in neighborhoods with no access to sidewalks or parks, unsafe recreation centers, and poor housing than among children not facing these environmental constraints. Current literature on the built environment has focused on the impact of environs and community-level influences on food choices, physical inactivity, and obesity (D'Addesa et al., 2010). Chen, Florax, Snyder, and Miller (2010) found that increased access to grocery stores in low-income neighborhoods reduced BMI for all adults in Marion County, Indiana by approximately 0.3 BMI points (a practically significant reduction); access to more farmers' markets, grocery stores/supermarkets, and supercenters per capita was independently associated with lower obesity. In 2011, more than 40 million children under the age of 5 were overweight (WHO, 2013) and about 35 million of these children lived in unindustrialized countries (WHO, 2011a). In 2009-2010, the rate of obesity among U.S. children and adolescents age 2 to 19 years was 16.9%; the figure was higher among adolescents than preschool children (Ogden et al., 2012b). Among preschool children aged 2 to 5 years, obesity rate increased from 5.0% to 12.1% between 1976 to 1980 and 2009 to 2010, and

increased 5.0% to 18.4% among adolescents aged 12 to 19 during the same period (Fryar et al., 2012).

This reflects a tripling of obesity rates since 1976 to 1980 among adolescents aged 12 to 19 (Fryar et al., 2012). A closer look at the data shows there were extensive gaps in obesity rates among children and adolescents from racial and ethnic minority groups. These children have been and continue to be at a higher risk for developing obesity than their White counterparts. Between 1988 to 1994 and 2009 to 2010, the occurrence of obesity escalated for all children but especially for adolescents aged 12 to 19 years (Ogden et al., 2012). The obesity rate among adolescents aged 12 to 19 increased from 5.0% to 21.0 % in 2012 (NCHS, 2012; Ogden et al., 2014). African American children and adolescents are at a higher risk for developing obesity than some of their counterparts. African American female adolescents are more likely to be obese than White or Hispanic female adolescents (Skinner & Skelton, 2014). In addition, researchers observed that the obesity in adolescence persists into adulthood (Würbach, Zellner, & Kromeyer-Hauschild, 2009). Identifying and addressing the impact of the built environment on the obesity epidemic among African American youth would potentially reduce the continuance of the disease into adulthood. Furthermore, comprehending how features of the economic, social, and cultural environments of minority and low-income children might reduce the prevalence of obesity in this group. Establishing which changes in those environments would help to reduce obesity among minority children would be a necessary step in addressing this major public health problem.

There are significant gaps in the current literature because most studies did not test early intervention programs that focused on gestation and infancy, which are critical periods of obesity development (Wojcicki & Heyman, 2010). They did not adequately examine existing community-based health-promotion programs to identify assessment tools that can be adopted or adapted for the urban United States low SES group and extrapolate and test these interventions (Branscum & Sharma, 2011). Nor did they measure retention of behavioral change past 6-months follow-up or focus on interventions for 8 to 10 year olds; most of the ineffective interventions have targeted this group. Furthermore, authors of these studies did not consider the impact of effective preventive interventions on the need to monitor and treat individual children or investigate whether specific messages in educational programs reduced or increased the risk. They did not explore whether overweight/obesity prevention programs contributed to childhood underweight (Zenzen & Kridli, 2009). Another shortfall of these studies was that they did not offer the development of theoretically based, reliable, and valid measurements of sedentary behavior and attitudinal antecedents of behavior that are appropriate for children as young as 2 years. Finally, they did not measure body weight to assess whether altering food acquisition behaviors influenced body weight (Eyles, Ni Mhurchu, Nghiem, & Blakely, 2012; Powell & Chaloupka, 2009).

Purpose of the Study

The purpose of this quantitative study was to examine the associations between diet, physical activity, the built environment and the mean BMI in adolescents aged 12 to 17 years living in South Los Angeles. I examined neighborhood insecurity from multiple

viewpoints: (a) physical security (perception of safety); (b) food insecurity (ate less than should because of money in past 12 months); and (c) availability of recreational facilities necessary for a healthy lifestyle. This study filled a gap in current research by studying neighborhood insecurity as a component of a child's built environment and its relationship to childhood obesity.

Research Questions and Hypotheses

RQ1: What is the association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI?

$H1_0$: There is no association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

$H1_a$: There is an association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

RQ2: What is the association between neighborhood food insecurity in South Los Angeles and adolescent's dietary intake and the mean BMI?

$H2_0$: There is no association between neighborhood food insecurity, adolescent's dietary intake and the mean BMI.

$H2_a$: There is an association between neighborhood food insecurity, adolescent's dietary intake and the mean BMI.

RQ3: What is the association between neighborhood recreational facilities in South Los Angeles and adolescent's physical activity and the mean BMI?

$H3_0$: There is no association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

$H3_a$: There is an association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

RQ4: What is the relationship between parents' education level, parents' income level and adolescent's physical activity and the mean BMI?

$H4_0$: There is no association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

$H4_a$: There is an association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

Theoretical Framework for the Study

The social ecological model has been used to identify many levels of influence on behavior, from individual, family, and social factors to institutional, community, built environment, and policy factors (Sallis, Floyd, Rodríguez, & Saelens, 2012). These diverse stimuli are systematized into five bi-directional systems: microsystems or intrapersonal, the mesosystem or interpersonal, exosystem or institutional/organizational, the macrosystem or community, and chronosystem or public policy (Ndiaye, Silk, Anderson, Horstman, Carpenter, Hurley, & Proulx, 2013). The social ecological model focuses on the impact of all these nested ecosystems and their reciprocal impacts. On the individual level, the child's weight is at the center of the model, because it functions as the central impact on child health (Davison & Birch, 2001). This is influenced directly by child features and issues such as age, gender, dietary patterns, and physical activity.

The family level includes parental support of child physical activity, child feeding practices, and family/child television viewing. Davison and Birch (2001) established that

family influence on children's feeding pattern occurs by the dissemination of food knowledge and health behavior from parent to child, parental modeling of feeding behavior, food-related control patterns, and parent/child interactions during meal times. For instance, parental work schedules directly influence child eating patterns (Davison & Birch, 2001). The community and societal influences impact school lunch programs, the availability of healthful foods in a family's community, and family leisure-time activity. Societal influences inform federal and provincial governments, including public policy (Gabriel, Doiron, Arias de Sanchez, & Wartman, 2010).

According to Egger and Swinburn (1997), the ecological obesity context (physical, economic, policy, and sociocultural) suggests that environmental influences may have a major impact on obesity-related health behaviors. The social ecological model is centered on modeled behavior that is determined by intrapersonal factors, interpersonal processes, and community/institutional influence. Together these nested systems or layers interplay and impact obesity behavior (Davison & Birch, 2001). Several subsystems within the ecological system are targeted to influence a considerable behavioral change (Whittemore, Melkus, & Grey, 2010). The ecological systems theory has been used to model a number of health behavioral changes including encouraging physical activity within schools (Langille & Rogers, 2010), encouraging the prevention of substance abuse (Connell, Gilreath, Aklin, & Brex, 2010), and preventing Type 2 diabetes (Whittemore et al., 2010). A number of researchers indicated that childhood obesity develops from interplay of multiple influences, which include family demographics and parental habits (Crawford et al., 2010; Davison & Birch, 2001).

Nature of the Study

Analysis of data in this study was based on a quantitative research design using secondary (confidential) data from the CHIS 2011-2012 (Appendix D). The data on African American adolescents 12 to 17 years of age was used. Variables used in this research study, such as safety of the neighborhood, self-reported gender, age, diet, nutrition and food environment, parental education attainment, and parental income, were previously found to influence how an individual develops skills, behaviors, values, and culture in adolescence and adulthood (Waters, Cross, & Runions, 2009). In this study, I examined whether there was a relationship between the built environment and the mean BMI of adolescents using 6 years of data (CHIS 2007-2013 data). The dependent variable was the mean BMI and the independent variables of interest were neighborhood safety, food environment, fast food outlets, physical activity, and park use.

Individual BMI was calculated using adolescents self-reported weight (kg) and height (m) (BMI = kg/m2) and plotted on a continuous scale to determine weight status. I used BMI as a reliable indicator of obesity for children and teens. This is consistent with CDC (2011a) guidelines and growth charts: adolescents with ≤ 5th percentile for BMI adjusted for age and gender were classified as *underweight*; adolescents within the >5th and ≤85th percentile for BMI adjusted for age and gender were classified as *normal weight*; adolescents within >85th and ≤95th percentile for BMI adjusted for age and gender were classified as *overweight*; and adolescents with ≥95th percentile for BMI adjusted for age and gender were classified as *obese*. The mean BMI was then calculated as the sums of adolescents BMI divided by total number of adolescents in the study. The

association between mean BMI and all independent variables was reviewed independently employing the regression, or *t* correlation coefficients, controlling for gender and age. The four questions provided a systematic testing between pairs of variables and then among variables. Examining this population-based dataset has helped me identify new correlations between variables used to describe overweight/obesity in children, their SES, and their environment.

Definition of Terms

The following terms have been defined for the purpose of this study:

Adolescents/ obese: Individuals ages 12 to 17 whose BMI (kg/m2) is equal or above the 95th percentile on gender and age specific CDC BMI guidelines (CHIS, 2013a; CDC, 2011a).

Affordability of food: The price of a particular food and the relative price of alternative or substitute foods (California Department of Food and Agriculture, 2012).

Age definition: Children are under age 12 and adolescents between the ages of 12 and 17.

Body mass index (BMI): BMI was calculated using adolescents self-reported weight (kg) and height (m) (BMI = kg/m2). Weight status is defined as: underweight, BMI<5th percentile; normal weight, BMI 5th percentile to ≤ 85th percentile; overweight BMI 85th to ≤ 95th percentile; and obese BMI > 95th percentile (CDC, 2011a; NIH,2012).

Cardiovascular disease (CVD): Generally refers to conditions that involve narrowed or blocked blood vessels (Shanthi, Pekka, & Norrving, 2011).

Fast food restaurants also known as *quick serve restaurants (QSRs)*: Chain restaurants that have two or more of the following features: expedited food service, takeout business, limited or no wait staff, and payment tendered prior to receiving food (Block, Scribner, & DeSalvo, 2004).

Fast food outlets: Places serving food such as one gets at McDonald's, KFC, Panda Express, or Taco Bell (CHIS, 2013a).

Food access: Having a variety of affordable, good quality, healthy food within one's community (California Department of Food and Agriculture, 2012).

Food deserts: Poor inner-city neighborhoods and rural communities where residents live far from the closest grocery store or supermarket. The USDA (as cited in Walker, Keane, & Burke, 2010) defined food deserts as both low-income areas and ones in which more than a third of the population (at the census tract level) lives over a mile from a grocery store/supermarket (10 miles for rural areas).

Food environment: A collection of physical, biological, and social factors that affect an individual or a group of individuals eating habits and patterns (Rosas et al., 2009; USDA, 2013).

Food insecurity: An individual ate less than he or she should because of money in past 12 months; limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire foods in a socially acceptable way or not having enough money to buy food or eat (CHIS, 2013a; Rosas et al., 2009; USDA, 2013).

Food security: Access by all individuals at all times to a sufficient amount of food for an active, healthy life (U.S. Department of Agriculture, 2013).

Mean body mass index (BMI): The sums of adolescents BMI divided by total number of adolescents in the study (CHIS, 2013a).

Neighborhood safety: This measure is a questionnaire to assess the respondents' perceptions about safety and crime in their neighborhoods (CHIS, 2013a).

Observed/raw data: The raw data are the unprocessed sample response data which are transmitted directly from the detector instrument (CHIS, 2013a).

Overweight: BMI of between 85% to ≤95 percentile, adjusted for age and gender, and calculated based on adolescents' height and weight and plotted on a continuous scale to determine weight status (CDC, 2011a).

Parental education: In this study parental education is used as a proxy for a child's SES; parental educational level: adult education attainment (CHIS, 2013a).

Parks: A piece of public land in or near a city that is kept free of houses and other buildings and can be used for pleasure and exercise (Godbey, 2009).

Parental income: Annual household income measured in interval from $5,000 to ≥$70,000 (CHIS, 2013a).

Prevalence of obesity: The total number of obesity cases in a given population at a specific time, expressed as a percentage of the population (CDC, 2014c).

Physical activity: Any bodily movement produced by skeletal muscles that require energy expenditure (WHO, n.d.b).

Physical insecurity: Perception of neighborhood safety (CHIS, 2013a).

Proxy: A term used to describe a person providing some or all of the information for another person because of age, language, or disability during the survey (CHIS, 2013a).

Recreational facilities: Broadly defined as park(s), where any leisure time activity is conducted outdoors (CHIS, 2013a).

Socioeconomic status (SES): A view that embraces some measures of access to social and economic resources (American Psychological Association, 2007). SES can be defined broadly as one's access to financial, social, cultural, and human capital resources.

Weighted/weighting data: Weighting is a technique to adjust based on the Census counts to account for over- and under-represented groups (CHIS, 2013a).

Assumptions

This study and analysis was guided by the following assumptions. First, I assumed that all parents and children would truthfully self-identify with the correct ethnic group, irrespective of individual behaviors. Second, it was assumed that these individuals would understand survey questionnaires and give unbiased responses, without coercion from the field interviewers. Where adult family members provided information on children, it was assumed that these adults would know how the children would respond to the questions. Third, it was assumed that the CHIS would make available valid measurements on participant weight status in BMI. Fourth, it was assumed that random cross-sectional outcomes, gathered under stringent protocols, would offer a generalizable outcome if the weighting assumptions were accurate. Fifth, any weight and height

changes from pre adolescence to late adolescences were assumed to be because of puberty and would not influence the sample.

Scope and Delimitations

The delimitations were based on the review of the CHIS analytical guides:

- The study was built from the secondary data set of the continuous CHIS 2007-2013 data collection from June 15, 2007 to January 14, 2013, which included about 3,000 adolescents and 9,000 children each year (age 12 and under) by adult proxy.
- The data set selected for this study included child height, weight status, early childhood factors, food security, and built environment (bullying, personal safety, social cohesion, and physical environment).
- CHIS 2007-2013 made up for nonresponses through weighted adjustments, which meant that when a non response occurred the "mean" response for that variable was then used for that subject for that variable.
- The constraints of this study were the information available in the CHIS public and private access data files on African American adolescents aged 12 to 17 years for the years 2007-2013.

Limitations

There were limitations of this study that need to be noted. First, the study was an analysis of a secondary/archival data that were collected earlier by other researchers to specifically meet collectors study needs. Second, CHIS data include self- and proxy reports, thus escalating data error and setting limit on data interpretation and deductions.

Third, the weight or obesity status may have been underestimated due to self-report height and weight. Fourth, it is not possible to infer causal relationships from these cross-sectional data. Fifth, this study used BMI to define weight status; please note that BMI is used as a screening tool for population surveillance and not as a diagnostic tool for health status (Longjohn, Sheon, Card-Higginson, Nader, & Mason, 2010). Finally, the study results may not apply to other geographic regions or populations because data are from a geographically limited California survey sample.

Significance

In this study, I went beyond the observation that physical inactivity is a precipitating factor for childhood obesity (Vos & Welsh, 2010) to identify potential influences, such as inactivity, with a view to addressing the problem. I expanded the perception of neighborhood insecurity to include food insecurity, where food access and the availability of healthy food choices are limited. Food security is important because children are entitled to access of optimal nutritional choices necessary for their healthy development (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2010). According to Casey et al. (2005), food insecurity among children is connected with poorer physical quality of life, which may preclude them from school and social interaction with peers. Public health practitioners, parents, and policymakers alike are troubled regarding high and growing rates of overweight and obesity amongst U.S. children (Sallis & Glanz, 2009).

The battle against the escalating problem of childhood obesity in the United States needs to be intensified, as the health of the population is closely tied to the health of its

children, and more so as overweight and childhood obesity are major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases, and cancer. Once considered a problem only in high income countries, overweight and childhood obesity are now increasingly ascendant in low- and middle-income countries, particularly in urban settings (WHO, n.d.a).

To make a positive change in the lives of obese individuals is consistent with the Walden University goal of social change. This study will effect positive social change by highlighting the health risk of obesity among minority children in South Los Angeles, with a view to drawing attention to the disproportionate effect of this universal health problem on them. It is my hope that by drawing attention to the health risks posed to these children by the obesity epidemic, stakeholders will take the necessary steps to address this situation, with the goal of improving the life situations of minority children so that they could live healthier and more productive lives. The outcomes of this study will inform policy makers and public health professionals about these factors.

One of the best strategies for tackling the disease of obesity is to improve the diet and physical activity habits of entire families (Sallis & Glanz, 2009). Preventing and treating childhood obesity will help protect the health of a child now and in the future. Results from various research projects can positively affect some policies that would impact children's futures.

Summary

This study consists of five chapters. Chapter 1 presented the study and detailed the background, study problem, research questions and hypotheses, significance,

assumptions and limitations, and operationally defined unique terms and designations. The CHIS data were presented as a comprehensive source of data for the selected variables shown to be associated with childhood obesity. The goal of this study was to depict the consequences of the childhood obesity epidemic and investigate the physical, environmental, and societal influences that put children at risk of becoming obese. The outcomes of this study will provide policy makers and public health professionals with information about these factors.

Chapter 2 offers an in-depth description of the problem and the purpose of the study, synopsis of the current literature, literature search strategy, theoretical foundation, review of literature related to key variables, and summary and conclusions. Chapter 3 presents a complete description of the study design and statistical tests. Chapter 4 includes a discussion on study analysis of all variables chosen from the CHIS 2007-2013 dataset for this group, and Chapter 5 provides the interpretation of study outcomes, recommendations for further studies and implications for social change.

Chapter 2: Literature Review

Introduction

Childhood and adolescent overweight and obesity have been increasing progressively for the last three decades (Ogden et al., 2012). Childhood obesity is one of the greatest public health challenges confronting the United States and many other industrialized countries. This has earned the full attention of health care professionals, health policy specialists, children's activists, and parents (WHTFCO, 2010). The aforementioned groups are apprehensive that overweight and obese children will turn into overweight and obese adults destined to suffer from many medical complications and health care costs associated with obesity (WHTFCO, 2010). According to the CDC (as cited in Ogden et al, 2012), 1 in 8 preschoolers in the United States are obese. For school age children and adolescents, significant discrepancies have been noted in obesity occurrence by race/ethnicity, and these vary by sex with rates lower among girls than boys (CDC, 2012b). In 2009-2010 for boys (aged 2 through 19 years), rates were 17.5% among non-Hispanic White boys; 22.6% among non-Hispanic Black boys; and 28.9% among Mexican American boys (Fryar et al., 2012; Ogden et al., 2012). For girls of the same age as the boys, rates were 29.2% among non-Hispanic White girls; 36.1 % among non-Hispanic Black girls; and 37.0 % among Hispanic girls (Ogden et al., 2014). African American adolescent girls were more likely to be obese than other adolescent girls and had higher rates of obesity than their male counterparts (Fryar et al., 2012). Overall, there currently has been a higher incidence of obesity among young Hispanics and African American children than young Whites (Ogden et al., 2012).

Built environments that include all man-made structures have been linked to the development of childhood overweight and obesity (WHTFCO, 2010). The built environment also includes the degree of access to supermarkets or healthy foods, places to exercise, and safety in the neighborhood. As a result, prevention of childhood obesity is one of the U.S. government's top priorities, as demonstrated by such initiatives as the Let's Move and the Healthy, Healthy Eating, Active Living–Community Health Initiative or HEAL-CHI, Hunger Free Kids Act of 2010 (Cheadle et al., 2010; WHTFCO, 2010; Wojcicki & Heyman, 2010). Therefore, there is still a need to examine how the environment may influence childhood obesity and how policy changes at the community and local levels might aid in its prevention.

The purpose of this study was to examine the interaction of diet, physical activity, and the built environment and the mean BMI of African American adolescents ages 12 to 17 years living in South Los Angeles. I examined neighborhood insecurity from multiple viewpoints: (a) physical security (safety); (b) food insecurity (absence of healthy food choices/prevalence of fast food outlets; and (c) availability of recreational facilities necessary for a healthy lifestyle. This study therefore filled a gap in current research by studying neighborhood insecurity as a component of a child's built environment and its relationship to childhood obesity.

Chapter 2 offers an in-depth description of the following topics: the problem and the purpose of the study, synopsis of the current literature, literature search strategy, theoretical foundation, review of literature related to key variables, and summary and conclusions. In this review, I explored existing literature on the impact of the built

environment on childhood overweight and obesity (Galvez et al., 2010; Ramirez, Gallion, Despres, & Adeigbe, 2013; Sarkar, Gallacher, & Webster, 2011; Singh et al., 2010). I also examined studies about obesity among ethnic minority children (Anderson et al., 2011; Chen, & Wang, 2012; Dixon, Peña, & Taveras, 2012; Melius, 2013; Rendall, Weden, Fernandes, & Vaynman, 2012). The review also highlights some studies that investigated the impact of both physical activity and food environments on childhood overweight and obesity (Galvez et al., 2010; Haddock, Siegel, & Wilkin, 2010; Maynard, Baker, Rawlins, Anderson, & Harding, 2009; Sallis & Glanz, 2009; Wright, 2011).

Literature Search Strategy

The review of literature on childhood obesity started with Internet searches for related peer-reviewed journals and for reliable professional sites, including those of national organizations such as the WHO, CDC, and the American Public Health Association. The search involved multiple databases including (a) pertinent textbooks; (b) electronic bibliographic databases, explicitly CINAHL, Medline, Academic Search Premier, JSTOR, Science Direct, Wiley Interscience Journals, Science, and Nature; and (c) reference lists of articles published in relevant journals. English language articles and books published between 2009 and 2013 were included in the study. Titles and abstracts were examined for relevance and inclusion/exclusion criteria. Full text was obtained for relevant articles meeting the inclusion criteria. Additional literature was found through hand searches of the bibliographies of articles captured through the initial electronic searches. All findings were reported, including those that were contradictory.

Articles written in languages other than English, research carried out outside of the United States, and narrative reviews and editorials were excluded from this review. Also excluded were (a) articles that focused largely on socioeconomic features of neighborhood problems, social capital, social cohesion, geographic area, town size, or total city; (b) population of senior citizens owing to functional restrictions that could limit their physical activity; (c) instrument validation researches; and (d) behavioral interferences lacking an environmental component such as fitness education classes, walking programs, and so forth. In order to conclude the descriptive phase of this study, the first series of information was summarized from all studies maintained after complete article selection. This search incorporated the authors, gender, age or grade of subjects, year of publication, and outcomes measured.

Given the substantial overlay between the environmental characteristics assessed in the current literature, a choice was made to use a literature review matrix to select peer-reviewed journals. For example, an assessment of proximity to public transit was charted onto *choices transportation type*; articles that reviewed sidewalk accessibility were recorded onto *walkable neighborhoods* and *distance to parks*. In cases where a study's independent variable was an index that merged various facets of the built environment into one score and residential density, the index was broken up into parts, and charted onto the appropriate principles; in these cases, all components had the same outcome data. Data were then summarized from this sub sample of journals. This information included the same material from the first deduction, race/ethnicity breakdown, sample size, study type, measurement techniques for the environment,

results, covariates, and outcomes for the correlation of smart growth values with physical activity and obesity, broken down by smart growth values.

Studies involving adults were included in this project only if they contributed important insight or references on increasing physical activity among children. The search was based on terms such as *overweight, childhood obesity, food insecurity,* and *neighborhood safety*. The key words were linked to 24 full text, peer-reviewed journals. The resulting key words or phrases were utilized for the electronic databases: *childhood obesity, NHANES, early childhood, food security, food insecurity, body mass index (BMI), overweight and obesity in children; African American, Black, minorities, built environment, physical activity, fast food restaurants, grocery markets, fast food outlets and childhood obesity; recreational facilities and physical activity*. Several hundred references were found including textbooks or reports and articles. From the findings, 129 citations were selected with textbooks (n = 7), and journals (n = 200).

Theoretical Foundation

The epidemic of overweight and obesity in children is complex as multiple factors contribute to this problem. It is important to understand the magnitude of this problem, how and what these children eat, as well as how the environment influences a child's weight status and food consumption. Unlike adults, children have no control on where they live, learn, and play (Odum, McKyer, & Tisone, 2013). Obesity is a chronic disease and its control and prevention by individuals require a lifelong commitment to an active lifestyle and healthy eating habits. The definitive objective is to prevent obesity in children and to minimize adult obesity.

Deterrence of childhood obesity necessitates a comprehension of the issues that influence its etiology. The traditional Bronfenbrenner's ecological systems theory was selected as the foundation for the present research. Ecological systems theory was retitled bioecological systems theory to highlight the fact that a child's individual biology is the main environment stimulating her development. Proposed by Bronfenbrenner in 1979, the human ecological theory is important as it provides a foundation for and reinforces a correlation between the research question and various sections of the study. Human ecological theory allows for modification of research questions contained in the proposal and provides a basis for explaining study results. Urie Bronfenbrenner (1917-2005) developed the ecological systems theory to account for how influences in a child's environment impact a child's growth and development, and how an adolescent's development is influenced by a shared interaction of the individual with layers of associations that form the encircling environment. Bronfenbrenner (1979) suggested that each child has his or her own distinctive characteristics, for instance genetics, age, sex and individual assets. These sets of characteristics influence a child's interactions within the environment.

In the ecological model of human development, Bronfenbrenner proposes that every child is at the center of a ring of circles set in an all-encompassing system of time, which influences and constantly changes all the contexts in which the child finds itself. The ecological systems theory covers the child's perception of self, immediate household, school, neighborhood and contextual social factors into a model to rationalize the development of human individualities (Darling, 2007; Galvez et al., 2010). The

connections between individuals, families, and communities broaden past social capital into the realm of ecological systems theory. Darling (2007) described ecological systems theory as being made up of a number of system levels represented by a set of concentric circles. Each level plays a multipart role in the adolescent's development. The connections between these levels and the adolescent influence the development and growth of the individual (Bronfenbrenner, 1979, p. 21). Bronfenbrenner (1979) claimed that the inquiry regarding human development mandates the investigation of the interaction between the individual and the built environments. Bronfenbrenner (1979, p. 21) went on to label the ecology of human development as the systematic investigation of the progressive and mutual interrelationship between an active, growing individual and the changing properties of the setting in which the developing individual lives as this process is influenced by interactions between these settings and by the bigger contexts in which the settings are encircled.

Instead of a linear, cause and effect theoretical framework, the ecological systems theory emphasizes on the dynamic and evolving interactions between individuals and ecological environments where small changes may lead to substantial and unpredictable developments (Bronfenbrenner, 1979). The concentric circles begin with the children at play in the center and display the influences on the children and their play from the viewpoint of the play setting. This model also acknowledges the flow of influences within and between every circle. The play circle at the same time highlights the role of the playworker in offering a play setting as well as an environment where these children

are expected to play; each of the outer circles should strengthen rather than constrain children's play.

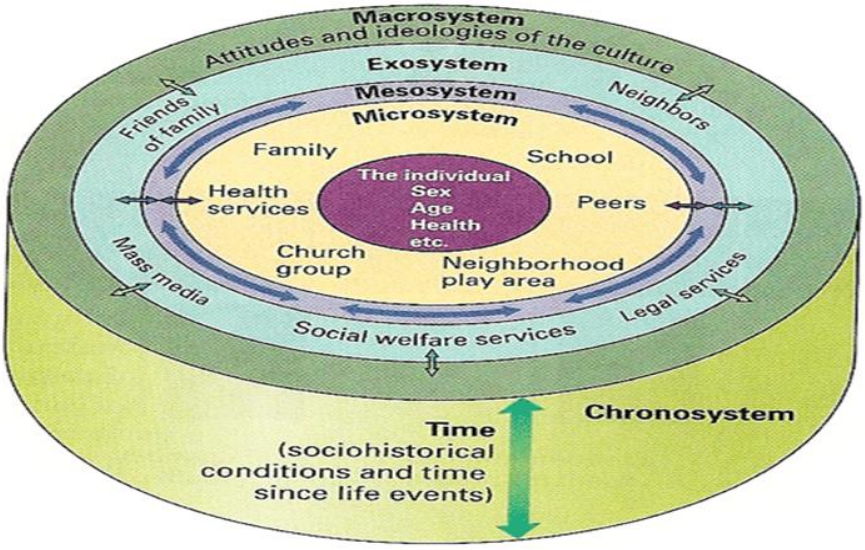

Figure 1. Bronfenbrenner's ecological theory of development explaining the set of nested environmental influences on a child. Source: Bronfenbrenner, 1979.

An understanding of each level is essential to further investigate the question of effectual behavior modification. Childhood obesity, according to EST, develops from five distinct levels of bi directional systems interactions: (a) microsystem, (b) mesosystem, (c) exosystem, (d) macrosystem, and (e) chronosystem. A compressive approach to understanding human ecosystem involves demographic pattern, economic system, power hierarchy, land use and management and designed environment. Together, the above function as a guide for analysis related to the five environmental core settings (Pickett et al., 1997).

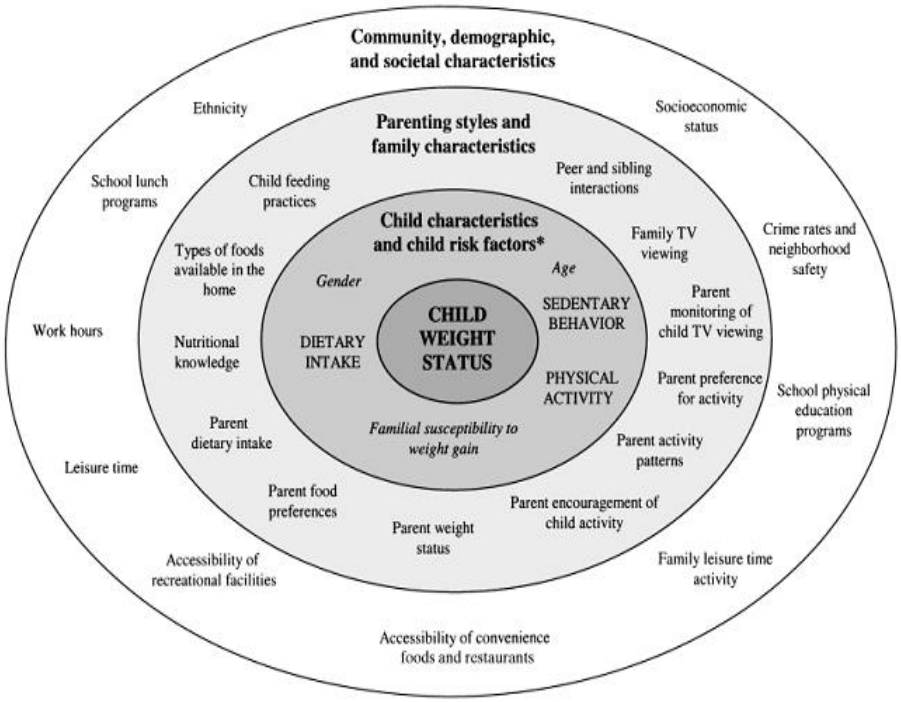

Figure 2. Ecological model as it relates to childhood obesity. Source: Davison and Birch 2001.

Microsystem

The microsystem is the innermost circle comprising of interactions with family, siblings, peer groups, religious group, school, health services and neighborhood play area (see figure 1). These factors have an immediate influence on childhood development. The microsystem represents a model of roles, activities, and interactive relations experienced by the developing child in a known setting with physical and material features (Bronfenbrenner, 1979). This system also includes biological features such as family tendency to weight gain, age, gender, and ethnicity, in addition to vital figures such as parents, siblings, classmates, and teachers. In a microsystem, children model their growth through a pattern of roles, activities, and relations that import meaning to them and

develop their behaviors in settings that involve face-to-face interactions (Bronfenbrenner, 1979).

Diet and physical activity are directly influenced in the microsystem. This layer provides a direct face-to-face interface between parents and child or teacher and student. In the school setting, the student is able to interact with other students thereby facilitating learning (Davison & Birch, 2001). In this layer, the proximal processes function to create and maintain development, but are influenced by the content and structure of the microsystem. Interactions inside the microsystem are interpersonal associations that have two-directional influences. Thus children and parents, or teachers and students can influence each other (Davison & Birch, 2001). Galvez et al. (2010) describe family factors in this level regarding childhood obesity to include parental physical activity, parental behavior change processes, parenting style, family dietary behaviors, and parental readiness to partake in physical activities. Davison and Birch (2001) infer that the family environment is the strongest influence in a child's early obesity development. An example of this might be parental support pertaining to dietary intake or physical activity for the child. Again, parents have great influence over their children's eating habits, both in obvious approaches as in buying food for the family and permitting their children to eat the food, and in less obvious approaches, as in modeling behavior and parenting style. The modeling behavior in addition influences child TV viewing. According to Bleakley, Jordan and Hennessy (2013), parents' TV viewing patterns allied with child TV viewing patterns. This is bothersome as a lot of parents do not realize the connection between increased TV viewing and childhood obesity (Jordan et al., 2011).

Mesosystem

Next to microsystem, is the concentric circle of mesosystem which comprises the associations and processes taking place between two or more layers delimiting the developing individual (Bronfenbrenner, 1979). The microsystem and mesosystem are interdependent on each other. In the mesosystem, family experiences are directly linked to experiences outside the microsystem. For instance, the interactions embrace influences such as access to school lunch programs and healthy food in the child's home (Galvez et al., 2010). Every aspect of this system shows the context around the child's parents, teachers, neighborhood, and the child's entire environment. Romero et al. (2001) postulated that children's awareness of neighborhood insecurity would be connected with increased BMI as a result of less physical activity and more TV viewing time and that unsafe neighborhoods would affect the choices of leisure time activity (see Figure 2). The mesosystem reflects the interaction between home and school, or other sections of the microsystem. Incorporating built environment in this layer allows further understanding of health influences. Training from school could be turned into real life decisions through food choices made at home. The family is the most important and influential component of the mesosystem. The effects of the family cover all facets of the child's development: health, food, language, security, and ideas are all cultivated through the input and deeds associated with feedback within the family. An example of the mesosystem is organizations such as schools that endorse policies that can affect dietary habits, such as disallowing soda pop vending machines in schools.

Exosystem

The next circle embodies the exosystem. Bronfenbrenner depicts the exosystem as numerous community dynamics that can influence children as they grow (Noffsinger et al., 2012). This layer reflects larger social systems that are not directly in contact with the child's growth even though the child feels the positive or adverse force involved with the interactions. For example, if parents receive a pay raise at work due to a promotion, this may have a positive influence on the child as parents will be able to buy groceries or other physical needs. On the other hand, a negative influence will be a scenario where the parents are not able to meet their obligations due to a layoff. The exosystem embraces both the mesosystem and the microsystem (Bronfenbrenner, 1979). Also illustrating the exosystem are neighborhood advocacy groups which may take proactive steps to secure better playground safety (Paquette & Ryan, 2001). This system consists of the social settings that extend beyond the child's direct involvement. The exosystem host the built environment and influences childhood obesity via the accessibility of spare time activities and neighborhood safety (Galvex et al., 2010). The exosystem also embraces family friends, family networks, extended family, neighbors, community, mass media, workplaces, social welfare services, health systems, legal services, neighborhood organizations and government entities.

Macrosystem

The macrosystem is represented by the outermost circle and the influence of cultural factors such as ethnicity, SES, accessibility of recreational facilities, convenience stores and restaurants, crime rates and neighborhood safety, leisure time and cultural

practices that make available opportunities for children's positive development under stress (McCubbin & McCubbin, 2005). The macrosystem also involves customs, laws and cultural values. According to Davison & Birch (2001), this system has a distant impact on the development of obesity because of its distance from the nuclei of the ecosystem. The macrosystem has a cascading influence on the interactions of all other strata. Bronfenbrenner (1979) contended that this system influences what, how, when and where we carry out our relations. For example, ease of access to foods, public programs that provide food similar to the Women, Infants, and Children (WIC) and other social/political systems impact the health and dietary intake of youth. This layer helps us to keep the many threads of our lives together.

Chronosystem

The chronosystem incorporates the perception of time, embracing the influence of historical life events or chronological aging as it relates to a child's environments (Bronfenbrenner, 1979; Bronfenbrenner, 1989). This layer consists of both external factors, like the timing of a parent's death, or internal, like the biological changes that occur with the aging of a child. Other dynamics in this layer that may influence childhood obesity include age, ethnicity, and culture. The chronosystem allows families to act on different stressors within the societal boundaries as they exist in their lives. This layer also assimilates any changes due to time.

Ecological Theory: Literature-Based Analysis

Children's weight status is best understood in light of the contextual dynamics that influence its etiology. Researchers have established a broad range of genetic and

environmental influences that are linked with obesity in children (Spruijt-Metz, 2011). The ecological theory supports the conjoining of individual and environmental processes, but does not address the question of how the different levels impact each other and whether that makes a difference in the overall result. The theory does not account for the optimal mix and sequence of intervention approaches to generate continued population-wide impact. This is essential given new indication that adult weight gain and loss do not occur in a linear trajectory (Hall et al., 2011). This theory also shows that different mixtures and/ or successions of interventions of differing modalities may be crucial in bringing about continued population effect beyond the age span affected by early life-cycle approaches. This perception, initially known as ecological systems theory (Bronfenbrenner, 1986), has been retitled bio-ecological systems theory to highlight the function of biology in human behavior (Ryan, 2001). To this effect, parents provide both genetic and environmental factors which influence the development of children's eating behaviors and weight crisis through the earliest years of life.

The ecological theory has been proposed over the last decade as a useful tool for understanding obesity. This study will show how it has been applied in different ways. Lytle (2009) depicted the causes of childhood obesity in a longitudinal cohort study utilizing a social ecological framework. Guided by the ecological conceptual model which was used to assess personal, contextual influences as well as home, psychosocial factors, school and neighborhood environment, Lytle posited that BMI percentile and body composition are unswervingly influenced by biological, dietary and physical activity dynamics; at the same time, the biological dynamics are directly affected by a

child's weight status. Lytle (2009) concluded that there is an association between childhood obesity and its many influences.

Davison and Birch (2001) applied this theory differently. They identified the interplay between family culture and the environment within which the family operates. The authors utilized an ecological model to conceptualize childhood obesity, and showed mounting evidence that treatment of childhood obesity is successful with family and parent involvement. They concluded that it is imperative to understand the context of childhood obesity to uncover more successful measures to avert it before it begins to produce relatively irreparable health problems.

Gentile et al. (2009) verified this proposition by investigating the Switch program, which focused on increasing children's fruit and vegetable consumption, increasing physical activity, and decreasing children's screen time at the family and school levels. To investigate the proximate and continued results of the Switch program, 1,323 children from 10 schools in two states and their parents were enrolled and randomly assigned to either treatment or control group. Assessments and measurements were made, and the outcomes showed that the Switch program produced a small-to-modest treatment influences for promoting eating of fruit and vegetable and reducing screen time. This investigation showed promise for success in reducing childhood obesity.

Williams (2011) acknowledged that minority and low income families have the highest rates of overweight and obesity. The author assessed the social ecological vision of childhood obesity and identified factors from the supervening physical, social and cultural environments (including the family) which exert an influence on the weight

status of children. He concluded that theoretically driven methods based on experience will increase the probability of success of population based obesity prevention and control interventions.

Comparable outcomes have been described by other researchers. Franzini et al. (2009) assessed the correlation between the weight status of fifth grade students' and their physical and social environment. In this study, data was accumulated on 650 fifth grade pupils and one parent for a period of four months. The authors conducted an efficient neighborhood surveillance to measure neighborhood physical features; children's sociodemographic factors were controlled. After analysis Franzini et al. (2009) observed that a positive social environment was positively related with many measures of physical activity and that physical activity was adversely allied with obesity in these children. The authors also observed that the physical environment was not significantly allied with the children's physical activity. The authors concluded that both neighborhood social factors and the physical environment ought to be reflected on in the interventions and development of health policy to decrease childhood obesity.

Sanchez-Vaznaugh et al. (2012) carried out a cross sectional study to determine whether school district level compliance with California physical education policies was connected with physical fitness among 5th grade public school students in California. According to the authors, only 50% of the school districts were in compliance with the state's physical education mandates. This figure shows that 82% of the 91,236 students go to schools in noncompliant school districts. The authors concluded that orders for

physical education in schools may positively enhance children's fitness levels, but compliance depends on the success of the devices used.

In this longitudinal study, Crawford et al. (2010) conducted an assessment of the influences of home and neighborhood environments on 5 year modifications in physical activity and BMI *z* score among children aged 10 to 12 years. The authors collected data at three time points. For this study, 301 children were recruited and their height and weight taken; their physical activity was evaluated by means of accelerometers. Using Geographic Information Systems, Crawford et al. (2010) assessed parents' perception of home and neighborhood environments. After analysis, the authors found that physical activity fell while BMI rose over the 5 years of the investigation as these children became teenagers. They also found that the home environment is more important than the neighborhood environment in affecting children's physical activity and BMI in 5 years.

Rationale for Choosing Ecological Theory

Childhood obesity results from an interaction of numerous influences which include family and the environment. The ecological systems theory best explains how influences in a child and the child's environment shape the child's growth and development. To understand the complexity of obesity among children, it is important to understand how a child's family influences the child's weight-regulating behaviors (Davison & Birch, 2001). The ecological theory was initially branded as ecological systems theory (Bronfenbrenner, 1986), but was later changed to bioecological systems theory (BST) to draw attention to the function of biology in human behavior (Ryan, 2001). This theory proposes that to understand individuals' health, one has to investigate

their ecological function which includes the family, school, religion, the community, society, and the cultural influences. These distinctive influences are structured into five layers of bi-directional systems (microsystems, mesosystem, exosystem, macrosystem and chronosystem) which interplay and impact the complexity that encourages obesity (Davison & Birch, 2001). Child weight status is thus influenced by child features and risk factors such as dietary patterns and physical inactivity. Davison and Birch (2001) for instance established that family influence on children's diet arises by the imparting of nutritional knowledge affecting behaviors from parent to child, parental modeling of nutritional behavior, parent-child interfaces through meal times, and food-related control models.

The ecological theory focuses on the importance and effects of a number of nested contexts in which children develop. This theory provides an effective foundation for the present study. The research questions are concerned with the relationship between an obese child and his environment. Bronfenbrenner (1979) contended that the study of human development necessitates an assessment of the interaction between the human being and his dynamic environments. The most significant surroundings for a child being his or her family, the child spends most of his or her time with it as it has the most immediate and emotional influence on the child. Another important setting in a child's life is the extended family, early care, day care centers and schools, health care services, places of worship, neighborhoods, libraries and Community Park. Child development takes place through complex and progressive processes of interface among a child and persons in his or her immediate environment. To be successful, the interfaces necessitate

a bi-directional communication over continued periods of time (Bronfenbrenner, 1989, p. 996). For successful interface, the child is at the center of the model and the model recognizes that a child influences as well as it is influenced by the surroundings in which he or she spends time.

According to Bronfenbrenner (1989), a child's weight status is ascertained by the child's experiences in these settings. The amount and quality of the influences between the child and family or school have important implications for the child's development. According to the ecological theory, childhood obesity is allied with risk factors at individual, familial, and societal levels. Consistent with the view of Bronfenbrenner and Davison and Birch, children's dietary intake and their physical activity can be grouped into microsystems. However, the levels of interaction between different layers overlap. The mesosystem layer consists of nutritional knowledge, parent's physical activity patterns and support, sibling interactions, parenting styles, parent's dietary habits and physical activity. The next layer which is the exosystem comprises school lunch programs, SES, accessibility of restaurants and convenience foods.

Literature Review Related to Key Variables

Literature review for this study largely was centered on childhood obesity, its prevalence within the United States and around the world, as well as the etiology and outcomes of children's health. Detailed attention was given to studies presenting data on the link between childhood obesity and the built environment. In addition, the literature examined variables which influence health outcomes for children. Many of the studies identified common influences which may be connected to the continual increase of

children's weight and related co-morbidities, including home and school environments, region of residence, race and ethnic culture.

Organization of the Review

The framework of this review was systematized utilizing the variables in the study questions enumerated in Chapter 1. The variables of interest are: minorities, especially African Americans, neighborhood physical security (perception of safety), children's physical activity, neighborhood food insecurity (ate less than should because of money in past 12 months), neighborhood recreational facilities (parks), parents' educational level, and parents' income level. In the methods and analysis section, gender was limited to demographic descriptions. This study covered six independent variables and one dependent variable, with the literature review including one or more of these variables often mixed with other variables that were either not part of the study or not available in the database.

Social and Built Environmental Factors Influencing Childhood Obesity

The ''built environment'' can be referred to as many types of settings that may or not hinge on human activity. Physical activity levels of childhood may be influenced by environmental structures that encourage or discourage physical activity, for example, walkability of the environment, access to recreational facilities and neighborhood crime rates (Ferreira et al., 2007). Other factors include population density, availability of roads, housing, walkways, parks, shops, transportation networks, and public spaces. The school environment, which may or may not have access to healthy foods and competently led physical activity classes, also plays an important role in childhood and adolescent

obesity (Story, Nanney, & Schwartz, 2009). In their review, Dunton et al. (2009) observed that availability of a school play space, proximity to supermarkets, road safety, and lower population density are connected to lower obesity rates in children. In adolescents, the number of available recreational facilities appears to be the only influence that has been clearly connected to obesity (Spruijt-Metz et al., 2011).

Existing studies of the etiologies of childhood obesity emphasize the individual-level influences and assess the impact of how health on socioeconomic features and household-level settings, such as gender, race/ethnicity, age, household income, and parental education (Diez-Roux & Mair, 2010; Singh et al., 2010). The impact of the built environment has also received some attention. Existing literature on the built environment highlights the importance of environs and community-level influences as rationalizations of dietary choices, physical activity and health outcomes including obesity (D'Addesa et al., 2010). Based on scientific evidence, researchers determined that characteristics of the built environment impact an array of behaviors and shape overall health (D'Addesa et al., 2010). Aspects of the food environment explored in the literature include proximity, location and concentration of fast-food restaurants (Dunn, 2010; Currie et al., 2010), supermarkets (Bodor, Rice, Farley, Swalm, & Rose, 2010; Courtemanche & Cardin, 2011), non-fast food restaurants (Anderson & Matsa, 2011), and farmers' markets (Jilcott, Keyserling, Crawford, McGuirt, & Ammerman, 2011; Salois, 2012). The degree to which obesity is linked with the built environment has an effect on the efficacious type of interventions at the community level. Much of the present investigation focuses solely on grown-ups (Feng et al., 2010), with the result that

the association of the built environment on child health is not clear. Nevertheless, some reviews deduce that a child's environment influences obesity.

Children's Physical Activity Variables

The WHO (n.d.b) defined physical activity "as any bodily movement produced by skeletal muscles that require energy expenditure" (p. 1). Exercise is a subgroup of physical activity that is structured, planned, repetitive, and focused for the purpose of maintenance or improvement of one or more elements of physical fitness is the aim (WHO, n.d.b). Physical activity should not to be confused with exercise, but most times, both phrases are interchangeable. Physical activity involves exercise in addition to other activities which include bodily movement, performed as part of playing, house chore, active transportation, working and recreational leisure interest (WHO, n.d.b). The U.S. Department of Health and Human Services (2012) recommends that children and adolescents should exercise or perform 60 minutes or more of physical activity every day. The significance of physical activity as a basis for good health has been well established in public health and medical literature. Yet a large number of Americans live sedentary lifestyles. A number of variables lie behind an individual's choice to exercise, walk, or cycle. This review examines individual environmental variables e.g. the safety of neighborhood surroundings, and how these affect physical activities.

According to Woodcock, Franco, Orsini, and Roberts (2011) physical inactivity is the 4th leading risk factor for chronic diseases and early death. Inactive persons have a higher incidence of death from heart disease, stroke and cancer (Woodcock et al., 2011). Over the past decade researchers have advanced the knowledge of the physical

environmental features that are connected with physical activity behaviors, dietary and body weight status. Some researchers have found that living in a neighborhood with easy access of recreational places, walkability, and pleasing esthetics is linked with more physical activity and lower body weight status (Black & Macinko, 2010; Coogan et al., 2009; Duncan et al., 2010; Gomez et al., 2010; Kondo et al., 2009; Rodrıguez et al., 2009).

Existing literature from urban planning, transportation, public health, and leisure studies (Sallis, Adams, & Ding, 2011; Sallis & Glanz, 2009) has assessed the link between the built environment and physical activity. Regrettably, these links are less understood among young people than among adults as reflected by fewer published studies with a focus on children (Davison & Lawson, 2006; de Vet et al., 2011). Studies conducted over the past decade have shed some light on the connection between physical environmental features and physical activity behaviors, dietary and body weight status. Some researchers have found that living in a neighborhood with recreational space, walk paths and pleasing esthetics is linked with more physical activity and lower body weight status (Black & Macinko, 2010; Coogan et al., 2009; Duncan et al., 2010; Gomez et al., 2010; Kondo et al., 2009; Rodrıguez et al., 2009).

A number of other features have been shown to have an adverse influence on children's activity levels. Fears of litigation have added to the decline of the play value observed in many public and private playgrounds (Jarret & Waite-Stupiansky, 2009). Parents' increased anxieties about the safety of their neighborhood have led to a reduction in children's physical activities, notably with respect to outdoor access

(Sutterby, 2009). Television reporting of child abductions and kidnapping has made parents aware of the conceivable drawbacks for children playing alone outdoor. The result of these fears is that children's physical activities have reduced, with a resulting negative impact on their weight and healthy. According to Sallis and Glanz (2009), tenants of walkable neighborhoods who have access to recreational facilities are less likely to be overweight or obese and more likely to be physically active. Diminished physical activity has been linked with childhood obesity. Physical activity influences children's weight status by increasing energy expenditure and enhancing children's health outcomes. For example, low physical activity in children may be related to a higher risk of developing cardiovascular disease (Ruiz & Ortega, 2009). Minority children are at an escalated risk of overweight and obesity compared with White children. Until recent years, studies had focused mainly on the nutritional underpinning of childhood obesity, but nowadays attention is given to Americans' low levels of physical activity. All children from various backgrounds are consuming more calories and participating in less activity, leading to escalated rates of childhood obesity (Vernarelli, Mitchell, Hartman, & Rolls, 2011).

With a view to providing an insight for developing interventions to prevent or reduce childhood overweight, Wong and Leatherdale (2009) collected data via a cross-sectional investigation of 25,060 school children grades 9 through 12 from 76 secondary schools in Ontario, Canada. The authors examined the data using a sex-specific logistic regression analysis program to investigate how BMI, social influences, smoking behavior and team sports participation were associated with being (a) reduced activity-increased

inactivity, (b) low active-low inactive, and c) high active-high inactive (Wong & Leatherdale, 2009). The authors studied 4 subpopulations of youth with a focus on physical activity and sedentary behavior patterns. They found that the most prevalent of these groups was made up of boys and girls who were both highly active and highly sedentary. This finding suggests that being highly sedentary and being physically active are not mutually exclusive. The authors expressed the view that in order to understand the factors associated with overweight, and in developing effective initiatives for obesity prevention among youth, it is important to consider levels of both physical activity and sedentary behavior. More effective interventions would thus require an increase in physical activity and a reduction in sedentary behavior. The authors concluded that boys and girls with decreased physical activity have a tendency to be overweight compared to boys and girls with reduced inactivity and increased activity. The mean BMI among boys was 22.0 and 21.3 among girls, 13.0% of 12,806 boys were overweight and 13.3% of 12,254 girls were overweight (Wong & Leatherdale, 2009).

In contrast, Franzini et al. (2009) revealed that the physical environment was not substantially associated with physical activity. The authors examined the PA and obesity of fifth-grade schoolchildren in relation to their physical and social neighborhood environments. They used a cross sectional study to examine the risky health behaviors and health outcomes in 650 children, and their primary care providers as part of a community based initiative (Franzini et al., 2009). They performed a methodical, objective surveillance of the community to assess neighborhood physical features, and analyzed study information on social processes. They also observed that an encouraging

social environment was positively connected with teams, lessons, and gym class in school and that physical activity was negatively associated with obesity among children in their study.

Since there are acknowledged health risks linked with physical inactivity (or sedentary behavior), it is as essential to focus on motor skill improvement, math and language. According to Seefelt, Haubenstricker and Reuchlien (1979, p. 31) children who lack motor skills are often consigned to a life of prohibition from the planned and free play experiences of their peers, and subsequently, to a lifetime of inactivity because of their hindrances in early movement behavior (Seefelt et al., 1979). Coyl (2009) indicated that obesity in school aged children increased from 6.5% in 1980 to 17% in 2006 while physical education programs remained compromised in school venues. Levy and Petty (2008) asserted that activity levels could assist in lowering the escalating obesity levels. Yet, the influences connected with the drop in activity levels during adolescence remain for the most part unknown (Sallis, Prochaska & Taylor, 2000). By the age of 18 and 19 years, the majority of the girls engaged in almost no regular physical activities other than those executed during school, 29.9% of girls and 17.0% of boys are found to not be involved in the recommended 60 minutes of moderate to vigorous physical activity (Roger et al., 2011).

Jose et al. (2011) examined the associations between attitudinal, sociodemographic, sociocultural, behavioral and physical influences in children and adolescents with respect to physical activity behavior during the transformation from adolescence to adulthood. For this cohort study, the authors gathered data on children and

adolescents (at ages 7-15 years) as part of the 1985 Australian Health and Fitness Survey. These data were grouped into behavioral, attitudinal, sociocultural, socio demographics, and physical factors. After analysis, the authors observed that females' sports proficiency in childhood and adolescence was notably associated with being persistently active. Playing sport outside school for males with active fathers was connected with being persistently active into adulthood. The authors concluded that females' perceived sports proficiency, cardiorespiratory strength, playing sport outside school and having active fathers during childhood and adolescence to be positively connected with being persistently active during the transition from adolescence to adulthood. Diminished physical activity has been shown to be one of the risks associated with childhood obesity. Researchers have also suggested that an increased reliance on fast food may induce childhood obesity (Boone-Heinonen et al., 2011; Davis & Carpenter, 2009).

Neighborhood Food Insecurity Variables

Good food is essential to overall health. These days, many Californians (the proposed state of this study) live in communities with an abundance of low-priced, low-nutrient, and high-calorie food, but with limited access to fresh fruits and vegetables (California Department of Public Health, 2010). They habitually travel miles away from their community to buy healthy foods at affordable prices. Larson et al. (2009) argued that low-income minority neighborhoods usually have limited access to supermarkets. These are largely African American communities with about 50 % less access to supermarkets than White neighborhoods (Han et al., 2010; Sharkey et al., 2009; Zenk et al., 2009). Food options are regularly made based on what is available, affordable, and

convenient for the individual family. According to Berkowitz and Borchard (2009), nutritional knowledge of parents and caregivers who plan a child's meals impacts food attitudes and practices in the child (Berkowitz & Borchard, 2009).

A number of researchers have investigated the correlation between obesity and neighborhood food environments, concentrating largely on how brands of stores, especially supermarkets, impact residents' food consumption behavior. They found that access to numerous supermarkets improves the dietary quality of proximate shoppers and decreases the risk of obesity (Boone-Heinonen et al., 2011; Chen et al., 2010; Chen, Florax & Snyder, 2009; Currie et al., 2010; Davis & Carpenter, 2009). Currie et al. (2010) found that having fast food restaurants within a tenth of a mile increased obesity rates by at least 1.2 percentage points among 9th graders. Davis & Carpenter (2009) examined the effect of fast food proximity on obesity rates among California 7th through 12^{th} graders using data from the 2002 to 2005 California healthy kids survey. They found that the 7th through 12th graders odds of being overweight was 1.06 while their odds of being obese when a fast food restaurant was found within a half mile of their school were 1.07. They also estimated that the existence of fast food restaurants near to the school affected a student's BMI to increase by 0.08 to 0.14 BMI points. Boone-Heinonen et al. (2011) observed that when a fast food restaurant is within 1.00 to 2.99 km of home of respondents, they consume more fast food. Chen et al. (2009) observed that BMI scores were directly connected to proximity of fast food restaurants and were negatively connected to accessibility of supermarkets. Residing in the food deserts has been linked with lower quality diets and a resultant increase in the risk of obesity.

Children's choices of healthy foods are influenced by their home, childcare center, school, or community (CDC, 2011b). Larson et al. (2009) found that individuals in rural areas, mostly minorities, and lower income neighborhoods, have less access to supermarkets and stores that offer affordable foods and fresh vegetables and fruits (Larson et al., 2009). They indicated that if neighborhoods have restricted access to convenience stores and better access to supermarkets, they tend to have healthier food and reduce levels of obesity.

According to the WHTFCO (2010) low income and rural neighborhoods have abundance of fast-food outlets and convenience stores, which mainly offer lower quality and less healthy foods. In addition, prices for fresh foods in these neighborhoods tend to be considerably higher (Drewnowski, 2010; Monsivais & Drewnowski, 2009). While research on children's eating patterns of fruit and vegetables is abundant, comparatively few investigations have assessed children's eating patterns with respect to beverage consumption. Considering that national fast food chains are placed within 400 meters of 42% of city schools, the most patronized fast food chains are small grocery stores and mini marts (bodegas) that market mostly unhealthy packaged foods. Nestle (2010) found that 92% of the schools have fast food chains and mini-marts stores within 400 meters of the schools. These stores may stock fewer, and lower quality healthy foods (WHTFCO, 2010), and typically are found at a distance of 211 meters of schools, with their focus highest adjacent to schools with more low income and minority students (Nestle, 2010).

Notwithstanding that earlier work has focused on the effect of diverse characteristics of the food environment on body weight, the effect of state and local sales

taxes on less healthy, energy dense foods based on nutrient content study of the correlation between the food environment and weight gain is lacking. The oversight of an analysis that systematically includes various factors of the food environment leads not only to biased results but may also disallow a direct comparison of the importance of different determinants of weight outcomes. Comprehensively measuring the impact of the food environment on weight outcomes requires an integrated framework that accounts not only for food environment factors but also for consumer characteristics.

Chen et al. (2010) found that the influence of improvements in the access of grocery stores on BMI varied based on the features of the neighborhood. For instance, increasing access to a series of grocery stores in low-income communities decreased BMI for all adults in Marion County, Indiana by about 0.3 BMI points (Chen et al., 2010). Also, a report from the USDA (2009) revealed that about 2 million U.S. households reside more than one mile from a supermarket. Other researchers found that access to low quality food away from home, especially from fast food restaurants, has a positive influence on obesity risk. Currie et al. (2010) found that access to fast food restaurants is related to obesity and weight gain among ninth graders and pregnant mothers. Employing an identification approach based on county-level variation in the number of fast food restaurants, Dunn (2010) showed that access to fast food restaurants is linked to increased BMI among females by an average of 0.67 BMI points and non Whites in medium density counties by an average of 2.1 BMI points. In contrast, another researcher established that the presence of one or more fast food restaurants and one or more non

fast food restaurants in the neighborhoods was positively related to BMI and overweight (Davis & Carpenter, 2009).

A study by Laska, Murray, Lytle, and Harnack (2012), established an association between soda intake and high BMI in children. In this investigation, Laska and colleagues analyzed records from respondents of 693 adolescents from Minnesota who were surveyed for 2 years. The authors examined the degree to which differences in adolescent sugar-sweetened beverage, diet soda, breakfast, and fast-food ingestion were related with differences in BMI and percent body fat (PBF). The association between dietary intake, BMI, and PBF was analyzed using random coefficient models. Two studies were carried out: a cross-sectional and a longitudinal study. The researchers of the cross-sectional study showed that breakfast consumption was inversely related to BMI and PBF for both males and females, and diet soda intake was positively related to an increase of 2.5 units in BMI and 3.6 units in PBF increase among females. The researchers of the longitudinal study showed that there was a relationship between sugar-sweetened beverage consumption and an increase of 0.7 units of PBF and 0.3 units of BMI among males (Laska et al., 2012).

In another study, Elbel et al. (2011) assessed children's and teenagers' fast-food selection in low-income neighborhoods in New York City and Newark, in an effort to gain an insight into how children and parents decide on fast food selections, and how they react to compulsory calorie food labeling. For this study, 349 children and teenagers aged 11 to 17 years and their parents' (mostly racial or ethnic minority groups) were assessed before and after food labeling was introduced to access the relationship between food

calorie consumption, food selection and obesity in children. Several adolescents recounted noting calorie food labels after their presentation and a small number of adolescents pondered the information before placing their orders. Elbel et al. (2011) found that about one third of the adolescents ate fast food six times or more per week and more recounted that taste was the main consideration in selecting their meal. At the same time, adolescents in the study recounted that their parents have some influence on their meal selection. The authors found no indication that food labeling persuaded adolescent food selection or parental food selections for children in this population.

In comparison, Kimbro and colleague assessed the association between food assistance and BMI for low-income young children, who are placed on federal food programs (Kimbro & Rigby, 2010). The authors found that food assistance programs may unintentionally add to childhood obesity in cities with high food prices that sponsored meals at school or day care are beneficial for children's weight status, and that intensifying access to sponsored meals at schools could be a valuable means of reducing obesity in poor children.

Neighborhood Physical Security Variables

Researchers have suggested that decreased confidence in the physical security of a neighborhood may also be associated with childhood obesity. Safety in the neighborhood is a unique influence on childhood obesity, a factor which may well be studied within both the built and social environment. Researchers have examined the correlation between both perceived safety and objective measures of crime rates and/or physical chaos and childhood obesity. For instance, when a neighborhood lacks safe

places for outdoor recreation, children are inclined to spend more time indoors. Regular physical activity promotes health and fitness in children and adolescents (U.S. Department of Health and Human Services, 2012). According to the Physical Activity Guidelines Advisory Committee (2008) children and adolescents should achieve 60 minutes or more of physical activity per day. This would include aerobic activity along with age-appropriate muscle- and bone-strengthening activities. In spite of the significance of regular physical activity in fostering wellbeing and lifelong health, evidence exists that levels of physical activity amongst children remain low and that levels of physical activity drop significantly during adolescence (U.S. Department of Health and Human Services, 2012. p. 1). Inactivity rates among children ages 6 to 12 dropped from 16.6 % in 2010 to 16 % in 2011 and it dropped from 16.7 % to 16.4 % among adolescents age 13 to 17 (Physical Activity Council [PAC], 2012, p. 6). The 2011 National Youth Risk Behavior Survey (YRBS) reported that many children do not meet the Physical Activity Guidelines (CDC, 2012c). According to the U.S. Department of Health and Human Services (2012) only 42% of children between the ages of 6 to 11 years met the physical activity guidelines of 60 minutes of physical activity per day and only 8%of adolescents met the recommendation (Troiano et al., 2008).

Additional issues associated with the decrease of physical activity and outdoor play involve the neighborhoods, safety of the play areas, as well as the ability of the parents to pay attention to their children while they play (Weinstein, Felgley, Pullen, Mann, & Redman, 1999). Physically inactive behavior of a community may be influenced by the characteristics of their physical and social environment (Rech et al,

2012). Persons living in neighborhoods with limited access to spaces for physical activity, poor quality sidewalks, poor lighting and places in social disarray (such as crime and robberies, the presence of drugs) tend to be more inactive (Rech et al, 2012; Reis et al., 2010). The correlation between perceived neighborhood safety and inactivity has been examined in different countries (Gomez et al., 2004; McGinn, Evenson, Herring, Huston, & Rodriguez, 2008), but the outcomes of these investigations are inconsistent and have not revealed adequate evidence of a correlation. Studies conducted in Brazil for example have also shown inconsistent results because they did not reveal adequate evidence of a correlation between neighborhood safety and leisure time physical activity (Amorim et al., 2010; Parra et al., 2011).

Amorim et al. (2010) conveyed a positive correlation between perceived neighborhood safety and physical activity during leisure time, but no correlation with walking for transportation intents among adults residing in southern Brazil was established. This inconsistency in results is due, in some degree, to diverse safety scales applied in prior research and to the reality that most investigations have not established the effect modification of socio demographic variables, such as income, gender and age. Some studies have stated that low income individuals, the elderly, and women are liable to perceive low levels of safety in communities, which can affect their physical activity (Rech et al., 2012). It is theorized by Rech et al. (2012) that persons with lower perceptions of safety in their immediate area are likely to be inactive. On the other hand, having physical activity apparatus at home does not mean that individuals who own these equipment's are going to use them. Maitland et al (2013) observed a limited association

with physical activity apparatus at home and children's physical activity. Rech et al. (2012) postulated that individuals who perceive their neighborhood as unsafe purchase home physical activity apparatus. Consequently, an assessment stratified by gender, income and other social or environmental variables may add to the comprehension of the correlation between physical sedentariness and the view of safety of the environs (Rech et al., 2012).

Another aspect of neighborhood safety that might impact physical activity is physical hazards. According to Dowda et al. (2009) physical hazards include unsafe exercise apparatus, tick bites from exercising outside, potential injuries from tripping over broken glass, problems with playground apparatus, holes in the playground or running into objects. These potential physical hazards and an increase in kidnappings and lawsuits make many parents and children feel unsafe with outdoor play. Weinstein et al. (1999) asserts that 36% of parents feel that their children should be allowed to walk to school alone, or ride their bikes to school alone. Dowda et al. (2009) indicated that schoolchildren are liable to be active if a recreational facility is close by, and may not be as active if a playground is in the neighborhood.

Neighborhood Recreational Facilities Variables

Recreational facilities in neighborhoods used by the community are important to promotion of physical activity especially in terms of obesity and cardio-metabolic outcomes (Leal & Chaix, 2010). Publicly- run recreational programming is one of the least studied influences of physical activity on childhood obesity (Dahmann et al., 2010). Recreational PA can originate in public recreational area and tracks, health clubs, on

sidewalks or streets, and in homes. The recreational facilities in this review include parks, tracks, community recreational facilities, playgrounds, tennis courts, or relevant-community improvements that support physical activity. Dahmann et al. (2010), examined recreation programs from southern California cities, and found that neighborhoods with higher population density, a greater share of minorities, and lower incomes individuals had poorer access to public recreational programming, but this investigation did not associate the allocation of recreational supplies to either physical activity or obesity.

Similarly, in a longitudinal study, Wolch et al. (2011) assessed the association between the proximity of recreational resources or parks and the development of childhood obesity. For this analysis, Wolch et al. (2011) collected data on 3,173 Southern California children between the ages of 9 and 10 from 12 communities in 1993 and 1996. They found that almost 20% of children in their research had no link to exercise programs within 10 km, and more than a third had no link within 5 km. Several children had poor access to local parkland; over half had no park within 500 m of their homes.

Parent's Education Level

For the most part, an individual's educational attainment is a predictor of SES. According to the WHO (2008), education has an enduring, permanent, and cumulative effect on health. This is true as poor health in childhood is allied with lower parental educational attainment, lower social status and more health problems in adulthood (WHO, 2008). This implies that health status is a crucial tool through which economic status is measured.

Previous researchers have consistently found a relationship between education and health. For example, parental education and race/ethnicity have been found to be the most compelling social factors that are linked with obesity risk in children (Flegal et al, 2010; Walsemann et al., 2012; Clarke et al., 2009). Generally, this is true among minority adults with low socio-economic status. This group has a higher BMI than Whites and other high SES individuals (Clarke et al., 2009; Flegal et al., 2010; Walsemann et al., 2012). Equally of note is the fact that parental education influences young adults' weight status long-term by influencing weight status upon entering adulthood and by tastes and preferences that individuals interject into adulthood (Fiorito et al., 2010; Oken & Gillman, 2012).

In contrast, Baum and Ruhm (2009) observed that the dissimilarity in BMI by mothers' educational level was quite small at age 20, but BMI increased twofold by age 40. This means that BMI increased from 0.5 kg/m2 for 20 years old to 1.3 kg/m2 at age 40, based on SES and the obesity inequality rose from 6.2 to 11.7 percentage points (Baum & Ruhm, 2009). On the other hand, Lee et al. (2009) claimed that individuals whose parents have lower educational attainment come into adulthood with a higher BMI due to inverse association with childhood obesity status. Similarly, Ross and Mirowsky (2010) attest that the attainment of higher education may bring on effective problem-solving abilities and greater motivation for a better life. According to a report from the NCHS (2012), education determines infant mortality and life expectancy, which assesses health.

Parental education guides family choices about food and physical activity and consequently shapes children's weight status (Nader et al., 2012). While education is linked with income and occupation, it also exerts the strongest effect on health (Freudenberg & Ruglis, 2007). Researchers have shown that each added year in school is linked with increased life expectancy and better health. An extra four years of education decreases five-year mortality by 1.8 % points; it also decreases the risk of heart disease by 2.16 % points and the risk of diabetes by 1.3 % points (National Bureau of Economic Research [NBOER], 2013). It is evident that children born to mothers with less education are more likely to have higher birth weights and are less likely to be immunized and die in infancy (World Bank, 2012).

Parents' Income Variables

Low-income individuals typically reside in distressed and disadvantaged urban environments characterized by physical and social disorder. Lower socioeconomic status has been repeatedly linked with poorer health in childhood (Nikiema et al., 2010; Singh et al., 2010). SES is measured by parental educational level, occupational status, and income level. Nikiema et al. (2010) in their cohort study of 14,556 children found that poverty in the first few years of life increased risk of chronic diseases like asthma attacks and obesity. They also have shown that poverty at another stage of the early childhood life course may not create the same effects on chronic disease in a different country.

Also, individuals in lower SES groups are more likely to live in ''food deserts'' where fresh fruits and vegetables are not as available when compared to their more affluent counterparts (Ver Ploeg et al., 2009). The social environments or situations, such

as unemployment and poverty, as well as crime, may negatively impact park use and recreational program use and be related to obesity (Dahmann et al., 2010).

In the United States and other developed nations, children of low SES are more likely to be obese than are children of high SES (Kleiser et al., 2009; O'Dea and Dibley, 2010). According to the Child Trends Data Bank (2009), kindergarten children in the lowest SES groups were likely to be overweight or obese than children in higher SES groups, and the trend increases sharply at the end of first grade for children in the lowest SES group against children in the highest SES group. Poverty is related to increased obesity risk via decreased physical activity, decreased access to healthy food and food insecurity (Wells, Evans, Beavis, & Ong, 2010). The effect of SES on racial and ethnic disparities in overweight/obesity is combined with the fact that African American and Latino children may likely live in socially disadvantaged neighborhoods and have limited access to supermarkets and healthy food choices (Odoms-Young, Zenk, & Mason, 2009; Child Trends Data Bank, 2009). In addition, SES during childhood could have long-term impacts that influence BMI rates in adulthood (Wells et al., 2010).

Along with gender, race, ethnicity, racial variables and racial ideals have a substantial effect on adolescent development and growth of body image (Giletta, Scholte, Engels, & Larsen, 2010; Rice & Dolgin, 2010). According to Plybon et al. (2009) bigger body size is customarily accepted by the African Americans, and this is considered a symbol of societal prominence, good health and success (Plybon et al., 2009). Remarkably, evidence suggests that violence and a lack of safety in the minority

communities' places constraints on children's access to physical activity outdoors and consequently promotes the onset of obesity (Kumanyika, 2008).

American children are steadily getting larger with minority children particularly at risk for overweight and obesity. Authors of earlier studies claimed that African Americans desire large body size (Barroso, Peters, Johnson, Kelder, & Jefferson, 2010; Kronenfeld et al., 2010), reported satisfaction with body size (Chandler-Laney et al., 2009; Kronenfeld et al., 2010) or underestimate their body weight (Kronenfeld et al., 2010; Wang, Liang, & Chen, 2009). In fact, African American women indicated that they preferred smaller figure as their size but favored larger figures than White women (Kronenfeld et al., 2010). This preference for a large body image as a model, as well as feeding behaviors in African American culture justify the acceptance of obesity in this culture (Barroso et al., 2010; Kronenfeld et al., 2010).

Chen et al. (2012) hypothesized that the knowledge of the effect of ideal body image (IBI) on obesity and everyday life behaviors among adolescents is limited, particularly for African American adolescents. Studies have shown that young racial/ethnic minority children are subjected to IBI risks and fewer protections. Researchers have suggested that African American have preference for large silhouettes (Barroso et al., 2010; Kronenfeld et al., 2010), reported satisfaction for high levels of body shape (Chandler-Laney et al., 2009; Kronenfeld et al., 2010), or underestimate their body weight (Kronenfeld et al., 2010; Wang et al., 2009). For example, African American culture is connected with big IBI; this may explain the tolerance and acceptance of obesity by this racial group (Barroso et al., 2010).

Critique of Methods

Methods used by epidemiologists to determine sample size, study design, and statistical analysis for research are highlighted in this section. Wright (2011) in an effort to examine the link between overweight status and activity among Hispanic urban, school-age children, recruited 140 Hispanic elementary school students in urban Los Angeles age 7 to11 years. The author conducted a power analysis which indicated that 130 students were needed in the study. The power analysis was appropriate to calculate sample size. The author used descriptive statistics to describe the prevalence of normal weight, overweight, and the frequency of those participating in daily physical activity and sports teams and attending school physical activity class. Bivariate analysis (correlations and Pearson chi-square tests) was used to test associations between weight status (BMI) and activity behaviors while multiple regression analysis was used to assess childhood overweight. The statistical method used was appropriate given the level of measurement of the variables. Ninety-five percent confidence intervals (CIs) were projected for all regression analyses and the level of significance for all analyses was defined as $p \leq 0.05$. After analysis, the author concluded that normal-weight children had higher levels of physical activity and team sports. The author also found no significant interactions between overweight status and activity among these school-age Hispanic children. The results align with the study's purpose, research design and statistical analysis used. However, Wright (2011) listed the following study limitations: opportunity to ask qualitative questions were limited because standardized surveys with prescribed

questions were used. Also, the author was not able to obtain a more in-depth understanding of some of the behavioral findings.

Slater et al. (2010) assessed the relationship between the level of physical activity, friendliness of the built environment and adolescent PA and BMI. The authors used a secondary data collected from 2001 to 2003 that consisted of cross-sections of individual-level national data for 8th and 10th grade students who participated in the Monitoring the Future (MTF) survey with community-level environmental measures developed through the Bridging the Gap Study. Annual national sample of 33,000 of 8th and 10th grade students in the coterminous United States were analyzed for this study, but sample size analysis was not presented. Using self-reported height and weight, the authors calculated BMI. Individuals' body weight status was classified on the basis of BMI for children and teens' using the 2000 CDC Growth Chart and obesity was classified as BMI ≥ age-sex-specific 95th percentile. The BMI calculation is consistent with CDC guidelines and growth charts (CDC 2011a). Multilevel models were run and controlled for youth and community demographic and socioeconomic features. The authors found that increased levels of physical disorder were linked with reduced African American and higher weight. They also found that a greater number of commercial African American facilities were linked with increased African American. The statistical tests used were appropriate to test the hypothesis. Appropriate statistical methods were used, given the level of measurement of the variables. The authors encountered the following limitations: they were not able to make direct causal inferences about whether these environmental measures directly influenced changes in PA behavior and obesity because cross-sectional

data used. The PA and weight measures were self-reported and may be subjected to error and bias. They were also not able to include mixed land use measure in local compactness index. However, a key strength of the study key was the focus on the association of multiple factors on physical activity and weight using environmental data collected directly from the adolescents' neighborhoods.

Leatherdale et al. (2011) examined the association between student- and school-level characteristics with being overweight and obese among students in grades 9 and 10 attending 76 secondary schools in Ontario, Canada. The sample was non-random. Of the 34,578 eligible students eligible to complete the Physical Activity Module (PAM) in the 76 participating schools, only 12,049 participants were recruited for the study. A power analysis was not used to estimate sample size needs for this study. The outcome variable was based on a measure of BMI, calculated from weight and height. BMI is used as a reliable indicator of body fatness for most children and teens. To understand student-and school-level factors linked with weight status among these students, the authors ran a multi-level logistic regression analyses to examine the features associated with being overweight versus normal weight, and obese versus normal weight. The authors also looked at the contextual interactions between all of the major school and student characteristics. After analysis, the authors found that students who participated in school-based physical activities were associated with a slightly reduced risk of being overweight or obese. The statistical tests utilized by the authors were appropriate for the research design and the test aligned with the study purpose. However, because cross-sectional data

were used for this study, it is not possible to infer causal relationships. This study also used BMI to define weight status.

While each of the studies supports my proposed research methods in some way, Slater et al. (2010) and Leatherdale et al. (2011) both substantiate my choice of dependent variable and use of secondary data and its analysis. The authors used BMI as the dependent variable and to define weight status. The authors calculated BMI based on self-reported height and weight. This BMI calculation is consistent with CDC guidelines and growth charts and is an acceptable method for determining weight status in children and adolescents as it takes into account body fat changes with age and that amount of body fat differs by gender (CDC, 2011a). In addition, both of these studies used cross sectional, secondary data as I did. Despite the limitations of these data to show cause-and-effect relationships, the authors were able to demonstrate associations of selected student characteristics and environmental factors to physical activity and weight status (i.e. overweight and obesity) using study design and statistical analysis similar.

Summary and Conclusions

Overweight and obesity are among the top challenging health problems at the beginning of the 21st century (King, 2011). The prevalence of overweight and obesity has escalated alarmingly, attaining epidemic levels in adults, adolescents, and children in the United States and globally (King, 2011; Ogden et al., 2012). This review has shown that along the early life course, from pre-conception to childhood, risk factors that accumulate over the course of a life of inter-relationships between biological, psychological, behavioral, social and environmental factors lead to child overweight and

obesity (Green, 2011; Marmot, 2010). The majority of the reviewed studies provided similar findings about childhood obesity and the many built environment factors influencing its etiology. To combat this epidemic, researches on interventions that include both social and built environment should be looked at. Chapter 3 consists of study design, research questions and hypotheses, definition of variables, instrumentation, data collection process, and protection of participants. In Chapter 4, the research tool, analyses, and findings are illuminated. Chapter 5 provides an interpretation of the study outcomes and a discussion on limitations and recommendations for future research as well as the implications for social change.

Chapter 3: Research Method

Introduction

The purpose of this study was to examine the interaction of diet, physical activity, and the built environment and the mean BMI of African American adolescents ages 12 to 17 years living in South Los Angeles. I examined neighborhood insecurity from multiple viewpoints: (a) physical security; (b) food insecurity; and (c) availability of recreational facilities necessary for a healthy lifestyle. An improved understanding of neighborhood insecurity as a component of a child's built environment and its relationship to childhood obesity supports the need for effective childhood obesity research to help prevent one of the most serious health threats.

This chapter offers an in-depth description of the study method based on the CHIS 2007-2013 dataset. The research design, method, data instrumentation, collection and analysis, ethical procedures, and data management protocols are described. This chapter provides an understanding of the secondary dataset—CHIS 2007-2013—and the methodology for exploring childhood factors, food security, and status on childhood obesity.

Research Design and Rationale

A cross-sectional study design was used to examine stated hypotheses. In this study, I utilized secondary data obtained from adolescents, ages 12 to 17 years, in the 2007-2013 CHIS child/adolescent private use file for which complete age, sex, height, and weight were obtained. The CHIS is a stratified, cross sectional study of civilian, non institutionalized residents from 0 to 18 years of age and older living in the State of

California. The CHIS is a multi-stage sample design. The sample is stratified into 56 geographic sampling strata, including two counties with sub county strata, 41 single-county strata, and three multi county strata comprising the 17 outstanding counties (CHIS, 2013a). Within every geographic stratum, households were chosen via random-digit dial (RDD) throughout the State of California. As a result, CHIS incorporated adults, adolescents, and children in the group samples. A cross-sectional study of all respondents was processed with all information being gathered at one point in the information collection period. Use of the CHIS database provided access to quantitative data that have been collected and the results of which have been critically analyzed. This approach outlines and assesses associations through a deductive method of knowledge attainment (Johnson & Onwuegbuzie, 2004; Sale, Lohfeld, & Brazil, 2002). I obtained data related to the dependent and independent variables from the CHIS dataset to aid in answering the research questions. The dependent variable was mean BMI and the independent variables of interest were the outdoor recreational facilities, parents' educational level, family income, food insecurity, physical security, and physical activity level (see Appendix C).

This dataset was useful in evaluating the relationship between physical security, physical activity, food insecurity and availability of outdoor recreational facilities necessary for a healthy lifestyle, parental educational level, parental income level, and childhood overweight and obesity. The cross-sectional design was suitable for this goal for several reasons. First, cross-sectional survey design has usually been used among researchers examining the association that environmental influences have on childhood

overweight and obesity (Crawford et al., 2012; Duncan, Johnson, Molnar, & Azrael, 2009; Eagle et al., 2012; Hattori, An, & Sturm, 2013; Jilcott et al., 2011; Sallis & Glanz, 2009; Timperio et al., 2010). Furthermore, this design allowed an investigation of the correlation between built environment and childhood obesity. Hattori et al. (2013) used CHIS data to investigate the correlation between the number of neighborhood food outlets and dietary intake and BMI among California adults based on geographic size of a neighborhood or food environment. The authors observed no strong evidence that food outlets near homes were associated with dietary intake or BMI. In conclusion, the authors found that for the null outcome, shopping trends were weakly related to access to motor transportation in many neighborhoods (Hattori et al., 2013). They also observed that associations between food environment measures and obesity were not reliably replicated, and dietary behaviors did not confirm these associations. Previously reported associations that the authors replicated included those of Jeffery et al. (2006), Boone-Heinonen et al. (2011), Giskes et al. (2010) and An and Sturm (2012).

Jeffery et al. (2006) examined the relationship between living or working near fast food restaurants and body weight. Their investigation provided mixed evidence with respect to the potential effects of the rapid growth of convenience food outlets on obesity in the U.S. population. The study showed that there was a positive association between eating at fast food restaurants and a high fat diet and BMI; it showed a negative association with vegetable consumption and physical activity (Jeffery et al., 2006). Proximity of fast food restaurants to home or work was not associated with eating at fast-food restaurants or with BMI and proximity to fast-food restaurants was not associated

with BMI, but was associated with frequency of eating at those restaurants. Hattori et al (2013) and Jeffery et al (2006) focused on adults. Jeffery et al (2006) concluded that failure to find relationships between proximity to fast food restaurants and obesity may be accounted for on the bases of methodological weakness.

Boone-Heinonen et al. (2011) modeled fast food consumption, diet quality, and meeting fruit and vegetable recommendations as a function of fast food chain, grocery store, or supermarket availability within 1, 1 to 2.9, 3 to 4.9, and 5 to 8 km of respondent's homes. The authors found that the consumption of fast food was related to fast food availability in low-income respondents particularly within 1 to 2.9 km of homes. The authors found that the consumption of fast food was related to fast food availability in low income respondents particularly within 1 to 2.9 km of homes among men. Greater availability of supermarkets was generally unrelated to diet quality and the intake of fruit and vegetables. The authors found mixed results for relationships between grocery store availability and diet outcomes (Boone-Heinonen et al., 2011). While recommending zoning restrictions of fast food restaurants within 3 km of low-income residents, the authors suggested the implementation of complementary or alternative measures to promote change in dietary behavior.

Giskes et al. (2011) reviewed the more recent literature on how features of the food environment are associated with dietary intake and overweight/obesity. The authors' target population was 18 years and above. The results showed a consistent association between weight status and the food environment. Specifically, an association was found between greater accessibility to supermarkets or less access to takeaway outlets with BMI

(Giskes et al., 2011). According to the authors, any measure of weight status, including absolute weight or any equivilized weight scale such as BMI, weight for height, or categorization of weight status into groups, was included in the study. Living in a socioeconomically deprived area was the only environmental factor associated with a number of obesogenic dietary behaviors. The findings highlighted a closer association between the environment and weight status than that seen between the environment and dietary behaviors (Giskes et al., 2011). The authors recognized the role of the environment in the development of overweight/obesity but observed that the dietary mechanisms that contribute to this remain unclear.

An and Sturm (2012) examined the relationship between school and residential neighborhood food environment and diet among youth in California. Data for this study were gathered from children aged 5 to 11 years and adolescents aged 12 to 17 years from CHIS for 2005-2007, analyzed in 2011. The authors of this study showed no significant relationship between food environment and consumption (An & Sturm, 2012). They noted that the role of transportation has altered the definition of the shopping environment as today's society has become very mobile. Thus, access to transportation could be a more essential determinant of dietary behaviors than immediate or proximate availability.

My study differed from both Hattori et al. (2013) and Jeffery et al. (2006) in that while both studies focused on adults, the current study focused on African American adolescents aged 12 to 17 years living in South Los Angeles. Both Boone-Heinonen et al. (2011) and Jeffery et al. recorded mixed results: the former with respect to the potential

effects of the rapid growth of convenience food outlets on obesity in the U.S. population, and the latter regarding the relationship between grocery store availability and diet outcomes. Like Hattori et al. and Jeffery et al. Giskes et al. (2011) focused on a population bracket of 18 years and above in contrast to the age bracket in this study. Notably, their findings were not mixed but confirmed that living in a socio-economically deprived area was an environmental factor associated with a number of obesogenic dietary behaviors. The absence of uniformity in the results of the studies replicated by Hattori et al. highlighted an unsettled state of research in this area, thus necessitating further research and further replication of earlier studies. My study has provided further links in the chain of findings that will ultimately provide a settled state of affairs in this area of research.

Cross-sectional study designs have been used by many researchers in epidemiology for the advancement of epidemiologic understanding. In particular, epidemiologists use cross-sectional design to study a subset of a population or the entire population, and from these individuals, data are gathered through questionnaire or face-to-face interviews to help answer research questions of interest. For example, Babey, Wolstein, Diamant, Bloom, and Goldstein (2011) used CHIS data to investigate overweight and obesity among Californian students in the fifth, seventh, and ninth grader from 2005 to 2010 and among children by California cities (2012). Hattori et al. (2013) on the other hand used CHIS data to investigate neighborhood food outlets, diet, and obesity among California adults in 2007 and 2009. Melius (2013) used CHIS data to

investigate overweight and obesity in minority children and implications for family and community social work.

This study is a secondary data analysis of cross-sectional state representative data collected by telephone interview of parents/guardians on adolescents ages 12 to17 from the 2007-2013 CHIS. The quantitative method was preferred for this study due to the levels of measurement of the variables, the desire to clarify the type and degree of the relationship, and unique variation between the variables. A descriptive correlational design utilizing quantitative methods was the best way to study associations between the variables and to test the theoretical model in this study. Using data from 2007-2013 CHIS gave me access to comprehensive data. By using this method, I precisely compiled quantitative data and critically analyzed the results (CHIS, 2013a). This method enabled me to test and assess the associations between variables by means of a deductive process (Johnson & Onwuegbuzie, 2004; Sale et al., 2002). It also enabled me to test theory deductively from existing literature, through creating hypothesized correlations and projected results for study (Johnson & Onwuegbuzie, 2004). I obtained the mean BMI from the sums of adolescents BMI divided by total number of adolescents in the study. CHIS health surveys often rely on respondents' reports of their height and weight measure, a method that tends to result in underestimating the incidence of overweight and obesity (Strauss, 1999). The BMI was calculated from self-reported weight in kilograms divided by self-reported height in meters squared, which was then used to classify weight status (*obese* BMI >95th percentile for age and gender) and independent variables from the CHIS dataset to help to answer the research questions. Quantitative methods examine

hypothesis deductively from obtainable literature, through the generation of hypothesized associations and outlined outcomes for study (Johnson & Onwuegbuzie, 2004). The quantitative method enabled me to test my theories or hypotheses, collect descriptive data and investigate any association between variables (Creswell, Klassen, Clark, & Smith, 2010). I investigated the relationships among the variables found in the CHIS relating to mean BMI, demographics, and language use in African American adolescents 12 to 17 years of age using CHIS child private file for which complete age, sex, height, and weight measures were available to calculate mean BMI.

Description of Sample and Population

The population of interest is African American adolescents aged 12 to 17 years and their parent samples residing in South Los Angeles. The rationale for choosing this population was that overweight and obesity have doubled among children 6 to 11 years of age and multiplied by three among adolescents 12 to 19 years of age between 1976 and 1980, and 1999 to 2002, respectively (NCHS, 2012; Niehoff, 2009; Ogden et al., 2012). CHIS include survey data from Whites, Latinos, African Americans, Asians and Pacific Islanders, and American Indians/Alaska Natives based on self-reported responses to a series of questions on race and ethnicity. The households were selected by random digit dialing throughout the State of California. As a result, CHIS incorporates adults, adolescents, and children in the group samples.

The sample for this study is observed to denote the non-institutionalized inhabitants for each sampling stratum and statewide (CHIS, 2012). Over sampling is used to aid the public health services in determining trends in health risk among different

ethnic groups (CHIS, 2013b). Multistage sampling was used to approximate representativeness of the state's population. Increasing overall sample size is the simplest approach to improving reliability. Oversampling of underrepresented populations is a more efficient way to increase the reliability of estimates; UCLA uses these aforementioned techniques.

A power analysis was conducted to determine sample size needed for this quantitative study. For correlation analysis, 0.80 power (the probability that a true relationship exists between study variables is 80%), a moderate effect size of 0.30 (or, how strongly the independent variable is related to the dependent variable), and an alpha of 0.05 (5% chance of a Type I error occurring (such as rejecting the null hypothesis when it is in fact, true) requires at least 82 participants in the sample to detect a significant model (Faul, Erdfelder, Lang, & Buchner, 2007; Lan & Lian, 2009). If the *p*-value is less than 0.05, then the null hypothesis is rejected. Cohen (Faul et al., 2007; Lan & Lian, 2009) explained the following effect size conventions: small ρ =0.1, medium ρ =0.3 and large ρ = 0.5.

Power is mainly a function of α, sample size, and effect size. To calculate the number of participants required, a sample size that gives 80% power at the 0.05 level of significance is usually applied. A priori, post hoc, and compromise power analysis are available for determining the correct sample size needed for a study (Faul et al., 2007; Lan & Lian, 2009). A priori analysis is done before a study has been carried out; post-hoc analysis is done after a study has been carried out to help to rationalize the outcome of a study (Faul et al., 2007; Lan & Lian, 2009). Statistical power is associated with the

sample size because a larger sample size gives greater power. The larger the sample size and the less variable the characteristic being measured, the more accurate a sample-based estimate will be (Faul et al., 2007; Lan & Lian, 2009). The aim of calculating power analysis is to avoid a type II error, which ensues when one retains a flawed hypothesis. The variables I acquired from the CHIS dataset aided me to answer the research questions. The dependent variable is mean BMI and was calculated by the sums of adolescents BMI divided by total number of adolescents in the study and the independent variables of interest are neighborhood safety, food environment, fast- food outlets, physical activity and park use (Appendix C). The CHIS dataset was useful in assessing the mean BMI among AA adolescents living in the South of Los Angeles.

Archival Data

A quantitative design with statistical assessment was preferred for this research. A survey was utilized to collect data from respondents to compare, rationalize, or explain their feelings, thoughts, understanding regarding various questions (Sale, 2002). CHIS data are collected intermittently through a 6-year data collection cycle. Data were collected through interviews conducted by Westat, a private company under contract with the UCLA Center for Health Policy Research. Interviews were carried out in five languages: English, Vietnamese, Chinese, Spanish, and Korean with computer-assisted telephone interviewing (CATI) system (CHIS, 2013b, p. 8). The aforementioned languages were selected based on information from the 2000 United States Census to single out the languages that would cover the largest number of Californians in the respondents that did not speak English or well enough English to otherwise participate in

the survey. Refresher trainings are also given to trained staff; in addition individually trained bilingual/bicultural interviewers were engaged to carry out non-English interviews. The survey included questions about perceived neighborhood safety, physical activity, and demographics. The child's BMI was calculated based on parent-reported height and weight.

Data Collection Cycle

The data from the CHIS are gathered continuously in 1-year data collection cycle. The 2007-2013 data collection began on June 15, 2007 and ended on January 14, 2013. The future plan for data collection is to adjust collection cycle to begin in January of each year and end in December of the next year to permit the publication of 1-year estimations for each almanac year which will be obtainable via the UCLA data access center. Because data collection is ongoing, each CHIS data cycle has its own distinctive characters. Collection of data is done in five languages: English, Korean, Vietnamese, Spanish, and Chinese. As California is a multicultural state, the five languages in necessary in order to include the largest number of Californians in the sample that either did not speak English or did not speak English well enough to otherwise participate (CHIS, 2013a).

Data Collection

CHIS 2007-2013 consist of two distinct samples, both administered through a CATI system with RDD sampling: a landline sample supplemented by surname-listed samples, and a statewide cell phone sample (CHIS, 2013a. p2). The cell phone sample included child and adolescent extended interviews. Trained field staff interviewed one

randomly chosen adult in each household, one adolescent and one child if residing in the household and the sampled adult was the parent or legal guardian; three interviews could be completed in each household. In households with children where the sampled adult was not the screener respondent, children and adolescents could be sampled as segment of the screening interview, and the extended child interviews could be conducted prior to the adult interview.

Children 0 to 11 years were interviewed by proxy with the adult most knowledgeable about the health of the selected child and adolescents from 12 to 17 years were interviewed following parental permission. Adult respondent chosen for the interview are the parent or legal guardian of children or adolescents living in the same household. Children were interviewed by adult proxy of parents' and caretakers who know them, while adolescents were interviewed with the consent of their parents. Adults who completed questions on public program eligibility, income, employment, and food insecurity sections on their questionnaire were considered to have completed their interview. For fragile and ailing individuals over 65 years who were not able to finish the extended adult interview proxy interviews were conducted to evade biases for health estimates of senior individuals that might result. Proxy interviews in CHIS 2011-2012 were 283 seniors by a spouse/partner or adult child, 550 teen interviews and 1,500 child interviews completed from only cell phone sample. CHIS 2011-2012 RDD total estimated sample size was 54,000 adults, approximately 3,000 adolescents, and approximately 9,000 children by adult proxy for each cycle (CHIS, 2013a). The total estimated sample size for California's overall population sampling strata includes Los

Angeles and San Diego Counties. Trained interviewers asked respondents a series of questions regarding the physical, built environment and behavioral health of the sample child.

The 2007-2013 CHIS response rates are a combination of the completion rate of the screener and the extended interview. There are four types of interviews: the household screener, adult extended interview, child extended interview and the adolescent extended interview. The interview unfolded into successions of interview questionnaires starting with the screener stage or screener interview which includes mailed out pre-notification letters in five languages to all landline random digit dialing (RDD) sampled telephone numbers for which addresses could be obtained from reverse directory services (CHIS, 2013a). In this stage, the adult respondents are selected and interviewed. The letters explain the uses of the survey and its importance; they accentuate the government backing of the survey, and assure prospective respondents of voluntary participation status in the survey and the confidentiality of their personal information.

Other information included in the letters is toll-free number that participants may call and a CHIS web site address designed to deal with respondent survey questions. Letters are not sent to children or adolescents for interview. More than 66,000 screener interviews were completed averaging 2.3 minutes in length (CHIS, n.d.). Fourteen attempts are allowed to effect the preliminary communication with the household and if refusal is encountered, the household is placed on a refusal subsample list. Another attempt is made one to three weeks later. Before this attempt is made, another letter was sent to the household to inform them of the importance of their involvement and the

validity of the study. If a second refusal is encountered, another attempt would be made in two weeks. A comparable practice was used at the other three different levels of interview types (extended adult, child and adolescent). An attempt for conversion stops when respondent is hostile or when they request not to be called. A letter can be mailed out to the parent of an adolescent to be interviewed when if the parent refused permission for their adolescent to be interviewed; this is to ask them to reconsider.

According to CHIS (n.d.) the urban counties had lower screener completion rates than rural counties. The landline sampled telephone numbers are working non- business phone numbers, with confirmed surnames. Addresses were not available for the cell sample. The response rate for landline telephone sampled numbers is higher because letters were sent out in advance. This was achieved by matching sampled telephone numbers to a mailing address (CHIS, n.d.). For adolescents, the response rate includes getting consent from a parent or caretaker. For adults, the response rate is slightly higher, from 47.4 to 52.5% and about the same for adolescent and children's rate. To get a complete response rate for each type of interview, the screener response rate is multiplied by the extended response rates (CHIS, 2013a, p. 8). The second stage of the survey starts with a purposive selection of household samples from the list of household residents generated during Step-1. An adult respondent was selected for an interview that takes about 33 minutes (CHIS, 2005). After the completion of the adult interview, a supplementary interview was attempted if this adult respondent was the parent or legal guardian of a child or adolescent living in the household. Also, in those households with more than one adolescent and children under the age of 12, one adolescent and one child

were selected for interview, and the parent more knowledgeable about the child or children was selected for an interviewed (CHIS, n.d.). In 2003, the extended adult interview response rate was 60%. Adults with diverse attributes answered questions at varying rates, as is characteristic of most surveys.

The topics for these questionnaires were: (a) demographic background or occupation, (b) food security, (c) housing characteristics, (d) income, (e) race (census 2000 definition), (f) food security (g) personal safety, social cohesion and physical environment (h) park/ playground use, (i) BMI, (j) walking distance from home to work and school (k) adult educational attainment and (l) access to fresh and affordable foods, and so forth. The information collected through the interview process was managed from a laptop with the computer-assisted survey instrument, with A-CASI abbreviation.

Instrument Used

The data collected above was administered from a laptop with a computer-assisted survey instrument (A-CASI) technology. The question order was designed to facilitate checking responses that could be in error. Redundant questions offered a check for consistency in the replies from the respondents. Computer-assisted telephone interviewing (CATI) enables one to reach a high number of subjects, and to record the answers instantly, minimizing errors of recording. It also simplifies the handling of collected data. According to Chao (n.d.) CATI leads to a better stabilization of the interview because the CATI method can automatically detect inconsistent responses and ask the respondent to resolve these before concluding the interview (Westat Corporation, n.d.). Computer-controlled skip configurations enable complex interviews than are

achievable with pencil and paper and forms. This method also expedites electronic transfer of data from the field to the home office and reduces the need for data cleaning and keying (Westat Corporation, n.d). The staff from Westat, UCLA, and Public Health Institute (PHI) supervised interviews throughout the period data collection, during interviewer debriefing sessions, and as Westat data preparation staff reviewed minor remarks entered by interviewers, several issues with questions arose on the basis of which recommendations were made that a change in the question wording or answer categories would be beneficial for the next data collection cycle (CHIS, 2013a).

Who Collected Data?

The CHIS 2007-2013 data were collected by the Westat Corporation field interviewers. Westat is a private corporation that focuses on statistical research; they conducted CHIS 2007-2013 data collection under contract with the UCLA Center for Health Policy Research. The field interviewers administer in-person interviews with randomly selected respondents using computer-assisted. The field interviewers are liable for communicating respondents at homes, businesses, or schools to conduct the interviews (Westat Corporation, n.d.). They transfer the interview data back to the home office. The 2013 CHIS includes 54,000 participants of whom 2,799 are adolescents aged 12 to 17 years old. The CHIS 2007-2013 involves two distinct samples: a landline sample accompanied by last name -listed samples, and a statewide cell phone sample which is administered through a CATI approach with RDD sampling. Since the ACTI instrument is self-administered, field staff only needs adequate training on the instrument to be able to answer respondent's questions (Westat Corporation, n.d.). The field interviewers or

surveyor documented the use of other language, if somebody in the household responded as a proxy for the sampled individual or if an interpreter was utilized. Language usage was also gathered throughout the assessments.

The accuracy of the CHIS data depends on the recall skills of the respondents and the variation among the measurements taken by survey staff. This survey had a high percentage of completion, which may be due in part to trained interviewers at the completion of each step (CHIS, 2013b). As the responsible entity for CHIS, UCLA Center for Health Policy Research (UCLA) continuously strives to improve the quality of CHIS data by addressing methodological issues as they arise (CHIS, 2013b). In addition, it monitors data collection and analysis for quality and relevancy of health information, ensures availability of state- and local-level data, and the representativeness of key racial and ethnic sub-groups in California, and the ability of users to access data and data products in multiple formats(CHIS, 2007; CHIS, 2013b).

Interviewer Training

Westat Corporation train interviewers in general interviewing techniques once hired. This training is generally in Westat's CATI system and project specific training before they are hired as Westat employees. Once hired staffs are trained for different tasks: lead trainer who delivered the training script, a group leader who evaluated trainees, runners who helped trainees during interactive and role plays, etc (CHIS, 2005). Initial trainings were conducted concurrently in the Merced, Citrus Heights, and Greeley centers. This training was offered to all interviewers in general interviewing methods and the use of the computer system. The interviewers then received a project specific training

that focused on the CHIS screener and extensive interviews (CHIS, 2005). Additional trainings were conducted as necessary throughout the data gathering period. Trainings are generally held at the following centers Citrus Heights and Merced, California; Frederick and Rockville, Maryland; Greeley, Colorado; Sarasota, Florida; and Chambersburg, Pennsylvania. Before training, operations manager, major members of the study area staff, the Telephone Research Center (TRC), and senior TRC staff developed training materials.

There are three stages of training for the interviewers: General Interviewing Techniques (GIT), Teltrain (CATI training), and project-specific training (CHIS, 2005). In the first stage, the interviewers are trained on the basic techniques on how to get accurate data by using listening and probing approach. These individuals are also taught on confidentiality practices and methods for gaining respondent cooperation. The Teltrain training stage, make use of an interactive, self-administered computer-assisted tutorial training program, and each interviewer go through the process for conducting interviews make use of CATI (CHIS, 2005). Trainees with weak keyboard skills are identified in this stage and those who did not exhibit adequate keyboard skills were released from training program. The CHIS project training is the final stage; in this stage the training is dedicated to the administration of the CATI questionnaire and the general techniques. The interviewers also are given training in refusal anticipation methods. The interviewers are finally assessed through cooperation rate reports and observing of live interviewing to assess the basic skills necessary for effectual interviewing. The supervisor only assesses ten percent of all interviews for at least 10 minutes at a time throughout the data

compilation period by. One-on-one coaching session to reevaluation practices that works in an attempt to reinforce demonstrated skills and/or offer feedback for improving interviewing style followed monitoring session. Assessments are based on the following skills: ability to gain respondent cooperation, reading fluency, use of a conversational style, ability to answer respondent questions quickly, accurately, and completely, reading screens verbatim and using neutral probes (CHIS, 2005). If after the assessments an interviewer fails to show competency in the aforementioned skills, then an additional coaching sessions highlighting how to gain respondent cooperation and how to answer respondent questions is given to interviewer.

Types of Data

CHIS data was repurposed for use in this study. CHIS data is secondary data collected for analyses and publications to assess public health and health care needs, to develop and advocate policies to meet those needs, and to plan and budget health care coverage and services (CHIS, 2013a). Other researchers used this data to broaden their knowledge of a variety of health-related problems. The first major advantage of working with secondary data is its cost effectiveness because someone else already collected the data. The disadvantage of using secondary data is a need to fit the purpose of the new study and research questions being asked (Simon & Goes, 2013). Another challenge is that variables may have been defined or categorized differently than would have been chosen.

How to Access Data

The CHIS provides researchers with two in-depth data: public use data files and confidential data. The CHIS public data is accessible through the CHIS Survey website (CHIS, 2013a). The confidential data is accessible through the data access center (DAC) based at the UCLA Center for Health Policy Research, in partnership with the Department of Health Care Services, the California Department of Public Health, the California Endowment, First 5 California, the National Cancer Institute, and Kaiser Permanente (CHIS, 2013a). Researchers can access data remotely upon project approval; prospective researchers wishing to use confidential CHIS data must tender a DAC application. The manager will collect and check all application for completion. After review of all application, the manager communicates with the researcher applicant if more information is needed to complete application. Further reviews of completed application are made by the data disclosure review committee (DDRC). All approvals of DAC projects are good for two years after the date of project approval, this also address data use permission.

Students who plan on using confidential CHIS data for their dissertation are made to present proof of faculty support and the DAC application (see Appendix D) in the form of a short letter from a faculty member stating that he/she is acting as the faculty adviser for the project, and that he/she has appraised and consented to student's research proposal. The particular data set I used for my project is the CHIS 2007-2013 Survey data that was compiled from June 15, 2007 to January 14, 2013. Both public and confidential

use data files contain information on a variety of topics; these files are obtainable in a variety of data formats, including SAS, SPSS and STATA data formats.

Custom data files are created for research projects based on the variables and stipulations submitted with the application for gain access to confidential data. Researchers may provide their personal data to be merged with CHIS data, which should be specified in their application. The new data file is not provided to any researcher without prior written agreement of the researcher who provided the files. This new data files may not be deleted from the DAC. Set up cost for data file set up, initial technical assistance, custom data, and proposal review is a one-time fee of five hundred dollar.

Process for Data Management and Protection of Data

The CHIS data is accessible through AskCHIS, the Center's user friendly online data query system; reports and policy briefs published by the Center, public-use data files, confidential data files, requests to the Center to conduct special data analyses, and workshops conducted by the center's health DATA program or by the Public Health Institute (CHIS, 2013b). The CHIS data are available in 6 different formats to guarantee that users have many choices for accessing data that is tailored to their needs (CHIS, 2013b). Their public-use data files which include supporting documentation are available for free download from the CHIS Web site. I completed an electronic confidentiality agreement needed to access CHIS data, and data files were downloaded immediately after UCLA approval (see Appendix D). The data files are confidential, and include data elements that are accessible at the data access center or through data files provided to qualified funders.

Data Analysis

The 2007-2013 CHIS data used for this study were raw or unweighted data from a non-institutionalized population from the state of California. Since the data were confidential due to the sensitive demographical information and the ages of the target population, the data were only accessible through the DAC. Missing values in the 2007-2013 CHIS dataset files were excluded before constructing the frequency and cross-tabulation tables. Westat imputed missing values for those variables used in the weighting process and UCLA-CHPR staff imputed values for all other variables (CHIS, 2013a). The Westat Company employs two imputation procedures to fill in missing responses for items needed for weighting the information. A completely random selection from the observed distribution of respondents is the first imputation method. This method was employed for a handful of variables when the percentage of the survey items missing was extremely small. The second method was hot deck imputation with no replacement. The hot deck method is the most commonly employed method for allotting values for missing responses. In this method, a value narrated by a respondent for a specific item is allotted to a comparable person who did not answer to that item (CHIS, 2013a). The imputation process by UCLA-CHPR starts with data editing. A valid substitute value was required based on known values of other variables of the same respondent or other example (s) from the same domiciliary.

Measures: Dependent Variable

Mean BMI is the dependent variable and was calculated from the sums of adolescents BMI divided by total number of adolescents in the study. *Overweight or*

obese is defined as follows: adolescents with ≤ 5th percentile for BMI adjusted for age and gender is classified as *underweight,* adolescents within the >5th and ≤85th percentile for BMI adjusted for age and gender is classified as normal weight, adolescents within >85th and ≤95th percentile for BMI adjusted for age and gender is classified as *overweight,* and adolescents with ≥95th percentile for BMI adjusted for age and gender is classified as *obese* (WHO, n.d.a).

Independent Variables

Independent variables were extracted from the CHIS 2007-2013 restricted use child data set and recoded where applicable for the current analysis. Race and ethnicity were exclusively categorized as Asians, African Americans, Hispanics, and Whites (the reference group), controlling for gender and age.

Research Questions and Hypotheses

RQ1: What is the association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI?

$H1_0$: There is no association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

$H1_a$: There is an association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

RQ2: What is the association between neighborhood food insecurity in South Los Angeles and adolescent's dietary intake and the mean BMI?

$H2_0$: There is no association between neighborhood food insecurity, adolescent's dietary intake and the mean BMI.

$H2_a$: There is an association between neighborhood food insecurity, adolescent's dietary intake and the mean BMI.

RQ3: What is the association between neighborhood recreational facilities in South Los Angeles and adolescent's physical activity and the mean BMI?

$H3_0$: There is no association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

$H3_a$: There is an association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

RQ4: What is the relationship between parents' education level, parents' income level and adolescent's physical activity and the mean BMI?

$H4_0$: There is no association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

$H4_a$: There is an association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

Description of Variables

Table 1

Data Dictionary

Variables	Source variable	Variable type	Value option for variable
Dependent variable			
BMI	BMI_P	Continuous	BMI = (weight (Kgm)/height2 (cm2)
Independent Variables			
Demographics			
Ethnicity	RACECN_P	Nominal	African-American Caucasian/white Hispanic Asian Native American Native Hawaiian/Pacific Islander
Neighborhood recreational facilities	TC42	Nominal, categorical	0=yes 1=no
Physical activity	TE49	Nominal, Categorical	0=yes 1=no
Physical activity teen			Number of days past week physically active 60 min or more
Parent income level	POVGWD_P AK22_P	Ordinal	$0 to $19,999 $20,000 to 39,999 $40,000 to 59,999 $60,000 to 79,999 $80,000 or higher

(Table continues)

Variables	**Source variable**	**Variable type**	**Value option for variable**
Adult educational attainment Diploma equivalent Education	AHEDUC	Ordinal	1. Grade 1-8 2. Grade 9-11 3. Grade 12/H.S. 4. Some College 5. Vocational School 6. AA or AS Degree 7. BA or BS Degree 8. Some Grad. School 9. MA or MS Degree 10. PH.D. OR 91. No Formal
Neighborhood food security	FSLEV FSLEVCB	Nominal, categorical	0=yes 1=no
Gender	SRSEX	Nominal Categorical	1 = Male, 2 = Female
Age to 17	SRAGE_P	Interval	Years of age from 12
Neighborhood food insecurity past	TE64		ate less than should because of money in 12 months
Statistical tests for	and		Multiple regression, Descriptive statistic will be conducted.

Note. ***Data file: teen.sas7bdat, teen.sav, teen.dta
Source: UCLA Center for Health Policy Research, 2011-2012 CHIS

Data Analysis Plan (Variables and Statistical Procedures)

Analyses were completed with the Statistical Analysis System (SAS) software for Windows (SAS Version 9.4). The PROC FREQ procedure was used to compute several statistics that described the associations between variables in a cross tabulation table. The PROC FREQ also helps to identify which categories have the most and smallest counts (SAS Institute Inc., 2013, P. 73). By default, PROC FREQ excludes missing values before constructing the frequency and cross tabulation tables. It also excludes missing values before computing statistics. In spite of this, the total frequency of observations with missing values is displayed below each table (SAS Institute Inc., 2013, P. 148). The analytical approaches to the four research questions was descriptive statistics that characterize the sample (means [SD]; number [proportion]) for all variables utilizing parametric methods for interval and ratio variables and nonparametric statistics for categorical variables. Mean BMI is the dependent variable and was calculated by sums of adolescents divided by total number of adolescents in the study. Overweight or obese is defined as follows: adolescents with ≤ 5th percentile for BMI are classified as *underweight*. Also adolescents BMI within the >5th and ≤85th percentile for BMI are classified as *normal weight*. The adolescents within >85th and ≤95th percentile for BMI are classified as *overweight*, and adolescents with 95th percentile for BMI is classified as *obese* (WHO, n.d.a). The association between mean BMI and all independent variables was reviewed independently employing regression analyses and Spearman's Correlation Test. Bivariate analysis (correlations) was used to test relationships between mean BMI and physical activity behaviors. Multiple regression analysis was used to examine

directional effect and interaction among each variable. It assessed the link between parental education level, physical activity and sedentary behavior. Multiple Regression analysis was used to examine joint associations among dependent and independent variables and is useful for describing the potential effects of a set of variables on a dependent variable. A *p*-value of < 0.05 and 95% confidence intervals was used to determine statistical significance throughout all the analyses that were performed.

Reliability and Validity

Reliability is defined as the constancy with which outcomes occur and validity signifies how well the data measure what they are supposed to measure (Triola, 2004, p. 203). The quality of the CHIS data is consistently outstanding (CHIS, 2007). The CHIS uses methods that yield valid, reliable, and characteristic data for researchers. As such, its reputation for reliability has led to its extensive use in a variety of program and policy activities to include ascertaining and defining problems targeting resource use, planning and assessment of programs, and assessment of studies (CHIS, 2007). CHIS has been compared with national reputable data such as the Medical Expenditure Panel Survey (MEPS) and the National Health Interview Survey (NHIS) (CHIS, 2008). Both the CHIS and NHIS are general health surveys and include a number of comparable and similar variables (CHIS, 2008). A benchmarking study in 2003 was conducted by UCLA in collaboration with the National Center for Health Statistics and Agency for Healthcare Research and Quality to assess potential nonresponse bias for a variety of estimates CHIS as compared to the national data in NHIS and MEPS (CHIS, 2008). For this comparison, only the California samples of NHIS and MEPS were used. While the "CHIS response

rate was lower than that of NHIS and MEPS which are conducted in-person, the comparisons among the three surveys did not reveal striking differences and differences were statistically significant mainly due to a large sample size of CHIS, but for most characteristics it is difficult to consider their differences substantial (CHIS, 2008, p. 7). These findings are important because as with the National surveys, the Office and Management and Budget require CHIS to meet high standards of representativeness (CHIS, 2007).

Validity refers to as the process of certifying that the instrument accurately measures what it is intended to measure (Turocy, 2002). Validity is categorized into four types: the conclusion, internal validity, external validity and construct validity. The conclusion validity focuses more on the relationship between the result and the program while internal validity dwells on the kind of relationship there is between the result and the program. Construct validity, on the other hand, analyzes how strong the result is, whereas the external validity is focused more on the general concept of the result. Many researchers have used CHIS data in a way that is consistent with conclusion validity. Melius (2013) used the CHIS to examine indicators of overweight and obesity among racial and ethnic minority children age 2 to 11 years. His results support conclusion validity in that there were strong relationships between race, ethnicity and poverty with overweight and obesity in these children (41% of African Americans and 37% of Hispanics were obese vs. 22% of Asians and 20% of Whites). Also, the odds ratio of African American children becoming obese was 2.16 and Hispanics was 1.92 vs. 1.01 of both Asian and Whites children. These study outcomes along with the author's

observations that children with access to parks and playgrounds were 18% less likely to be overweight than children without such access indicate the importance of health behaviors and environmental contexts to understanding the causes of obesity in ethnically diverse communities (2013). Hastert, Babey, Diamant and Brown (2008) in their study using CHIS to look at barriers to healthy weight showed that lower-income adolescents living in California were twice as likely to be obese than their counterparts living in more affluent households (21% vs. 8%) due to fewer opportunities for physical activity and living in less healthy food environments. The results and conclusions of these studies are relevant to and supportive of CHIS data.

Ethical Procedures

Access to archived material is governed by rigorous codes of practice (Mauthner & Parry, 2009). This study used a secondary data from the UCLA-Center for Health Policy Research UCLA-CHPR. The UCLA-CHPR is liable for upholding consistent guidelines to safeguard respondent confidentiality as stipulated in approved protocols by the UCLA IRB number 11-000068 and the California Committee for the Protection of Human Subjects number 00-04-04. The area of my study that presented ethical concerns was obtaining the appropriate permissions to access, retain, and use data sets. Acquiring the proper consent for the use of these data sets was crucial before I could access, transfer or analyze the data. Procurement of the proper agreements to access, retain and utilize secondary data sets is crucial for investigators before any data are retrieved or transmitted and analyses are conducted. Stiles et al. (2011) asserted that a good practice is to make an official and detailed application for data from the custodian. This requires a

comprehensive written agreement between the researcher and the custodian of data. Security, confidentiality, permissions, and appropriate use summary are the four ethics for use of secondary data (Stiles et al., 2011). This written agreement detailed the conditions of data possession and what studies and analyses are permitted utilizing the data, and also how the data will be secured and confidentiality maintained, whether supplementary permissions or consent are needed at an individual level, and how long the researcher may retain the data. These confidential files allowed me access to sensitive or identifiable data that may be needed for population targeting, geographic mapping or other such analyses, but that would not otherwise be available to users in order to protect collaboration with researchers and data analysts. The confidential data are on sensitive variables such as sexual orientation, gun ownership, minorities, etc. and geo-coded data through the CHIS Data Access Center (DAC).

Finally, the agreement stipulates passable capacity to use the data that the data obtained are suitable and practical for research, and that the researcher has enough knowledge of the data and the circumstances within which data were gathered to correctly interpret results (Stiles et al., 2011). This study was conducted in a just and fair manner to all interested sub-populations by the use of stratified sampling to enable meaningful findings for smaller sub-population groups which otherwise might not have had sufficient sample sizes included to benefiting from this study. This study was approved by the Walden Institutional Review Board (IRB) with approval number of 09-26-14-0185135. The UCLA Center for Health Policy Research (committee) approval number through the Data Access Center is DAC141020.

Summary

This chapter includes information on study methodology. A quantitative approach was used. Hypotheses that link the food environment with obesity assert that nearness to fast-food outlets, convenience stores, or small grocery stores undermines diet quality, whereas nearness to supermarkets or full-range grocery stores enhances it by providing healthful products, mainly fruits and vegetables (Larson et al., 2009). The CHIS 2007-2013 dataset supports the study's variables. The data were raw/ unweighted, and represented adolescents from the population at large. These data are only accessible through DAC because of their sensitive nature. The regression analysis offered an understanding of the variable or variables that have the utmost effect on mean BMI in this age group. The SAS software for Windows (SAS Version 9.4 Service Pack 4, SAS Institute Inc, Cary, NC, 2013), was used for statistical analysis for the correlation of mean BMI to environmental factors. Chapter 4 includes a demonstration of the descriptive statistics, regression analysis, and results. Chapter 5 provides an interpretation of the outcomes and discussions on limitations and recommendations for future actions and implications for social change.

Chapter 4: Results

Introduction

The purpose of this cross- sectional study was to examine the associations between diet, physical activity, the built environment and the mean BMI of adolescents aged 12 to 17 years living in South Los Angeles, California. The mean BMI was determined by the sum of adolescents BMI divided by total number of adolescents in the study. Neighborhood insecurity was examined from multiple viewpoints: (a) physical security (perception of safety); (b) food insecurity (eating less than one should because of money in past 12 months); and (c) availability of recreational facilities (parks) necessary for a healthy lifestyle. The data for analysis were from CHIS, a state-wide, cross-sectional, unweighted, random sample in the State of California. In this quantitative study, secondary data analysis of the 2007-2013 CHIS dataset was used. The data collection process was described fully in Chapter 3. In line with this, the analyses were guided by the following research questions and hypotheses:

RQ1: What is the association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI?

$H1_0$: There is no association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

$H1_a$: There is an association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

RQ2: What is the association between neighborhood food insecurity in South Los Angeles and adolescent's dietary intake and the mean BMI?

$H2_0$: There is no association between neighborhood food insecurity, adolescent's dietary intake and the mean BMI.

$H2_a$: There is an association between neighborhood food insecurity, adolescent's dietary intake and the mean BMI.

RQ3: What is the association between neighborhood recreational facilities in South Los Angeles and adolescent's physical activity and the mean BMI?

$H3_0$: There is no association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

$H3_a$: There is an association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

RQ4: What is the relationship between parents' education level, parents' income level and adolescent's physical activity and the mean BMI?

$H4_0$: There is no association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

$H4_a$: There is an association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

The focus of this chapter is to present the hypotheses that were tested, data collection, and report the findings related to each hypothesis. The study outcomes are presented in tables with descriptive narratives. This chapter also includes a summary of the descriptive statistics of the study variables. This is followed by the results of the correlation test between variables and the multiple linear regression analysis presented to address the research questions of the study. Data analysis included descriptive statistics

(means, ranges, and standard deviations) describing the general characteristics as well as correlation tests and regression analysis for identification of statistically significant associations.

Data Collection

I used CHIS probability sample of civilian non institutionalized adolescents aged 12 to 17 years living in South Los Angeles. I used observed CHIS data as I specifically looked at the adolescents who completed the survey in the South Los Angeles area to understand the relevant social implications of this community; however, weighted data are available through CHIS. My data analysis was based on the California Health Interview Survey 2007-2013, allowing for an observed/unweighted sample size of 627 African American adolescents in the final data (Table 2). The reason I did not use weighted data was that it would have brought the population counts to U.S. Census proportions, understanding that this approach might not have addressed as well the actual proportions of the sample studied. Also, I used observed CHIS data because I only looked at the adolescents who completed the survey in the South Los Angeles area to better understand the relevant social implications of this community. The data used are available for restricted use by applying to the UCLA-DCA. The study design, data collection procedures, variables, and strategies to test the study hypothesis were described in Chapter 3. Data from the CHIS 2007-2013 were transferred into SAS software for Windows (SAS Version 9.4 Service Pack 4, SAS Institute Inc, Cary, NC, 2013); results were analyzed using frequencies and percentages and values with p-value $\leq$ 0.05 were considered statistically significant. Responses were examined to ensure

inclusion criteria were met; all participants were adolescents between the ages of 12 and 17. Interview responses of "refused" and "don't know" were considered as missing data. Obesity status was determined by examining the child's BMI in terms of age- and sex-specific percentiles using the 2000 CDC Growth Charts for the United States (see Appendices D and E). The mean BMI was determined by the sum of adolescents' BMI divided by total number of adolescents in the study. All the statistical analyses described below were completed using the merged information from the 6 years of CHIS dataset.

Demographics

As part of the demographic characteristics of the sample, gender and age were determined for the sample of African American adolescents living in South Los Angeles, California. The total number of observed sample size of African American adolescents aged 12 to 17 was 627 in the 6 years of data from the 2007-2013 CHIS datasets (Table 2). There were an almost equal proportion of 306 male (48.80%) and 321 female (51.20%) respondents, with a larger number of adolescents between 15 to 16 years of age at screening. Adolescents 12 years of age and 17 years of age each made up a smaller proportion of the sample than other age groups at 14.51% and 14.83%, respectively. Otherwise, the sample distribution by age was relatively consistent with a range of 16.76% to 18.66% for adolescents 13 to 17 years of age. Also, almost half or 225 of adolescents (45.89%) were from the CHIS year 2007, 165 (26.32%) were from the CHIS year 2011 to 2012, 162 (25.84%) from CHIS year 2009, and 75 (11/.6%) from CHIS year 2013. Table 2 shows observed frequency by year: frequency ranges from 225 in 2007 to 75 in 2013.

Table 2

Frequency and Percentages for Age and Gender

	Frequency	Percentage
Gender		
Male	306	48.80
Female	321	51.20
Total	627	100.00
Age		
12	91	14.51
13	105	16.75
14	106	16.91
15	115	18.34
16	117	18.66
17	93	14.83
Total	627	100.00
CHIS Year		
2007	225	45.89
2009	162	25.84
2011-2012	165	26.32
20013	75	11.96
Total	627	100.00

Descriptive Statistics

There are 306 male (48.80%) and 321 female (51.20%) respondents, with a larger number of adolescents between 15 to 16 years of age at screening. Of these adolescent respondents, 60.9 % were normal weight, 19.9% were overweight, 17.5% were obese, and 1.6% were underweight (Table 3.4). The total number of obese adolescents was *N*=110, with males having a slightly higher proportion of obesity *N*=57 (51.82%) male vs. 53 (48.18%) females. However, the reverse is the case for overweight *N*=125 with 56 (44.80%) males overweight vs. 69 (55.20%) females. The total number of normal weight adolescents were *N*=382 and out of this number, 188 (49.20%) were male vs. 194

(50.80%) female. The total number of underweight *N*=10, the data were composed of an equal proportion of 50% males vs. 50% female. For age-specific mean BMI (Table 3.5), 20.9% of 12 years old were obese, 17.3% of the 13 years old were obese, 18.2 % of the 14-year-old were obese, and 14.6 % of 16 and 17-year-old were also obese. Trends for overweight are similar to that of obesity with 16% of the 12 years old, 14.4 %, of 13 years old, 16% of the 14 years old, 20.8% of the 15 years old, 17.6% of the 16 years old and 15.2% of 17 years old overweight.

Descriptive statistics were generated for all variables (Table 3). The lower bound 95% confidence interval (C.I.) for the difference was wide, ranging from 1.08 to 67.56 and the upper bound 95% C.I. ranges from 1.1 to 71.68. The neighborhood physical security was scored on the perception of safety, 1- feels safe all of the time, 2-most of the time, 3-some of the time and 4- none of the time. Table 3.1 shows that 41.5% of participants felt safe in neighborhood all of the time, 44.8% felt safe most of the time, 11.9% felt safe some of the time, and 1.7% felt safe none of the time. The definition of neighborhood food insecurity was obtained from the CHIS adolescent survey public use file dictionary (PUF). This addressed the availability of sufficient food (coded 1 = yes, 0 = no). Adolescent's dietary intake was measured by the score of the number of times ate fast food during the past week, 39.2% said "Yes" to ate less than should because of money in past 12 mos, while 60.9% accounted for 'No" (Table 3.2). Adolescents' physical activity was measured by the number of days adolescents were physically active for 60 minutes or more. Validated self-reported questions were used to assess the number of days adolescents were physically active for 60 minutes or more. Being physically

active was evaluated by adding up the time adolescents were active for each day for the past one week. Then noting how many days they were active for at least 60 minutes from 0 day to 7 days, representing the days of the week. Also, adolescents recounted whether they engaged in PE at school, and the name of the school. Adolescents' physical activity was coded (1 = yes, 0 = no), 88.7% said "Yes" to park/playground walking distance from home, while 11.3% accounted for "No" (Table 3.3). With regard to weight status, 60.9 % of adolescents were normal weight, 19.9% were overweight, 17.5% were obese, and 1.6% were underweight (Table 3.4).

Variation in sample size by variable is due to the number of adolescents answering related questions. With the exception of questions on age and gender, specific BMI percentile, park/playground walking distance from home, and the number of times adolescents ate fast food during the past week, answered by every participant (N=627), other questions had some missing responses. For the purpose of statistical analysis, missing values were not included and this accounts for the different sample size by variable (Table 3). Table 3 also shows both skewness and kurtosis. Skewness is the degree of asymmetry of a distribution around its mean (Čisar & Čisar, 2010). The distribution of the data is symmetric when the skewness is close to zero. While a positive skewness indicates an asymmetric tail extending toward the right, a negative distribution shows an asymmetric tail extending toward the left. The kurtosis measure indicates peakedness or flatness of a distribution (Čisar & Čisar, 2010). In SAS, kurtosis coefficient is defined to have kurtosis of 0.0, a distribution which indicates a normal distribution. The following study variables: household income, times fast food was eaten

during the previous week, neighborhood safety, park/playground walking distant from home, have positive kurtosis. The positive nature of the kurtosis indicates a leptokurtic distribution. The ate less than should because of money in past 12 months, no. of days typical week teen physically active 60 min or more, and adult educational attainment variables are all negative indicating a platykurtic distribution. The BMI Percentile variable has a mode of zero and a median of 77.08. Because the mean BMI is 69.62 and the median is 77.08, this suggests a potentially significant negative Skewing (to the left).

Table 3
Descriptive Statistics of Study Variables

	N	Range	Mean	SD	95% CI	
					Lower bound	Upper bound
BMI Percentile (continuous)	627	99.86	69.62	26.22	67.56	71.68
No. of days typical week teen physically active 60 min or more	486	7.00	4.13	2.21	3.94	4.34
Ate less than should because of money in past 12 months	235	1.00	1.61	0.49	1.55	1.67
No. times ate fast food during past week	627	12.00	1.77	1.65	1.64	1.90
Feel safe in neighborhood	402	3.00	1.74	0.73	1.67	1.81
Park/playground Walking distance from home	627	1.00	1.11	0.32	1.09	1.14
Household annual income before taxes	586	600000.00	68618.00	58714.00	63855.30	73382.63
Adult educational attainment	625	9.00	5.18	0.20	4.99	5.36

(table continues)

	N	Minimum	Maximum	Mode	Median
BMI percentile (continuous)	627	0	99.86	0	77.08
No. of days typical week teen physically active 60 min or more	486	0	7.00	5.00	5.00
Ate less than should because of money in past 12 months	235	1	2.00	2.00	2.00
No. times ate fast food during past week	627	0	12.00	1.00	1.00
Feel safe in neighborhood	402	1	4.00	2.00	2.00
Park/playground Walking distance from home	627	1	2.00	1.00	1.00
Household annual income before taxes	586	0	600000.00	40000.00	55000.00
Adult educational attainment	625	1	10.00	-0.97	4.00

Note: see age and gender specific in tables 3.4 and 3.5

	N	Skewness	Est. Std. Error Skewness	Kurtosis	Est. Std. Error of Kurtosis
BMI Percentile (continuous)	627	-0.85	0.09	-0.26	0.19
No. of days typical week teen physically active 60 min or more	486	-0.29	0.11	-0.99	0.22
Ate less than should because of money in past 12 months	235	-0.45	0.15	-1.82	0.31
No. times ate fast food during past week	627	1.40	0.09	3.26	0.19
Feel safe in neighborhood	402	0.72	0.12	0.09	0.24
Park/playground Walking distance from home	627	2.45	0.09	4.00	0.19
Household annual income before taxes	586	2.45	0.10	12.99	0.20
Adult educational attainment	625	0.20	0.09	-0.97	0.19

Note. See age and gender specific in Tables 3.4 and 3.5**.**

Table 3.1

Demographic characteristics: frequencies and percentages according to feel safe in neighborhood

	F	%	Cumulative F	Cumulative %
All of the time	167	41.54	167	41.54
Most of the time	180	44.78	347	86.32
Some of the time	48	11.94	395	98.26
None of the time	7	01.74	402	100.00

Frequency Missing = 225

Table 3.2

Demographic characteristics: frequencies and percentages according to ate less than should because of money in past 12 months

	F	%	Cumulative F	Cumulative %
YES	92	39.15	92	39.15
NO	143	60.85	235	100.00

Frequency Missing = 392

Table 3.3

Demographic characteristics: frequencies and percentages according to park/playground walking distance from home

	F	%	Cumulative F	Cumulative %
YES	556	88.68	556	88.68
NO	71	11.32	627	100.00

Table 3.4

Demographic characteristics: frequencies and percentages according to categorized mean BMI variable and gender specific

BMI cat	F	Male	Female	%	Cumulative F	Cumulative %
Underweight	10	5	5	1.59	10	1.59
Normal weight	382	188	194	60.93	392	62.52
Overweight	125	56	69	19.94	517	82.46
Obese	110	57	53	17.54	627	100.00

Table 3.5

Demographic characteristics: frequencies and percentages according to categorized mean BMI variable and self-reported age

BMI cat	12y%	13y%	14y%	15y%	16y%	17y%	N
Underweight	3/30	1/10	2/20	3/30	1/10	0 /0	10
Normal weight	45/11.8	67/17.5	68/17.8	66/17.3	78/20.4	58/15.2	382
Overweight	20/16.0	18/14.4	20/16.0	26/20.8	22/17.6	19/15.2	125
Obese	23/20.9	19/17.3	16/14.6	20/18.2	16/14.6	16/14.6	110
N	91	105	106	115	117	93	627

Regression Results for Research Question 1

What is the association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI? The alternative hypothesis held that there would be an association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

This section presents the result of the regression analysis to determine if physical activity and neighborhood physical security of African American adolescents in South Los Angeles, California (N=627) have a statistically significant association with their mean BMI. Dummy codes were created for the independent variable of neighborhood physical security for the two categorical response choices of all the time and most of the

time. The alpha level $\alpha = 0.05$ which was preset to be the critical value for determining what constitutes statistical significance was used in the regression model. Independent variables have significant influences on the dependent variable if the *p*-values of the *t*-test of the regression results are equal or less than the 0.05.

The results of the test of model effects of adolescent's physical activity and neighborhood physical security on mean BMI are shown in Table 4. The ANOVA result (F (7, 80) = 1.36, p = 0.23) includes the overall significance of the model and the overall values of the two independent variables of adolescent's physical activity and neighborhood physical security relative to the mean BMI was found not to be statistically significant. The effect of adolescent's physical activity (F (1, 80) = 0.01, p = 0.91), neighborhood physical security (F (3, 80) = 1.96, p = 0.13), and the interaction effect of adolescent's physical activity and neighborhood physical security (F (3, 80) = 2.53, p = 0.06) relative to mean BMI was also found not to be statistically significant.

Table 4

Tests of Model Effects of Impact of Adolescent's Physical Activity and Neighborhood Physical Security on mean BMI

Effect	Num DF	F Value	Pr > F
Model	7	1.36	0.23
Intercept	1	260.13	0.00
Adolescent's physical activity	1	0.01	0.91
Neighborhood physical security	3	1.96	0.13
Adolescent's physical activity * Neighborhood physical security	3	2.53	0.06

The results of the regression analysis to determine the association between neighborhood physical security in South Los Angeles and adolescent's physical activity

and the mean BMI are shown in Table 5. The model fit in terms of R^2 of the generated linear regression model is 0.06 indicative that the two independent variables of adolescent's physical activity and neighborhood physical security accounted for only 6% of the variance in the weight status measure of BMI. The two independent variables have a very low combined effect on the dependent variable. The individual effects of the two independent variables, adolescent's physical activity (t (80) = -0.39, p = 0.69), and neighborhood physical security dummy category of "all the time" (t (80) = -0.30, p = 0.76), and neighborhood physical security dummy category of "most of the time" (t (80) = -1.56, p = 0.12) relative to mean BMI was found not to be statistically significant. The insignificant result is because all the p-values of the enumerated independent variables are greater than 0.05. Based on the outcome of the regression analysis, I cannot reject the null hypothesis for research question 1 that there is no association between neighborhood physical security in South Los Angeles and adolescent's physical activity and the mean BMI.

Table 5

Multiple Linear Regression Results of Impact of Adolescent's Physical Activity and Neighborhood Physical Security on mean BMI

Parameter	Estimate	Standard Error	t Value	Pr > |t|
(Intercept)	85.19	12.02	7.09	0.00
Adolescent's physical activity	-0.76	1.94	-0.39	0.69
Neighborhood physical security (All of the time)	-4.03	13.60	-0.30	0.76
Neighborhood physical security (Most of the time)	-21.44	13.78	-1.56	0.12

Note. F (7, 80) = 1.36, Sig. = 0.23, *R Square* (R^2) = 0.06, N = 261
a. Dependent Variable: mean BMI
b. Predictors: (Intercept), Adolescent's physical activity, Neighborhood physical security (All of the time), Neighborhood physical security (Most of the time)

Spearman's Correlation Coefficients Test Results for Research Question 2

To investigate the relationship between physical activity of African American adolescents in South Los Angeles, California (N=627) and the mean BMI, Spearman's correlation coefficient was conducted. A Spearman's correlation test was calculated to index the strength and direction of the relationships among the stated variables was also used in the correlation test. The alpha level (α=0.05) which was preset to be the critical value for determining what constitutes statistical significance. Significant correlation between variables is observed if the p-value of the r statistics of the Spearman's correlation test is less than or equal to 0.05. The results of the correlation between the two study variables are shown in table 6. There was no monotonic correlation between mean BMI and physical activity Behavior (Υ_S =0.0038, n 627, p =0.93). This outcome is because the p-value was greater than to the Alpha level which was preset to be the critical value for determining what constitutes statistical significance.

Table 6

Spearman's Correlation Test Results between mean BMI and Physical Activity (PA) Behavior

Spearman Correlation Coefficients
Prob > |r| under H0: Rho=0
Number of Observations

Correlations

Mean BMI	PA Behavior			
Spearman's rho	Mean BMI	Correlation Coefficients	1.00000	0.00384
		Sig. (2-tailed)		0.9327
		N	627	486
	PA Behavior	Correlation Coefficients	0.00384	1.00000
		Sig. (2-tailed)	0.9327	
		N	486	486

Note. Prob > |r| under H0: Rho = 0

Regression Results for Research Question 2

What is the association between neighborhood food insecurity in South Los Angeles and adolescent's dietary intake and the mean BMI?

A regression analysis was also conducted to determine if dietary behavior and food security of African American adolescents in low-income communities in South Los Angeles, California (*N*=627) have a statistically significant association with influence on the mean BMI. Dummy codes were created for the independent variable of food security for the two categorical response choices of no and yes. The alpha level (α=0.05) which was preset to be the critical value for determining what constitutes statistical significance was used in the regression model. The results of the test of model effects of adolescent's

dietary intake and food security on mean BMI are shown in Table 7. The ANOVA result (F (3, 80) = 4.37, p = 0.01) showed that the overall significance of the models was to predict mean BMI based upon the independent variables of adolescent's dietary intake and food security used in this model was statistically significant. The effect of food security (F (1, 80) = 8.35, p = 0.01) relative to the mean BMI were significant at the level of significance of 0.05. On the other hand, the effect of adolescent's dietary intake (F (1, 80) = 2.35, p = 0.13), and the interaction effect of adolescent's dietary intake and food security (F (3, 80) = 1.43, p = 0.23) relative to mean BMI was not statistically significant.

Table 7

Tests of Model Effects of Impact of Adolescent's Dietary Intake and Food Security on Weight Status (BMI)

Effect	Num DF	F Value	Pr > F
Model	3	4.37	0.01
Intercept	1	962.46	0.00
Adolescent's dietary intake	1	2.35	0.13
Food security	1	8.35	0.01
Adolescent's dietary intake * Food security	1	1.43	0.23

The results of the regression analysis to determine the association between adolescent's dietary intake and food security and mean BMI are shown in Table 8. The model fit in terms of R^2 of the generated linear regression model is 0.06 indicative that the two independent variables of adolescent's dietary intake and food security accounted for only 6% of the variance in the weight status measure of mean BMI. The two independent variables have a very low combined effect on the dependent variable. The individual effects of the two independent variables of adolescent's dietary intake (t (80) = -2.04, p =

0.05) and food security dummy category of "No" (t (80) = -2.89, p = 0.01) relative to the mean BMI were statistically significant. This outcome is because the alpha level (α=0.05) which was preset to be the critical value for determining what constitutes statistical significance. Based on the results of the regression analysis, I can reject the null hypothesis for research question 2 that there is no association between neighborhood food insecurity, adolescent's dietary intake and mean BMI. Based on the B estimate value both the adolescent's dietary intake (B = -2.82) and food security dummy category of "No" (B = -14.32) shows that there is a negative association, such that these are predictors of a decreased mean BMI. When the adolescent's dietary intake increased by one standard deviation, the mean BMI of the adolescents decreased by 2.82. When the adolescents were food insecure the mean BMI of the adolescents decreased by 14.32.

Table 8

Multiple Linear Regression Results of Impact of Adolescent's Dietary Intake and Food Security on mean BMI

Parameter	Estimate	Standard Error	t Value	Pr > |t|
(Intercept)	85.98	3.6	23.9	0
Adolescent's dietary intake	-2.82	1.39	-2.04	0.05
Food security (No)	-14.32	4.96	-2.89	0.01
Food security (Yes)	0	0		

Note. F (3, 80) = 4.37, Sig. = 0.01, *R Square* (R^2) = 0.06, N = 235
a. Dependent Variable: mean BMI
b. Predictors: (Intercept), Adolescent's dietary intake, Food security (No), Food security (Yes)

Regression Results for Research Question 3

What is the association between neighborhood recreational facilities in South Los Angeles and adolescent's physical activity and their mean BMI? The alternate hypothesis

held that there is an association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI.

This section presents the regression results to determine whether adolescent's physical activity and neighborhood recreational facilities of African American adolescents in low-income communities in South Los Angeles, California (N=627) are predictors to their mean BMI. Dummy codes were created for the independent variable of recreational facilities for the two categorical responses choices of yes and no. The alpha level (α=0.05) which was preset to be the critical value for determining what constitutes statistical significance was used in the regression model. The results of the test of model effects of impact of physical activity and neighborhood recreational facilities on mean BMI are shown in Table 9. The ANOVA result (F (3, 80) = 2.80, p = 0.05) includes the overall significance of the models which was used to predict mean BMI based on the independent variables used in this model. However, the effect of adolescent's physical activity (F (1, 80) < 0.001, p = 0.95), neighborhood recreational facilities (F (1, 80) = 1.24, p = 0.27), and the interaction effect of adolescent's physical activity and neighborhood recreational facilities (F (1, 80) = 0.01, p = 0.91) relative to mean BMI was not statistically significant.

Table 9

Tests of Model Effects of Impact of Adolescent's Physical Activity and Neighborhood Recreational Facilities on mean BMI

Effect	Num DF	F Value	Pr > F
Model	3	2.80	0.05
Intercept	1	54.33	0.00
Adolescent's physical activity	1	0.00	0.95
Neighborhood recreational facilities	1	1.24	0.27
Adolescent's physical activity * Neighborhood recreational facilities	1	0.01	0.91

The results of the regression analysis to determine the association between neighborhood recreational facilities, adolescent's physical activity and the mean BMI are shown in Table 10. The model fit in terms of R^2 of the generated linear regression model is 0.03 which indicated that the two independent variables of adolescent's physical activity and neighborhood recreational facilities accounted for only 3% of the variance in the mean BMI. The two independent variables also have a very low combined effect on the dependent variable. For the individual effects of the two independent variables, adolescent's physical activity (t (80) = -0.80, p = 0.42), neighborhood recreational facilities dummy category of "Yes" (t (80) = -1.11, p = 0.27), and neighborhood recreational facilities dummy category of "No" to weight status measure of mean BMI were insignificant. The outcome is because the p-values are all greater than 0.05. Based on the results of the regression analysis, the null hypothesis of no association was upheld; so the alternate hypothesis that there is an association was rejected.

Table 10

Multiple Linear Regression Results of Impact of Adolescent's Physical Activity and Neighborhood Recreational Facilities on mean BMI

Parameter	Estimate	Standard Error	t Value	Pr > |t|
(Intercept)	76.25	3.02	25.21	0.00
Adolescent's physical activity	-0.51	0.64	-0.80	0.42
Neighborhood recreational facilities (No)	-19.17	17.21	-1.11	0.27
Neighborhood recreational facilities (Yes)	0.00	0.00		

Note. F (3, 80) = 2.80, Sig. = 0.05, *R Square* (R^2) = 0.04, N = 486
a. Dependent Variable: mean BMI
b. Predictors: (Intercept), Adolescent's physical activity, Neighborhood recreational facilities No), Neighborhood recreational facilities (Yes)

Regression Results for Research Question 4

What is the relationship between parents' education level, parents' income level and adolescent's physical activity and the mean BMI? This section presents the regression results to determine whether adolescent's physical activity, parents' education level, and parents' income level of African American adolescents in South Los Angeles, California (N=627) are predictors of their mean BMI. The alpha level (α=0.05) was preset to be the critical value for determining what constitutes statistical significance was also used in the regression model.

The results of the test of model effects of impact of adolescents' physical activity, parents' education level, and parents' income level on mean BMI are shown in Table 11. The ANOVA result (F (4, 80) = 0.64, p = 0.64) includes the overall significance of the models to predict Mean BMI and the overall values of the three independent variables of adolescents physical activity, parents' education level, and parents' income level to the mean BMI. The predictive value of adolescent's physical activity (F (1, 80) = 0.05, p =

0.82), parents' income level (F (1, 80) = 0.62, p = 0.43), parents' education level (F (1, 80) = 0.02, p = 0.89), and the interaction effect of adolescent's physical activity, parents' income level, and parents' education level (F (1, 80) = 0.13, p = 0.72) relative to mean BMI was not statistically significant.

Table 11

Tests of Model Effects of Impact of Adolescent's Physical Activity, Parent's Education Level, and Parents' Income Level on mean BMI

Effect	Num DF	F Value	Pr > F
Model	4	0.64	0.64
Intercept	1	161.88	0.00
Adolescent's physical activity	1	0.05	0.82
Parents' income level	1	0.62	0.43
Parents' education level	1	0.02	0.89
Adolescent's physical activity * Parents' income level * Parents' education level	1	0.13	0.72

The results of the regression analysis to determine the association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI are shown in Table 12. The model fit in terms of R^2 of the generated linear regression model is 0.01 indicative that the three independent variables of adolescent's physical activity, parents' education level, and parents' income level accounted for only 1% of the variance in the mean BMI. The three independent variables also have a very low combined effect on the dependent variable. The individual effects of the three independent variables, adolescent's physical activity (t (80) = -0.22, p = 0.82), parents' education level (t (80) = -0.14, p = 0.89), and parents' income level (t (80) = -0.79, p = 0.43) to the mean BMI were insignificant. In addition, the interaction effect of the three

independent variables of adolescent's physical activity, parents' education level, and parents' income level (t (80) = -0.36, p = 0.72) to the dependent variable of mean BMI is also insignificant. Based on the results of the regression analysis, I accept the null hypothesis for the research question 4 that there is no association between parents' education level, parents' income level and adolescent's physical activity and the mean BMI.

Table 12

Multiple Linear Regression Results of Impact of Adolescent's Physical Activity, Parent's Education Level, and Parents' Income Level on mean BMI

Parameter	**Estimate**	**Standard Error**	**t Value**	**Pr > |t|**
(Intercept)	77.13	6.06	12.72	0.00
Adolescent's physical activity	-0.21	0.93	-0.22	0.82
Parents' income level	-0.32	0.40	-0.79	0.43
Parents' education level	-0.14	0.98	-0.14	0.89
Adolescent's physical activity * Parents' income level * Parents' education level	0.00	0.01	-0.36	0.72

Note. F (4, 80) = 0.64, Sig. = 0.64, *R Square* (R^2) = 0.04, N = 453
a. Dependent Variable: mean BMI
b. Predictors: (Intercept), Adolescent's physical activity, Parents' income level, Parents' education level

Summary

The objective of this cross- sectional study was to examine the associations between diet, physical activity, the built environment and the mean BMI of adolescents aged 12 to 17 years living in South Los Angeles, California. Study results were generated through the SAS statistical software. Calculations of the correlation coefficients and

regression results to address the research questions of this study were described. Based on the regression analyses result, I cannot reject the null hypotheses for Research Questions 1, 3, and 4. To be more specific, there are no associations between neighborhood physical security in South Los Angeles, adolescent's physical activity and the mean BMI. Also, there is no relationship between neighborhood recreational facilities, adolescent's physical activity and the mean BMI; and there is no association between parents' education level, parents' income level and adolescent's physical activity and mean BMI. However, there is an association between neighborhood food insecurity, adolescent's dietary intake, and mean BMI. The adolescent's dietary intake and food security dummy category of "No" have significant negative influence on the mean BMI. The ANOVA result included the overall significance of the model and the overall influence of the adolescent's physical activity and neighborhood recreational facilities to the dependent variable of the mean BMI were not significant. Chapter 5 concludes this study. Chapter 5 presented the discussion of findings, relevance, recommendation for future studies, and implications for social change.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this cross-sectional study was to examine the interaction of dietary behavior, physical activity, the built environment, and the mean BMI of adolescents aged 12 to 17 years living in South Los Angeles. A quantitative research design was used and data from the CHIS 2007-2013 selected to examined neighborhood insecurity from multiple viewpoints: (a) physical security (perception of safety); (b) food insecurity (eating less than one should because of money in past 12 months); and (c) availability of recreational facilities necessary for a healthy lifestyle. For this quantitative research design, secondary data from the CHIS 2007-2013 (Appendix D) were used to examine selected variables pertinent to the research questions associated with African American adolescents 12 to 17 years of age. These variables included the following: neighborhood safety, self-reported gender, age, dietary behaviors, nutrition and food environment, parental education attainment, and parental income, and these were previously found to influence how an individual develops skills, behaviors, values, and culture in adolescence and adulthood (Waters et al., 2009). This study was necessary to find out if there were statistical supports for the association of mean BMI with physical security, food insecurity, parental income, parental educational level, and availability of recreational facilities necessary for a healthy lifestyle. Previous researchers found mixed associations between these independent variables (physical security, food insecurity, parental income, parental educational level, and availability of recreational facilities necessary for a healthy lifestyle) and childhood obesity (Casey et al., 2009; Galvez et al., 2010; Sarkar et

al., 2011). Unfortunately, my result differed from many of these researchers as I was not able to validate some of these findings within my study population.

In Chapter 5, I discuss the results of the data analysis presented in Chapter 4 and present my research findings in terms of the literature presented in Chapter 2. It includes the following: findings, interpretation of the independent variables, implications for social change, limitations of the study, recommendations for future research, and conclusions. The findings and interpretation are relevant to the study's research questions.

Summary of Findings

There were no associations between neighborhood physical security in South Los Angeles, adolescents' physical activity, and the mean BMI; and no relationship between neighborhood recreational facilities, adolescents' physical activity, and the mean BMI. There were also no associations between parents' education level, parents' income level, and adolescents' physical activity and the mean BMI. However, there was an association between neighborhood food insecurity, adolescent's dietary intake, and the mean BMI. I also found from the ANOVA result that the overall significance of the model and the overall impact of the adolescent's physical activity and neighborhood recreational facilities on the dependent variable of weight status measure of BMI were not significant.

Interpretation of the Findings

Research Question 1

What is the association between neighborhood physical security in South Los Angeles and adolescents' physical activity and the mean BMI? The results of the test

showed that physical activity and neighborhood physical security were not significantly related to obesity in this group. Physical insecurity by itself did not have a direct effect on increased BMI. A study by the Committee on Environmental Health (2009) reported that such fear could be based on perceptions of disorder, contributed by the presence of things such as broken windows, or the untidiness of the neighborhood. Safety and security are without question very important for every community. This concern became more crucial in inner-city low-income settings, leading not only to reduced walking and cycling, but also to lower overall physical activity among children and adolescents (Zhu, Lee, Varni, & Kwok, 2011). Studies presented above indicated an apparent association between physical security and prevalence of obesity (Amorim et al., 2010; Rech et al., 2012).

Consequently, it is imperative to be aware of the behaviors that can influence obesity in these high-risk adolescents. Perceptions of parental safety have been reported time after time as key barriers to walking and cycling to school (Napier, Brown, Werner, & Gallimore, 2011; Panter, Jones, Van Sluijs, & Griffin, 2009; Zhu & Lee, 2009). Children's perception of safety of the neighborhood has also been shown to be a predictor of walking to and from school and consequently reduced BMI (Voorhees et al., 2010). Napier et al. (2011) reported that children walked to school more when the parents and their children perceived fewer barriers to walking. However, Rosenberg et al. (2009) found that walkable neighborhoods led to increased physical activity, decreased sedentary behavior, and lower BMI. My study outcome was contrary to the above notion; I found no association between neighborhood physical insecurity, physical activity, and the mean BMI among these adolescents. Weight status (mean BMI) and physical activity

behaviors (ϒ (484) = -0.04, $p = 0.41$) was not e statistically significant. The reason for the non association could be because of the small sample size that responded to the question regarding the neighborhood physical insecurity, $N = 402$. The effect of adolescents' physical activity (F (1, 80) = 0.01, $p = 0.91$), neighborhood physical security (F (3, 80) = 1.96, $p = 0.13$), and the effect of the interaction effect of adolescent's physical activity and neighborhood physical security (F (3, 80) = 2.53, $p = 0.06$) were insignificant. Persons living in neighborhoods with limited access to spaces for physical activity, poor quality sidewalks, poor lighting, and places in social disarray (such as crime and robberies, the presence of drugs) to be more inactive (Rech et al., 2012; Reis et al., 2010). These environmental conditions apply to South Los Angeles and, consequently, this might be the reason for a negative association between indicators of physical activity and mean BMI. The correlation between perceived neighborhood safety and inactivity has been examined in different countries (Gomez et al., 2004; McGinn et al., 2008), but the outcomes of these investigations were inconsistent and did not reveal adequate evidence of a correlation. Researchers in Brazil, for example, showed inconsistent results because they did not reveal adequate evidence of a correlation between neighborhood safety and leisure-time physical activity (Amorim et al., 2010; Parra et al., 2011).

Research Question 2

What is the association between neighborhood food insecurity in South Los Angeles and adolescents' dietary intake and the mean BMI? Based on the literature in Chapter 2 both food insecurity and obesity are of public health concern; however, results on the link between food security and childhood obesity were mixed. In my study, data

from 627 adolescents were examined for interaction of dietary intake, food insecurity, and the mean BMI in adolescents aged 12 to 17 years living in South Los Angeles, California. My study outcome showed that there was a positive association between neighborhood food insecurity, adolescents' dietary intake, and the mean BMI after controlling for age and gender. The ANOVA result (F (3, 80) = 4.37, p = 0.01) showed that the overall significance of the model or the overall influence of the two independent variables of adolescent's dietary intake and food security to the mean BMI was statistically significant. The effect of food security (F (1, 80) = 8.35, p = 0.01) relative to the mean BMI was statistically significant at the level of significance of 0.05. The findings were consistent with the extant literature. For example, Kursmark and Weitzman (2009) alluded that there is an association between food insecurity and being overweight or obese. They concluded that because of the several significant adverse effects of food insecurity on childhood health and development, it may be associated with obesity, and which often occurs in impoverished homes with adult smokers. Casey et al. (2006) analyzed the NHANES 1999-2002 dataset of children ages 12 to 17 and used BMI values ≥85 by definition to be at risk of overweight and obesity. They found that household and child food insecurity were associated with being at risk for overweight and overweight status among many demographic categories of children. Hattori et al. (2013) found significant positive associations between neighborhood fast-food outlets and dietary intake and between supermarkets and BMI among adults in California. They also observed that relations between food environment measures and obesity have not been reliably replicated, and dietary behaviors do not confirm these associations (Hattori et al.,

2013). Previously reported associations that the authors replicated includes those of Boone-Heinonen et al. (2011), Giskes et al. (2010), and Jeffery et al. (2006). Boone-Heinonen et al. and Jeffery et al. confirmed that living in a socio economically deprived area was an environmental factor linked with a number of obesogenic dietary behaviors. Food insecurity has also been linked with being obese among adult women in the United States, but it is uncertain if this association exists among female adolescents (Gundersen et al., 2009; Lohman, Stewart, Gundersen, Garasky, & Eisenmann, 2009).

Eisenmann, Gundersen, Lohman, Garasky, and Stewart (2011), Franklin, Jones, Love, Puckett, Macklin, and White-Means (2012), Larson and Story (2011) and Pe´rez-Escamilla (2011) found varied results in relation to the link between food insecurity and risk of overweight and obesity (by definition) among children and adolescents. In their study, Kac et al. (2012) examined the association of food insecurity with a higher prevalence of excessive weight in a large random sample of 1529 Brazilian female adolescents aged 15–19 years. The prevalence of excessive weight for adolescents aged 15–18 years was considered the 85th percentile as the cut-off point and for adolescents aged 19 years it was defined as BMI $\geq$ 25 kg/m^2. They found that household food insecurity is linked with a higher prevalence of excessive weight in this large random sample of Brazilian female adolescents. On the other hand, Gundersen, Garasky, and Lohman (2009) asserted that food insecure children were no more liable to be obese than food secure children after controlling for race/ethnicity and gender. An interesting ethnic/racial difference in response to food security support was found in the literature. Similarly, Giskes et al. (2010) showed a consistent association between weight status and

the food environment, noting that greater accessibility to supermarkets or less access to takeaway outlets were associated with a lower BMI or prevalence of overweight/obesity. While Boone-Heinonen et al., 2011; Hattori et al., 2013; Jeffery et al., 2006; and Giskes et al., 2010 with a focus on adults confirmed that living in a socio-economically-deprived area is an environmental factor associated with a number of obesogenic dietary behaviors. In my study, I showed that the mean BMI of adolescents is also a function of the neighborhood availability of fast foods particularly in the low income communities. The ANOVA result (F (3, 80) = 4.37, p = 0.01) showed that the overall significance of the models was to predict mean BMI based upon the independent variables of adolescent's dietary intake and food security used in this model was statistically significant. The effect of food security (F (1, 80) = 8.35, p = 0.01) also relative to the mean BMI was statistically significant at the level of significance of 0.05. Yu, Lombe, and Nebbitt (2010) found that food insecurity was much higher in African American households (48%) that participated in a food stamp program, when compared to Caucasian households (29%) participating in the same program. An and Sturm (2012) using data from children 5-11 years and adolescents aged 12-17 years from CHIS for 2005-2007 also found no significant relationship between food environment and consumption among youth in California.

Research Question 3

What is the association between neighborhood recreational facilities in South Los Angeles and adolescents' physical activity and the mean BMI? Some researchers have found that living in a neighborhood with easy access to recreational places, walkability,

and pleasing esthetics is linked with more physical activity and lower body weight status (Black & Macinko, 2010; Coogan et al., 2009; Duncan et al., 2010; Gomez et al., 2010; Kondo et al., 2009; Rodrıguez et al., 2009). In my study of 627 adolescents the availability of recreational facilities and physical activity were insignificantly related to BMI. The non-direct inferences about whether neighborhood recreational facilities directly influenced PA behavior and BMI may be due to the fact that cross-sectional data was used for analysis (Slater et al., 2010). The effect of adolescents' physical activity (F (1, 80) = 0.01, p = 0.91), neighborhood physical security (F (3, 80) = 1.96, p = 0.13), and the interaction effect of adolescent's physical activity and neighborhood physical security (F (3, 80) = 2.53, p = 0.06) are insignificant. When regression analysis was performed, the association between neighborhood recreational facilities, adolescent's physical activity, and the mean BMI was found to be insignificant with only 3% accounted variance in the weight status measure of BMI. As stated above my results directly opposed the findings of Babey et al. (2007, 2011), who claimed that teenagers living in disadvantaged neighborhoods who lack access to parks and show less physical activity with high availability of food are mostly affected by obesity. Slater et al. (2010) assessed the relationship between the level of physical activity, friendliness of the built environment and adolescent physical activity and BMI. The authors used a secondary data collected from 2001 to 2003 consisting of cross-sections of individual-level national data for 8th and 10th grade students who participated in the Monitoring the Future (MTF) survey with community-level environmental measures developed through the Bridging the Gap Study.

An annual national sample of 33,000 8th and 10th grade students in the coterminous United States were analyzed for this study, but sample size analysis was not presented. Using self-reported height and weight, the authors calculated BMI. Individuals' body weight status was classified on the basis of BMI for children and teens' using the 2000 CDC Growth Chart, and *obesity* was classified as BMI ≥ age-sex-specific 95th percentile. The BMI calculation was consistent with CDC guidelines and growth charts (CDC 2011a). The result of the present study is a reiteration of Wright's (2011) findings of no significant interactions between overweight status and physical activity. This study result is comparable to that of Wright (2011) in terms of the purpose of the study, research design and statistical analysis used but differs in age range, ethnicity of the samples, and samples size. While the use of a much larger sample size may not have resolved the non-comparable findings because Wright (2011) examined the association between overweight status and activity among Hispanic urban, school-age children and the current study utilized 627 African American adolescents aged 12 to 17 in South Los Angeles, California. Multilevel models were run and controlled for youth and community demographic and socioeconomic features. Mooney, Bader, Lovasi, Neckerman, Teitler, and Rundle (2014), found that increased levels of physical disorder (example: litter, graffiti, and abandoned buildings, presence of drugs, crime and robberies) were linked with reduced physical activity and higher weight. They also found that a greater number of commercial physical activity facilities were linked with increased physical activity. They were also not able to include mixed land use measure in local compactness index. Nevertheless, a crucial strength of the study was the focus on the association of multiple

factors on physical activity and weight using environmental data collected directly from the adolescents' neighborhoods.

Research Question 4

What is the relationship between parents' education level, parents' income level, and adolescents' physical activity and the mean BMI? SES is traditionally defined using indicators of income, education or occupation. In this study, I identified no association between parents' education level, parents' income level and BMI. The individual effects of the three independent variables, adolescent's physical activity (t (80) = -0.22, p = 0.82), parents' education level (t (80) = -0.14, p = 0.89), and parents' income level (t (80) = -0.79, p = 0.43) to the weight status measure of BMI were insignificant. Previous researchers found a negative association between family income and obesity among youths (Anderson et al., 2009; Murasko, 2009, 2013), as well as a strengthening of that relationship over time (Murasko, 2013). Despite the fact that these researchers reassert those results, they contribute to the literature by exploring the nature of the association between family income and childhood obesity. More specifically, these researchers examined how the association varies by family income levels, BMI levels, race, and gender. They also show that the difference in obesity rates among children from different income levels is not observed at a young age but develops over time.

One specific objective of the present study was to examine the association between parents' education level, parents' income level, and adolescents' physical activity and the mean BMI. Earlier researchers have consistently found a relationship between education and health. For example, parental education and race/ethnicity were

found to be the most compelling social factors that are linked with obesity risk in children (Clarke et al., 2009; Flegal et al., 2010; Walsemann et al., 2012). Lee et al. (2009) claimed that individuals whose parents have lower educational attainment, results in their children having higher BMIs as children and adults. Also, Ross and Mirowsky (2010) attest that the achievement of higher education may bring on practical problem-solving abilities and greater motivation for a better life. Baum and Ruhm (2009) observed that the dissimilarity in BMI by mothers' educational level was quite small at age 20, but BMI increased twofold by age 40. This means that the BMI disparity between low and high SES sample members increased from 0.5 kg/m2 for 20 years old to 1.3 kg/m2 at age 40, based on SES and the obesity inequality rose from 6.2 to 11.7 percentage points (Baum & Ruhm, 2009).The increase is related to parents with lower educational attainment. In contrast, I did not find a significant association between the parental educational level and the mean BMI of 627 adolescents residing in South Los Angeles with their parents. The differences in the results could be because populations studied were different and this could have affected my study outcomes. Representing the adult education attainment, the mean is 5.18 [95%CI of 4.99 – 5.36]. Mode for this variable is - 0.97 with a minimum of 1 and a maximum of 10.00 and the Median of 4.00. The income mean is $68618 [95%CI of $63855 - $73382], the mode for this variable is $40000, the minimum is $0, maximum is $600,000 and median of $55000. The income of $600,000 is an outlier. As Such, the findings of my study may have been different if it was omitted from the analysis. This outlier contributed to the mean income being much higher than both the median income and the modal income. Because this outlier was included in the study, the

distribution is far from normal. This suggests skewed distribution; however interpretation of this finding is problematic because of the ordinal coding of this variable. The apparent lack of normality of the household annual income (income distribution: Skewness coefficient = 2.45; Kurtosis coefficient = 12.99) may have impacted the assessment for an association between family income and mean BMI – an association found by others, but which I was not able to confirm.

Limitations of the Study

Relevant information about the mean BMI for African American adolescents in South Los Angeles was generated by this study. However, the use of secondary data has some limitation. For example, secondary data sets usually contain missing and unusual values which leads to a severe loss of statistical power, influences sample size, effect size, and the confidence with which data can be interpreted (Newman, 2014). To avoid missing data in my study, I could have limited my data request to just those respondents for whom the variables of interest had response; as I needed only 82 respondents to avoid a type II error, which ensues when one retains a flawed hypothesis. Also, I did not use weighted data because I wanted to capture the unique characteristics of the population being studied. Because I used unweighted data, I cannot generalize the results from my study beyond the population studied. Weighted data are important in generalizing results from survey respondents to the larger population covered by the survey. If weighted data are not employed in analyses, estimations for the groups and subgroups covered by the survey will be biased since some population subgroups are under- or over-represented in the respondent group (DuMouchel & Duncan, 1983). Such data sets may also limit data

interpretation and understanding. Missing data are problematic in research because it affects the generalizability of findings, decreases the amount of usable data in a data set, and ultimately decreases the power associated with a statistical test.

Another limitation of this study is the cross-sectional nature of the data, which cannot be used to imply causality (Carlson & Morrison, 2009). I elected to use cross-sectional design because it is quick and reasonably cheaper to perform than other study designs as well as supported by the type of data available; more importantly cross-sectional studies are carried out at one time point and over a short period (Shahar & Shahar, 2013). As a result, I cannot determine whether the effect presented using the fast food measure is due to fast food access individually or general access to restaurants or other factors. Another concern is that self-reported height and weight are often underestimated and vary significantly from different race/ethnic groups and gender (Gillum, & Sempos, 2005; Inagami, Cohen, Brown, & Asch, 2009; Wen, & Kowaleski-Jones, 2012). While, underestimation would most likely affect the associations found in this study, variations in self-report among different race/ethnic groups would bias this study in directions unknown (Krul, Daanen, & Choi, 2011).

Another significant limitation of this study is that the use of the mean BMI as a variable may not be appropriate measure for determining obesity among African American adolescents in South Los Angeles. Himes (2009) suggests that other measures of body fat, such as skinfold thicknesses, bioelectrical impedance, underwater weighing, and dual energy x-ray absorption, may be more accurate than BMI. BMI is used as a screening tool for population surveillance, and not as a diagnostic tool for health status.

The use of the questionnaires to obtain data through self-report also presents problems relating to the precision of the responses, which could limit data analyses and interpretation. Self-reported family income and educational attainment are personal life factors that participants may have been uncomfortable to share.

CHIS 2007-2013 data analysis provides a snapshot of the research effect and association between and among the selected variables of interest, but these data may oversimplify more complex issues of childhood obesity, to include interventions to decrease its prevalence, and confounders (example: age and sex) that might also affect the level of influence on the outcome variable (Kamangar, 2012).

Recommendations for Action

The first recommendation is to conduct future studies using weighted CHIS data. I did not use weighted data because I wanted to capture the unique characteristics of the population being studied. The results of this research will help provide a useful roadmap for other researchers to begin to view the relevant issues of overweight and obesity among African American adolescents in South Los Angeles, California. Results of this dissertation will be disseminated via publications in peer-reviewed journal articles, oral and poster presentations at health conferences, State, and local Health Departments, and in community organizations. This study is valuable, in particular for expanding access of the low-income population to direct information relating to their health.

I see a number of potential opportunities for future research from this study. This study explored the lived experience of obesity among African American adolescents living in South Los Angeles, California. It would be beneficial to apply these research

findings to obese adolescents who are not receiving medical treatment for their obesity so that data from the group can be gathered and compared with those of adolescents who are receiving treatment. It would be interesting to explore the influence culture has on both self-perception and meaning, as well as the role cultural patterns may have on the causes and sequelae of obesity in adolescents. Stressors associated with culture and gender would be of benefit to this body of research. Several mechanisms, proposed by other researchers that impact the overall obesity rate, would also be tested. To my knowledge, no study has investigated why low-income children's weight increases faster than that of high-income children. Although the aforementioned studies have indicated an apparent relationship between parental misperceptions of their children's weight status and, hence, childhood obesity, no study has yet examined the association between parental perceptions and some of the most important determinants (such as, tradition / culture, and medical causes) of childhood obesity (Raychaudhuri, & Sanyal, 2012). Furthermore, CHIS could expand its data collection to enable consideration of these and other factors that have been documented in the literature as important contributors to childhood obesity, but currently cannot be monitored using CHIS data. The need is to develop sound, evidence-based interventions that promote healthy body weight among adolescents in low-income communities. Further research can only help to improve interventions and the practice of health care professionals in obesity prevention and treatment programs for this vulnerable population.

Future research is required to support this study, using a CHIS weighted data. Implications for future research are based on findings from this study, as well as the

bounds in study generalizability noted above. Although mesosystem factors such as family income and neighborhood safety per parental perception were not related to obesity according to findings in this dissertation research, future research should seek to understand obesity rates among different age groups. I was not able to make direct inferences about whether family income and neighborhood safety were not related to obesity, may be due to the fact that I used unweighted data. Again the non-inference may be due nonparticipation of African Americans in research which has been linked to the history of racism in medical research (Corbie-Smith, Thomas, Williams, & Moody-Ayers, 1999).

Implications for Social Change

Reversing the trend of childhood and adult obesity in the United States would be one of the greatest social changes to occur in the past 50 years. This study adds some depth as to where efforts need to be directed to help alleviate childhood obesity. I examined five key influences connected with mean BMI of African American adolescents in South Los Angeles, California. Of the five influences, I found associations between adolescents' dietary intake, and food insecurity in relation to the mean BMI to be statistically significant (F (3, 80) = 4.37, p = 0.01). These results add to the current body of knowledge on obesity in African American adolescents in South Los Angeles, California. Research in low income areas with high rate of obesity (Lovasi, Hutson, Guerra, & Neckerman, 2009), is also important to the interests of the community.

Current published research has provided the public health community with comparative evidence of obesity in the United States in low-income communities

(Williams, 2011). The findings of this dissertation did not fully support previous findings on adolescent obesity in low-income families; this may be due to the previously mentioned reasons of non-participation of the African American population in medical studies (Corbie-Smith et al., 1999). To bring change in a given community, public health professionals must conduct research to find the factors in the macrosystem that influence the incidence of obesity among these adolescents. The findings of this study provided additional information on the factors associated with childhood obesity, and will provide the community with potential research targets in a population that has been overlooked, even though they might be exposed to factors related to obesity and health-related problems. However, this would need a thorough examination of the variables or factors that define the macrosystem of the adolescents in low-income communities.

Even though most findings did not reveal expected associations with factors which might be useful for planning intervention programs, this study will effect positive social change by highlighting the positive associations between dietary habits, food insecurity, and the mean BMI of adolescents aged 12 to 17 years living in South Los Angeles, California. The findings of this study also provided additional information on the factors associated or not associated with the mean BMI of this population. Knowledge of the association between adolescents' dietary habits and mean BMI as exemplified in this study validates the importance of early preventive measures for childhood obesity. Such interventions must begin first among women of child-bearing age. Dubois and Girard (2006) demand for interventions aimed at preventing childhood obesity by targeting smoking and nonsmoking pregnant women. These women are at risk for giving

birth to high-birth-weight children. I did not assess women of child-bearing age or pregnant women who smoke or who did not smoke as Dubois and Girard (2006) did. Salsberry and Reagan (2005) advocated for overweight prevention plans before pregnancy and in early childhood. The above notion is with a view to drawing attention to the disproportionate effect of this health problem on these young individuals. It is my hope that by drawing attention to the negative impact that childhood obesity posed to these children, the stakeholders will take the necessary steps to address this problem. All stakeholders need to go back to the drawing board and continue the discussion concerning childhood obesity, and the built environment. The primary goal would be improving the life situations of these minority adolescents so that they could live healthier and more productive lives. With good policies, the local government can make our streets safer for these families for much needed physical exercise. The steps suggested in this study for preventing the onset of childhood obesity among the target group will help reduce the burden of this disease. These burdens include the medical costs, which would arise in the event that these children became diabetic or suffer from obesity-related diseases as adults. This study would contribute to positive social change by increasing the awareness of the benefits of regular physical activity and healthier eating habits among the adolescents target audience in South Los Angeles. This enhanced awareness would increase life expectancy and reduce complications of obesity in this population. The emergence of a healthier population as a result of this study would lead to a healthier workforce and more prosperous society.

Conclusion

The purpose of this cross-sectional study was to examine the association between diet, physical activity, the built environment and the mean BMI of adolescents aged 12 to 17 years living in South Los Angeles, California. Four research questions were posed to understand the phenomenon under examination. The data for analysis were from 2007-2013 CHIS dataset. The outcomes of the study showed that the family and neighborhood factors (physical security, food insecurity, and availability of parks /recreational facilities for physical activity, parental education attainment and parental income), considered were not found to be associated with the mean BMI of adolescents in the South Los Angeles, California. However, when security of food in the neighborhood was associated with the mean BMI and dietary intake, both showed a significant association with the mean BMI. The results of the study will add to the knowledge of childhood obesity and be useful to inform and develop collaborative efforts toward reduction and prevention of childhood obesity. The outcome should also be used to advise and communicate shared efforts for the reduction and deterrence of childhood obesity.

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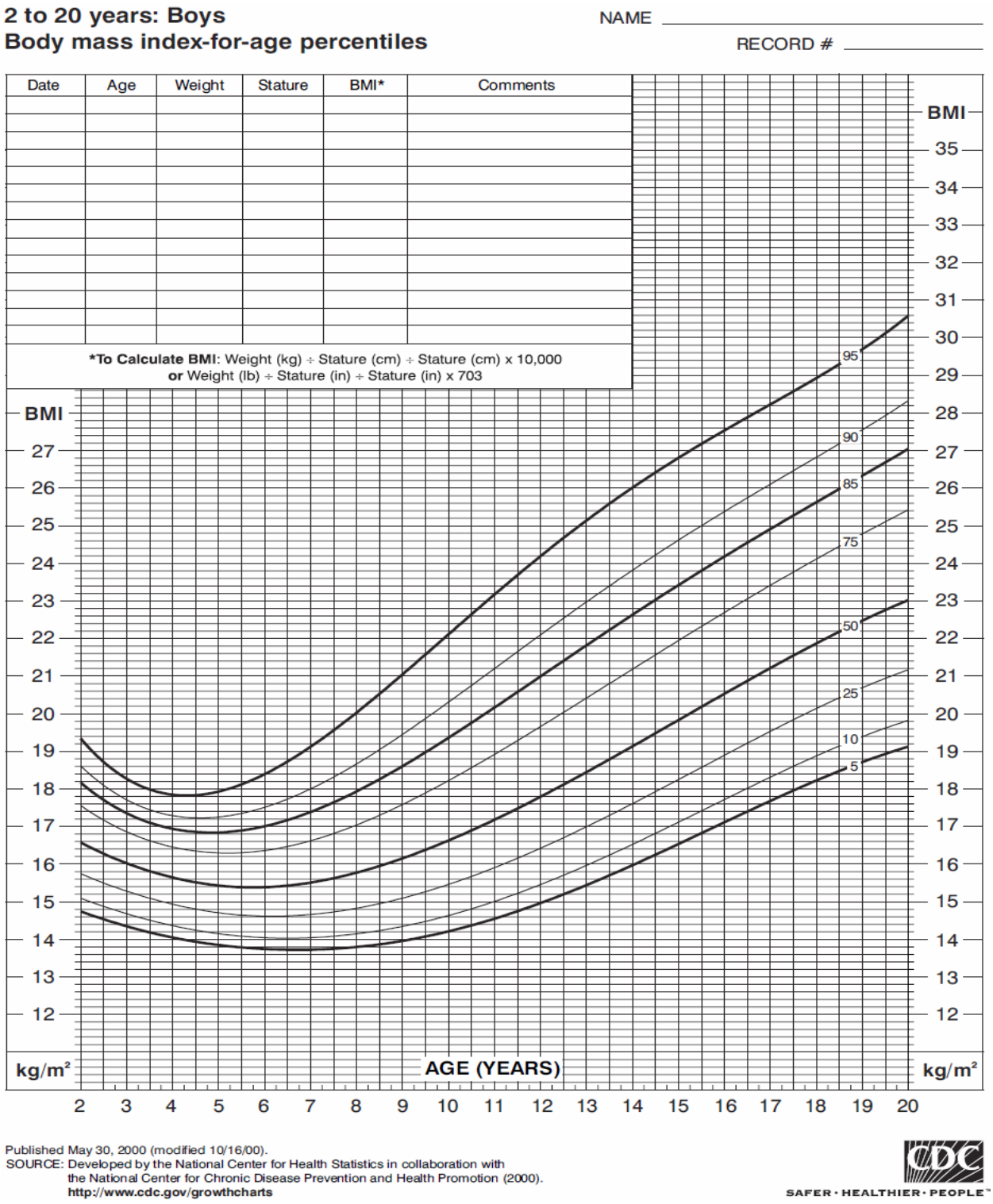
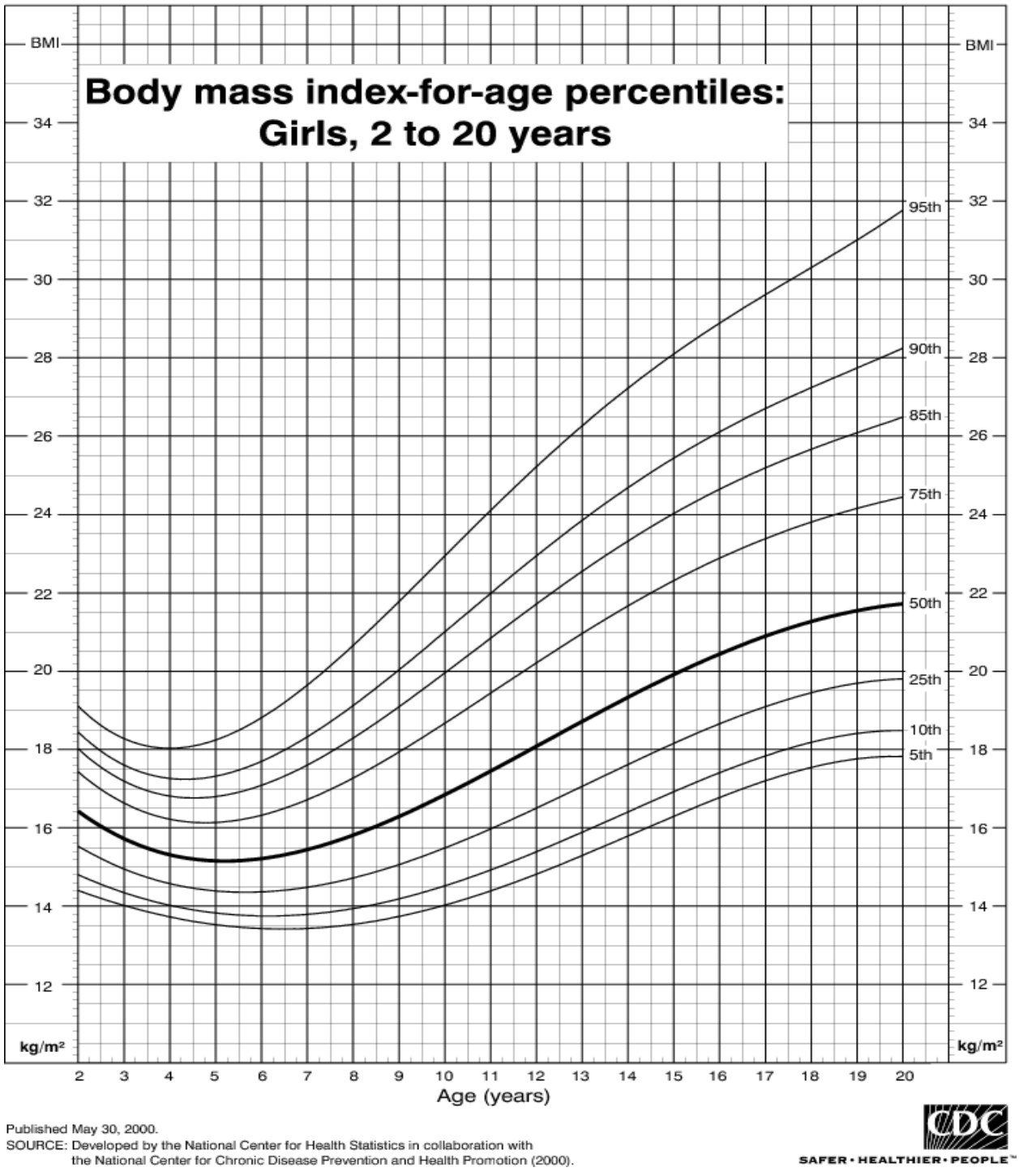
Appendix A: CDC Body Mass Index Chart for Boys



Appendix B: CDC Body Mass Index Chart for Girls



Appendix C: Restricted Variables

The following geographic variables are not located in the source files, but may be accessible upon request and IRB approval (UCLA & CHPS). These variables are restricted due to their identifiable nature.

VARIABLE	LABEL	NOTE
LATITUDE	LATITUDE	GEOGRAPHIC LONGITUDE OF RESIDENCE. USED FOR MAPPING.
LONGIT	LONGITUDE	GEOGRAPHIC LONGITUDE OF RESIDENCE. USED FOR MAPPING
CBLK	CENSUS BLOCK INCLUDING CENSUS TRACT	SMALLEST CENSUS DELINEATION AVAILABLE TO MERGE WITH CENSUS DATA; USED FOR MULTILEVEL MODELING, NEIGHBORHOOD ANALYSIS.

Teen and child restricted variables

VARIABLE	LABEL	NOTE
SCH_BLK	SCHOOL CENSUS TRACT INCLUDING BLOCK	
SCH_CDS	STATE SCHOOL ID NUMBER	
SCH_LAT	SCHOOL LATITUDE	
SCH_LON	SCHOOL LONGITUDE	

Data Dictionary

2011-2012 CALIFORNIA HEALTH INTERVIEW SURVEY
TEEN SURVEY DATA DICTIONARY

Section Q: Screening Information

VARNAME: PUF_ID QNAME11: QPAGENUM: NA
QNAME09: QNAME07:
LABEL: PUBLIC USE FILE ID
FREQ %
VALUE: 0-HIGH CONTINUOUS 2799 100.00

UNIVERSE: ALL ADOLESCENTS
INPUT VAR:
NOTES:
138

VARNAME: AGEGRP_A QNAME11: QPAGENUM: NA
QNAME09: QNAME07: NA
LABEL: AGE GROUP FOR ADULT
FREQ %
VALUE: -5 ADULT/HOUSEHOLD INFO NOT COLLECTED 42 1.50
1 <30 28 1.00
2 30-39 535 19.11
3 40-49 1271 45.41
4 50-59 782 27.94
5 60+ 141 5.04
UNIVERSE: ALL ADOLESCENTS
INPUT VAR: SRAGE

Section D: Physical Activity

VARNAME: TE8 QNAME11: QT11_D1 QPAGENUM: T-19
QNAME09: QT09_E1 QNAME07: QT07_D1
LABEL: **# OF DAYS PAST WEEK TEEN PHYSICALLY ACTIVE 60 MIN OR MORE**

MEAN STATISTICS
N 2799
MIN 0
MAX 7
MEAN 3.66

UNIVERSE: ALL ADOLESCENTS WHO WERE IN SCHOOL LAST WK OR HOME-SCHOOL
INPUT VAR:
NOTES:

TE62	HAVE BEEN TO PARK/PLAYGROUND IN PAST 30 DAYS	DD-30
TE63	WAS PHYSICALLY ACTIVE LAST TIME AT PARK	DD-31
TE64	FEEL SAFE IN NEIGHBORHOOD	DD-93
TE65	FEEL SAFE AT YOUR SCHOOL	DD-93
TE8	# OF DAYS PAST WEEK TEEN PHYSICALLY ACTIVE 60 MIN OR MORE	DD-28

TF1	HAS USUAL SOURCE OF HEALTH CARE	DD-43
TF11	RECVD PSYCHOLOGICAL/EMOTIONAL COUNSELING IN PAST 12 MOS	DD-42
TF14	HOW LONG SINCE LAST VISIT TO DENTIST	DD-64

VARNAME: TD27_P QNAME11: NA QPAGENUM: NA
QNAME09: NA QNAME07:
LABEL: # DAYS WALK HOME FROM SCHOOL PAST WK (PUF RECODE)
MEAN STATISTICS
N 2759
MIN 0
MAX 5
MEAN 1.56
UNIVERSE: ALL ADOLESCENTS
INPUT VAR:
NOTES:
VARNAME: TC42 QNAME11: QT11_D13 QPAGENUM: T-23 QNAME09:
QT09_E12 QNAME07: QT07_D18
LABEL: PARK/PLAYGRND WALKING DISTANCE FROM HOME
FREQ %
VALUE: 1 YES 2419 86.42
2 NO 380 13.58
UNIVERSE: ALL ADOLESCENTS
INPUT VAR:
NOTES:

Section C – Health Behaviors

Walking for Transportation and Leisure

QA09_C1 The next questions are about walking for transportation. I will ask you separately about walking for relaxation or exercise.

AD37W

During the past 7 days, did you walk to get some place that took you at least 10 minutes?

YES.....1
NO.....2 [GO TO QA09_C4]
UNABLE TO WALK .....3 [GO TO QA09_C7]
REFUSED..... -7 [GO TO QA09_C4]
DON'T KNOW..... -8 [GO TO QA09_C4]

Appendix D: Application to Use California Health Interview Survey Data

Application to Use
California Health Interview
Survey Data

Phone: (310) 794-8319
Fax: (310) 794-2686
Email: dacchpr@ucla.edu
www.chis.ucla.edu

UCLA Center for Health Policy Research
10960 Wilshire Boulevard, Suite 1550
Los Angeles, CA 90024
www.healthpolicy.ucla.edu

Personal and Organizational Information

Dataset requested

Principal Investigator:

Co-investigator:

Degree(s):

Co-investigator:

Project Title:

PI Organization:

Address:

City, State, Zip:

Child Teen Adult

2001 2003 2005 2007 2009 2011

Title: Degree(s):

Title: Degree(s):

Additional Key Personnel: Title:

Email:

Source of Funding:

Phone:

We will include your project in the Research Clearinghouse unless you opt out.

Fax:

Not Funded Pending Funding Funded

Do not include my project in the Research Clearinghouse, I will submit my project at a later date: www.chis.ucla.edu/rc/

The application should include the following:

Prospective users must submit applications to the Data Access Center at the e-mail address on the cover of this application. Your application will not be processed until we receive an electronic version (via e-mail) of your complete application and materials.

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A copy of a research or grant proposal, or a description of the research, which includes project purpose, methodology, research questions or hypotheses, statistical analysis plans, and publication plans

The Data Access Center Nondisclosure Affidavit must be signed (digital/electronic signatures accepted) and e-mailed back to the DAC Manager before the approval process starts. The application will remain active for the duration of 2 years from the current DAC

Curriculum Vitae or biographical sketch or resume

A complete list of the CHIS variables requested for each population (Please use the CHIS variable lists provided)

A detailed description of any user-supplied data files to be merged with California Health Interview Survey data, including documentation, file layout, number of records, and restrictions on the use of the data

Project Contact
(if different from PI)

Project Title:

Services Requested:

Name:

Address:

City, State, Zip:

Data Access Center
Service Request Form

Statistical/Programming Consulting

Running Computer Program Phone: Email:

Please provide a brief description below

Mapping ☐

☐

Publication Plans (please describe) ☐

Software Requested

SAS	☐	STATA	☐	SPSS	☐
SUDAAN	☐	ArcGIS	☐	Other : _____	☐

Project Period/Use of DAC ☐ ☐ ☐

Project Period:

Start Date: _____

End Date: _____

A copy of final publications must be sent to the DAC.

Project Title:

Data Access Center
Project Summary Form

Key Hypotheses:

Project Key Personnel:

Background:	
Variables Justification:	
Methods:	
Files to Merge with CHIS Data:	

Note: Please summarize your project on this page in addition to providing a copy of a research grant, proposal, or research description

PROJECT#: ghjk

The UCLA Center for Health Policy Research is responsible for providing access to the California Health Interview Survey data for legitimate research needs through its Data Access Center and for protecting the confidentiality of respondents. The success of the California Health Interview Survey depends upon the voluntary cooperation of the individuals who provide information to the California Health Interview Survey under an assurance that such information will be kept confidential and will be used only for research purposes.

The California Information Practices Act of 1977, Civil Code 1798, stipulates that no personal information may be used for any purpose other than that for which it was collected, and no personal information may be published or released in a form that identifies an individual unless such person has consented.

Unauthorized disclosure of personal information is punishable under Civil Code, Section 1798.55, which reads as follow: "The intentional violation of any provision of this chapter or of any rules or regulations adopted thereunder, by an officer or employee of any agency shall constitute a cause for discipline, including termination of employment."

Unauthorized disclosure of personal information is also subject to civil action for invasion of privacy under Civil Code, Section 1798.53. It is essential, therefore, that you understand your obligation not to disclose any information that may lead to disclosure of a respondent's identity.

In consideration of my request to be granted access to the California Health Interview Survey data files, I, (please print or type Principal Investigator's name), state that I am aware that the information contained in the data files has been provided to the California Health Interview Survey in accordance with the California Information Practices Act of 1977, Civil Code 1798, and with the assurance that it will be used only for health statistical reporting and analysis and will not be published or released in identifiable form. I am also aware that I can be held legally liable for any harm incurred by individuals who have provided or are described in the information contained in the above work files to which I will have access.

Having read and familiarized myself with the Data Access Center Nondisclosure Affidavit, including the California Information Practices Act of 1977, Civil Code 1798, I agree to the terms listed below (Principal Investigator, please initial each line item).

_____ 1. To not make copies of any files or portions of files to which I am granted access.

_____ 2. To not use any technique or method to attempt to learn the identity of any person in the data files.

_____ 3. To hold in strictest confidence the identity of any individual that may be inadvertently revealed in any documents, discussion, or analysis. If any such inadvertent revealing of identity occurs, I will immediately bring it to the attention of the Data Access Center Manager.

_____ 4. To acknowledge the "California Health Interview Survey" in a clear and appropriate manner in any publication or other public use of these data.

_____ 5. To submit copies of any published articles, reports, or briefs based on CHIS data to the Data Access Center Manager.

Your signatures indicate that you have carefully read and agree to be bound by the above statutory responsibilities. DAC projects cannot commence until the Principal Investigator and, if applicable, all Co- Principal Investigator Signature Investigators and other study personnel listed on the DAC Application have signed this Nondisclosure Affidavit. (electronic / digital signature is accepted)

Date

DATA ACCESS CENTER
NONDISCLOSURE AFFIDAVIT

All personnel listed on the DAC Application must read and sign this Nondisclosure Affidavit.

PROJECT # :_____

PI : _____

Date

Additional User Signature

Date

Additional User Signature

Date

Additional User Signature

Date

Additional User Signature

Date

Additional User Signature

Date

Additional User Signature

Additional User Signature

Additional User Signature