2020

Demographic factors associated with childhood obesity among women, infants, children (WIC) participants in 2014

Olukayode Wisdom Oduwole
Walden University

Walden University

College of Health Sciences

This is to certify that the doctoral study by

Olukayode Oduwole

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Namgyal Kyulo, Committee Chairperson, Public Health Faculty
Dr. Gwendolyn Francavillo, Committee Member, Public Health Faculty
Dr. Jagdish Khubchandani, University Reviewer, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2020

Abstract

Demographic Factors Associated with Childhood Obesity among Women, Infants, Children (WIC) Participants in 2014

by

Olukayode Oduwole

MMS, Jackson State University, 1989

BSPAS, Medical College of Georgia, 1994

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

2020

Abstract

In the past few years, there has been an alarming increase in childhood obesity in the United States and worldwide, however there is little consensus around how to respond to the problem. What has now become an epidemic, was uncommon decades ago. This study assessed the demographic factors associated with childhood obesity among WIC participants in 2014. The study utilized demographic data from 3,011,119 participants in 2014 nationally representative National Health and Nutrition Examination Survey, and social cognitive theory (SCT) to understand the demographical factors associated with childhood obesity. Adjusted odds of obesity were calculated to assess association between males and females, non-Hispanic white, non-Hispanic black, Hispanic, American Indian/Alaskan native, Asian/Pacific Islander, and 24-59 months old WIC participants. To test for differences in obesity trends interaction terms were added to the logistic regression between age, gender, and race. The adjusted prevalence of obesity among WIC participants was higher among males than females, among 36-59 months old, and finally among the Hispanics and American Indians/Alaskan natives compared with other racial groups. Significant impact can be achieved in terms of social change by modifying relative food prices, increasing exposure and gaining access to healthy foods and lowering exposure and access to unhealthy foods, and improving the image of healthy food while making unhealthy food less appealing.

Demographic Factors Associated with Childhood Obesity among Women, Infants, Children (WIC) Participants in 2014

by

Olukayode Oduwole

MMS, Jackson State University, 1989

BSPAS, Medical College of Georgia, 1994

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

Walden University

May 2020

Dedication

This dissertation is dedicated to the memory of my parents Samuel and Helena Oduwole who had gone to glory. They taught me that with perseverance I can achieve anything. They also instilled in me the value of good education.

Acknowledgments

Thanks be to God who causes us to triumph in Christ and make manifest the savour of His knowledge by us in every place. I want to thank my God from whom all blessing flows, for granting me the grace to complete this study. I want to show my sincere gratitude to my committee chairperson Dr. Namgyal Kyulo for his direction and feedback through e-mails, texting, and phone calls. Many thanks to Dr. Gwendolyn Francavillo my second committee member and methodology expert for her priceless instruction and valuable contributions to my dissertation. My appreciation also goes to my URR committee member, Dr. Jagdish Khubchandani for his time, patience, and expertise. I want to thank my loving wife and best friend Christiana, who was my prayer partner and cheerleader during my ordeal. She constantly proclaimed, 'You can do all things through Christ who strengthening you.' This saying constantly re-vibrates in my ears whenever I got stuck and didn't know what to do. Also, many thanks to Dr. Marion (Carl) Kinkade who was never tired of me asking questions or getting information related to my study.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study and Literature Review

Introduction

Childhood obesity has become a key health concern in the United States and worldwide. What has now become an epidemic, was less common decades ago (Renee, 2017). In tracking the history of obesity in the United States, researchers have attributed the cause to the increased fat and sugar intake during the 1980's and 1990's which had brought a surge in the rate of obesity, as people have rapidly changed their lifestyles and tending towards a more sedentary and high energy and fat diet lifestyle (Benjamin, 2010). The prevalence and trends of overweight children in the United States has increased from 28.7% in 1999-2000 to 32.2% in 2011-2012, and obesity has increased from 14.5% from 1999-2000 to 17.3% from 2011-2012 among children aged 2-19 years in the United States (Skinner & Shelton, 2014).

The mechanism of being obese is not fully known, however it is believed to be a disorder with manifold causes, which includes consumption of too many calories, sedentary lifestyle, genetics, metabolism, environment, culture, and behavioral (Benjamin, 2010). The ecological model as illustrated by Davison and colleagues suggested that child risk factors for obesity include dietary intake, physical inactivity, and sedentary behavior (Davison, Jurkowski, & Lawson, 2013). The impact of such risk factors is moderated by factors such as age, gender, household income, race, and parental level of education (Davison, et al., 2013). According to research, proper dietary habit and

engaging in adequate physical activity are crucial in relegating obesity in children (Boyle, Jones, & Walters, 2010).

The demographic factors associated with childhood obesity among low income children ages 2-4 years participating in the Special Supplemental Nutrition Program for women, Infants, and Children in the United States increased from 14% in 2000 to 15.5% in 2004, and 15.9% in 2010, then decreased to 14.5% in 2014 (Pan et al., 2016). Despite the increasing attention paid to childhood obesity nationwide, only few studies were done focusing on the demographic factors associated with childhood obesity among WIC participants ages 2 to 4 years old, which has open new avenue for research, and may serve as a source of hypotheses for further quantitative research on childhood obesity. It could also help to explore how race/ethnicity, gender, and age are associated with childhood obesity in preschool children enrolled in WIC program in the 50 states, District of Columbia, and three United States territories.

This study investigated the demographic factors associated with childhood obesity among women, infants, and children (WIC) preschool participants nationwide in 2014.

Problem Statement

The prevalence of childhood obesity in the United States and other parts of the developed world has become an issue of concern to public health practitioners and other health care professionals, because of the associated negative health sequelae (CDC, 2009; Frieden, Dietz, & Collins, 2010). According to CDC data, more than one out of every six American children is obese which triple the 1970's trend (CDC, 2009). The trends in

childhood obesity in the United States among young low-income children in the Women, Infants, and Children program (WIC) increased from 14% in 2000 to 15.5% in 2004, and to 15.9% in 2010 (Pan, Freedman, Sharma, Castellanos-Brown, Park, Smith, & Blanch, 2016). However, between 2010-2014, the overall incidence of childhood obesity was trending down at 14.5% (Pan, et al., 2016). Childhood overweight and obesity increased from 13.9% in 1999-2000 to 18.5% in 2015-2016 (State of Obesity, n.d.). WIC is a special supplemental nutrition program for women, infants, and children, established in 1972, with the purpose of preventing poor birth outcomes, such as infant mortality and low birth weight by improving the nutrition and health of participants. WIC is managed by the food and nutrition service (FNS) of the U.S. Department of Agriculture (Thorn, Tadler, Huret, Ayo, Trippe, Mendelson, et al., 2015). The remunerations include nutritious supplemental foods, nutrition education, counseling, which includes breast feeding promotion, support and referrals to healthcare providers, social services, and other community providers to assist with pregnancy, breast feeding, postpartum services, infant and preschool children program up to the age of 5 years (Thorn, et al., 2015).

The WIC program is of interest to me, as its main goal is to assist the poor and impoverish families with food and nutrition. WIC participants came from some of the nation's poorest households (Thorn, et al., 2015). For instance, in 2014, approximately three-quarters of all WIC members reported income at or below the federal poverty recommendations, and more than a third of the participants gave an account of incomes

equal to or less than 350 percent of the federal poverty recommendations (Thorn, et al., 2015).

While nationwide estimates indicate that preschool obesity between ages 2-4 is on the rise, with the largest significant increase occurred in Nebraska ranging from 14.4% to 16.9% as shown in 2010 and 2014 WIC state agencies data from the largest decrease in Puerto Rico from 20.3% to 13.9% within the same time frame (Pan, et al., 2016).

The associated risk factors with obese children includes high blood pressure, hypercholesterolemia, impaired glucose tolerance, breathing difficulty such as asthma, sleep apnea, joint problems and musculoskeletal pain, fatty liver disease, cholelithiasis, and gastro-esophageal reflux disease (Pollock, 2015). Obese children are also predisposed to psychological problems such as anxiety and depression, low self-worth, and confidence than children with normal BMI, as they are frequently bullied and stigmatized (Morrison, Shin, Tarnopolsky, et al., 2015). Also, childhood obesity is clearly linked to adulthood obesity and could result in serious sequelae of their well-being (Van Dijk & Innis, 2009). According to researchers' children with high BMI after age six have more than 50 percent possibility of being obese as an adult, despite parental status (Dabrowska, 2014). Similarly, according to Whitaker, et al. (1997), 80 percent of children who were overweight between ages 10 -15, would be obese at age 25. Children under eight years old with increased body habitus persisting into adulthood were found to be linked to adult obesity (Freedman, et al., 2001). Because of the extensive concern of childhood obesity epidemic among preschool children in the United States, and the gap in

trend of obesity in children ages 2-4 in 2014 (CDC, 2015), this study intends to fill a gap in identifying demographic factors associated with childhood obesity among WIC preschool participants in the United States and territories in 2014.

The Purpose of this Study

The purpose of this quantitative study employing the social cognitive theory was to conduct a determinative study that will explore the demographic factors associated with obesity among women, infants, and children enrolled preschool children nationwide and the U.S. territories.

Most studies have focused on trends of childhood obesity among young low-income WIC children in the United States. This study initiated and addressed significant gap in the literature on how age, race, and gender of participants are associated with childhood obesity in preschool children enrolled in the WIC program.

Research Questions and Hypotheses

This study evaluated the association between age of participants, gender, race, and childhood obesity among WIC enrolled preschool children in the United States, the district of Columbia, and U.S. territories. The independent variables include age, gender and race, and the dependent variable is childhood obesity. Three primary research questions guided this investigation.

Research Question 1: Is there any association between gender and obesity among WIC participants children?

H_{01}: There are no significant association between gender and obesity among WIC participants children.

H_{A1}: There are significant association between gender and obesity among WIC participants children.

Research Question 2: Is there any association between age and obesity among WIC participants children?

H_{02}: There are no significant association between age and obesity among WIC participants children.

H_{A2}: There are significant association between age and obesity among WIC participants children.

Research Question 3: Is there any association between race and obesity among WIC participants children?

H_{03}: There are no significant association between race and obesity among WIC participants children.

H_{A3}: There are significant association between race and obesity among WIC participants children.

Theoretical Foundation for the Study

The framework that will guide this study is a behavioral change theoretical framework, most especially Social Cognitive Theory. Social Cognitive Theory (SCT) started as the Social Learning Theory (SLT) in the 1960's by Dr. Albert Bandura, and later developed into SCT in 1986 and posits that people are not driven by inner forces,

but rather by external factors; which suggest that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior (Bandura, 1986); Gibbs, et al., 2011). The theory will offer a comprehensive framework to understand health problem and how to change them (Baranowski, Buday, & Baranowsi, 2003). SCT was used to measure the capability of WIC participants to take part in a positive nutrition behavior and be explicit how other variables like self-regulation and self-efficacy are vital in incorporating healthier nutrition into lifestyle (Anderson, Winett, & Wojcik, 2007). The framework will also enable one to investigate the trends of prevalence of childhood obesity and to funnel the models for nutritious eating and physical activity performance, by tackling the disparity issues that result in obesity (Baranowski, et al., 2003). SCT is related to this study, as it could be used to equip obese individuals with self-regulatory skill to manage their health habits and reinforce their habit changes with dependable social supports (Bandura, 2004). The theory could be used to address the mutual interaction between self-regulatory and environmental determinants of health behavior (Bandura, 2004). SCT could also be used to address the socio-structural determinants of health as well as the personal determinant (Bandura, 2004). In preventing obesity in the preschoolers necessitates altering the practices of social systems that have prevalent validities on health rather than solely modifying the habits of individuals (Bandura, 2004). The five constructs of SCT as develop by Bandura (1986) includes:

- Reciprocal Determinism- This happen to be the focal concept of SCT and it signifies the dynamic and mutual interaction of person, environment, and behavior.
- Behavioral Capability- It signifies a person's ability to perform a behavior through elemental knowledge and skill. To successfully implement a behavior, a person must know what to do and how to implement it.
- Observational Learning- The affirmation that a behavior shepherded by others can be witnessed and observed by others, which is often demonstrated through "modelling" of behaviors.
- Reinforcements- This signifies internal or external reactions to a person's behavior that influence the probability of carrying on or stopping the behavior.
- Expectations- This signifies the expected consequences of a person's behavior. The outcome expectations could be health involved or not health involved.

Nature of the Study

The nature of the study focused on quantitative research by utilizing cross sectional methodology to take a glimpse of the population being studied in 2014. Also, it was used to analyze the quantitative data and using the outcome of the dataset to interpret to what extent the quantitative data congregate to provide a better understanding of the trend of childhood obesity (Creswell, 2014), and to study the demographic factors associated with obesity among preschool WIC enrolled children in the United States and territories in 2014.

Literature Search Strategy

The literature search engine for this study was conducted using several multidisciplinary databases available from Walden University. These databases include Sage Premier, PubMed, ProQuest Central and cumulative index to nursing and allied health. The search focused on articles published between 2008 and 2017. Older articles were included when considered necessary. The search key words include trends in childhood obesity, childhood obesity among WIC participants, epidemiology of childhood obesity, parental perception of childhood obesity, the role and potential of the WIC program, and social cognitive theory. Google and google scholars search engines, multiple books, book chapters, and relevant articles were referred to with specific focus on demographic factors associated with obesity among preschool Women, Infants, and, Children participants in the United States, District of Columbia, and territories.

Literature Review Related to key Variables/Concepts

Childhood Obesity

According to CDC (2016), in-order to determine if a child is overweight or obese, body mass index (BMI) is used for the measurement. They defined an overweight child as having a BMI at or above the 85th percentile and below the 95th percentile for children of the same age and sex. In-order to determine a child's BMI, it is calculated by dividing a person's weight in kilogram by the square of height in meters. World Health Organization (2006) defined underweight as BMI less than 2 standard deviations below the WHO growth standard median, overweight in children as BMI greater than 2 standard

deviations above the WHO growth standard median, and obesity as BMI greater than 3 standard deviations above the WHO growth standard median (see figure 1).

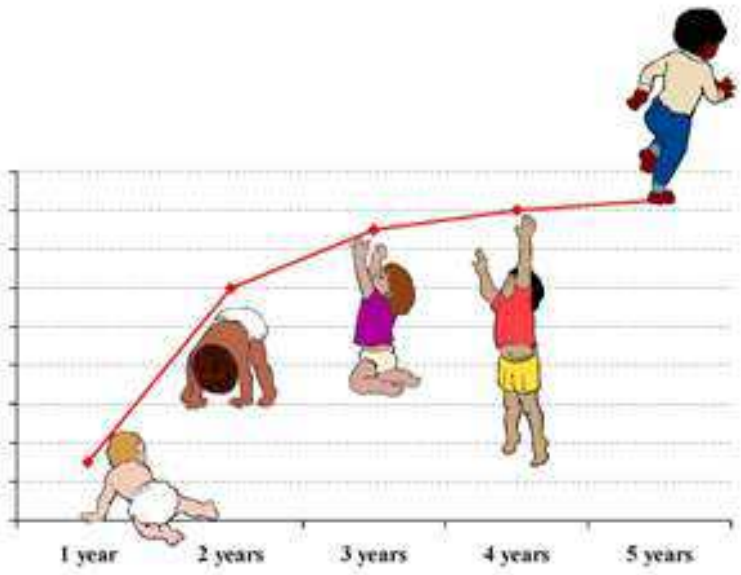

Figure 1. WHO Child Growth Standards. From WHO Multicenter Growth Reference Study. Retrieved from http://www.who.int

Trends of Childhood Obesity

CDC (2016) attributed the causes of childhood obesity as when a child is well above the normal weight for his or her age and height. The causes were attributed to either behavioral or genetics. Every behavior has its consequences either in a positive or negative way. In a study by Pollock (2015), more immediate health risk factors have been implicated as consequences of childhood obesity which includes high blood pressure, hypercholesterolemia, impaired glucose tolerance, breathing difficulty such as asthma, sleep apnea, joint problems and musculoskeletal pain, fatty liver disease, cholelithiasis,

and gastroesophageal reflux disease. Morrison et al (2015) also depicted in their research that obese children are predisposed to psychological problems such as anxiety, depression, low self-worth, and confidence than children with normal BMI, as they are frequently bullied and stigmatized. Gordon-Larsen et al (2010) linked children that are obese to likely become obese adults. Jensen et al (2014) indicate that adult obesity is associated with serious health conditions like cardiac disease, noninsulin dependent diabetes mellitus, and cancer.

According to Onis et al (2010), the prevalence of overweight and obesity in children has increased globally in recent decades. Prevalence and trends of overweight among preschool children in developing countries was reported in their study in the year 2000 based on data from 160 nationally representative samples from 94 countries. The overall prevalence of overweight reported was 3.3% but some countries and regions had significantly higher rates. Likewise, Pan et al (2016) examined trends in childhood obesity prevalence between 2000-2014 among WIC participants between ages 2-4 by utilizing WIC PC data. According to their study, the trends in childhood obesity in the United States among young low-income children participating in the WIC program increased from 14% in 2000 to 15.5% in 2004, and to 15.9% in 2010 (Pan et al, 2016). Between 2010-2014, the overall incidence of childhood obesity trended down at 14.5%.

Xiao et al (2015) conducted a study on the trends in the prevalence of overweight and obesity among Chinese preschool children from 2006-2014. The study indicated there are no significant changes in the prevalence of overweight and obesity among

children ages 3-4 years old. However, the prevalence of childhood obesity increased from 8.8% in 2006 to 10.1% 1n 2010, and then stayed stable until 2014 among children ages 5-6 years old. The prevalence of obesity was higher in boys than in girls.

Several studies have discussed socio-demographic factors associated with childhood obesity which includes household income, parental educational level, gender, and race (Pan, et al., 2016). A study by Ogden et al (2014) showed that lower socio-economic status is linked to higher risk of becoming obese. Non-Hispanic white children have a lower risk of being overweight or obese than non-Hispanic black children and Hispanic children in the United States (Martinson et al., 2012). Their earliest work backed the literature that lower socio-economic status is considerably linked to being overweight or obese, and white children are less affected than the blacks or Hispanics (Martinson, et al., 2012).

Household Income and Childhood Obesity

Tandon et al (2012) reported that children living in lower SES households are prone to be overweight or obese. Also, in another study, Ogden et al (2010) addressed that of the approximately 12 million children and adolescents who are obese, about 3 million (24%) live in households with income at or above 350% of the poverty level, about 4.5 million (38%) have below 130% of the poverty level. Additionally, the study showed that of the approximately 6 million obese non-Hispanic white children and adolescents, almost 4.4 million live in households with income at or above 130% of the poverty level. Eagle et al (2012) addressed the association of household income with the

prevalence of childhood obesity. Hensen et al (2014) indicate that low income families are less likely to realize that their children are obese or believe there should be an intervention with their eating and physical activity behaviors.

Eagle et al (2012) showed that as household income decreases, so also does the rate of childhood obesity in 68 of its public-school districts, which indicate that children of lower SES tend to have behaviors of nutritional intake and physical activity which report a greater disparity between energy intake and energy expenditure which likely promotes obesity. Their studies concluded that access to fast foods, poorer access to fresh fruits, vegetables, poor access to recreational parks, and both recreational and school-based exercise programs were likely to promote obesity in children from communities with lower household income. According to CDC report (2016), childhood obesity among preschoolers is more rampant in those who came from lower income families which is likely widespread among different racial and ethnic groups. Hispanic and non-Hispanic children are more likely to come from lower income families than non-Hispanic white children. According to the State of Obesity (n.d.), white females earn $2 for every $1 which is earned by Hispanic or non-Hispanic black families.

Family Educational Level and Childhood Obesity

Family educational level has also been implicated in the likelihood of causing obesity in children. Ogden et al (2010) found a significant reverse relationship between prevalence of obesity and the educational background of the household head. In their research, they found that 11.8% of those living in households where the household head

has at least a college degree were obese compared with 21.1% of children living in households where the household head had less than a high school education. Among the girls, they found that 8.3% are obese in household where the head of the household is a college graduate compared with 20.4% in households headed by parents with less than a high school diploma. Billic-Kirin et al (2014) offered evidence on the association of high adiposity among children with parental education level. Among the population studied 11.8% were overweight and 5.9% were obese and 10.9% of those with higher education were found to be overweight and none were obese.

Mcintosh (2015) state that significant disparities exist in obesity prevalence between different racial and ethnic groups. According to (Pan et al., 2016), from the figures taken from 2011-2012, 22.4% of Hispanic children were found to be obese, 20.2% of non-Hispanic youth, 14.1% of non-Hispanic white, and 8.6% of non-Hispanic Asian children. The prevalence of childhood obesity has remained stable at about 17% and it affects about 12.7 million children and adolescents. In 2014 14.5% of the WIC participants aged 2 to 4 years had obesity. The prevalence of childhood obesity among young low-income children diverged by WIC state agency ranging from 8.2% in Utah to 20% in Virginia. According to CDC findings, the prevalence of childhood obesity was higher among Hispanic at 17.3% and American Indian/Alaska native at 18.0%, non-Hispanic white at 12.2%, non-Hispanic black at 11.9% or Asian/Pacific Islander at 11.1%.

Impact of Race and Childhood Obesity

De Onis et al (2010) in their study, they referred to the most recent national statistics, the prevalence of children ages 2-19 years having a higher BMI ≥ 95 percentile was 15.3% among non-Hispanic white children, 20% among non-Hispanic black children, 20.8% among Mexican-American children. Pena et al (2012) studied the impact of race on childhood obesity. In their studies, they found that race has a great impact on childhood obesity. In their study, they found out that children from racial/ethnic minority groups were found to have a higher risk of various early life risk factors for obesity in comparison to their white counterparts. Campior et al (2009) also found a correlation between obesity-related risk factors to have a higher prevalence among racial/ethnic minority young people including higher levels of television viewing and more television in bedrooms, higher consumption of sugar sweetened beverages, and increased fast food consumption.

In the study by Biro and Wien (2010), they found out that childhood obesity associated with lower levels of physical activity among black and Hispanic children compared to white children. Huen et al (2013) found out that minorities specifically obesity inexplicably affects the Mexican-Americans due to dietary, nutritional, and physical inactivity.

Gender and Childhood Obesity

Ogden et al (2010) studied the relationship of gender as it relates to childhood. The study shows that boys living in a household at or above 350% of the poverty level,

the prevalence of obesity increased from 6.5% to 11.9% between 1988-1994 and 2005-2008. Their study also observed that boys living in a household with income between 130% and 350% of the poverty level and among those with income below 130% of the poverty level. Their study also found among girls, the prevalence of childhood obesity increased from 5.2% to 12% among those with income above 350% of poverty level, from 10.3% to 15.8% among those between 130% and 350% of the poverty level, and from 11.9% to 19% among those below 130% of the poverty level between 1988-1994, and 2005-2008. According to the data from the National Health and Nutrition Examination Survey (2012), between 1971-1974, there was an increase in childhood obesity among males and females, and from 1999, boys have generally been more likely to be obese than girls. The data also shows that the prevalence of childhood obesity leveled off from 2003-2004. However, between 1999-2000 and 2007-2008, there was shift among obese children to higher percentiles, with male boys and adolescents more likely to be at or above the 97^{th} percentile between 2009-2010, 14% of male children and 11% of female children ages 2-19 had a BMI at the 97^{th} percentile (Fryar et al, 2012). In a national study conducted by Keane et al (2014), the prevalence of childhood obesity was higher among girls than boys. Within the included studies, a significant trend overtime was observed for childhood obesity rates in female ($p = 0.04$) but not in male ($p = 0.2$). However, when trends in overweight and obesity prevalence overtime was assessed with the studies that collected data in children aged 4-7-9 years only, 8-13.9 years only and from 4-13.9 years, no significant trends were observed.

In an effort to maintain the health of low-income women, infants, and children who are at nutritional risk. WIC was established as an undeviating program in 1974 (USDA, n.d.). WIC provide supplemental foods, nutritional education, and health care referral for low-income women who are pregnant, postpartum, or breast feeding, infants, and children up to 5 years old. The goal of WIC is to provide nutritious foods to augment diets, nutrition education including breastfeeding promotion and support, and referrals to health and other social services (USDA, n.d.). WIC is administered in all 50 states, 34 Indian Tribal Organizations, American Samoa, District of Columbia, Guam, Commonwealth of the Northern Mariana Islands, Puerto Rico, and Virgin Island. WIC authorized package includes: infant cereal, baby foods, iron fortified adult cereal, fruits and vegetables, vitamin c-rich fruits or vegetable juice, eggs, milk, cheese, yogurt, soy-based beverages, tofu, peanut butter, dried and canned beans/peas, canned fish, whole wheat bread, and other whole grain options (USDA, n.d.). WIC also provide iron fortified infant formula for infants of women who do not copiously breastfeed.

Biennially, USDA conduct census called WIC PC that includes participants certified to receive WIC benefits in April of the reporting year (USDA, n.d.). According to USDA (n.d.), in-order to be qualified for WIC benefits, women, infants, and children, must meet the residential income (gross household income ≤ 185% of the U.S. poverty level or additionally eligible for other child nutrition program, and nutrition risk requirement.

Pan et al (2016) investigated the trends in obesity among participants aged 2-4 years participating in the special supplemental nutrition program for Women, Infants, and Children from 2000 to 2014. The sample included 22,533,518 children between the age of 2-4 years from 56 WIC state agencies. From 2000 to 2010, the total childhood obesity prevalence increased significantly from 14.0% in the year 2000 to 15.5% in 2004, and 15.9% in 2010. Between 2010 to 2014, childhood obesity prevalence decreased considerably to 14.5% in 2014. Their study also shows that among the 56 WIC state agencies with data for 2010 and 2014, only nine (16%) experienced an increase in childhood obesity prevalence including four (7%) in which the increase was statistically significant (Pan et al, 2016). The largest significant increase was found in Nebraska ranging from 14.4% to 16.9%. Reduction in obesity prevalence occurred in 45 (80%) WIC state agencies, including 34 (61%) in which the difference was statistically significant. The adjusted prevalence decreased by >3% points in six WIC states agencies. The largest significant drop was found in Puerto Rico from 20.3% to 13.9%.

Social Cognitive Theory

In explaining the developmental changes that people undergo over the course of their lives, many theories have been proposed over the years. This study utilized social cognitive theory to investigate the demographic factors associated with obesity among United States, District of Columbia, and U.S. territories preschool children participating in Women, Infants, and Children (WIC) program. Social cognitive theory (SCT) started as the social learning theory (SLT) in the 1960's by Dr. Albert Bandura, and later

developed into SCT in 1986 and posits that people are not driven by inner forces but rather by external factors; which suggest that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior (Bandura, 1986), (Gibbs, et al., 2011). See figure 2.

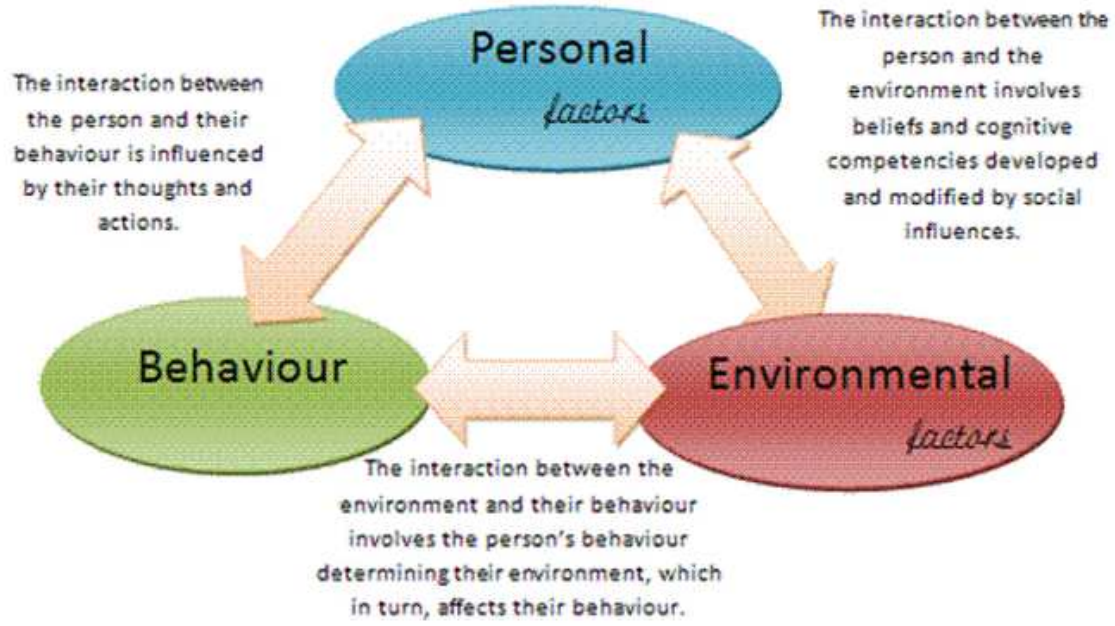

Figure 2. Social Cognitive Theory. Retrieved from http://www.socialcognitivetheory.weebly.com

Definitions

Socio-demographic: Defined as the personal characteristics of a population which includes age, gender, social class, level of education, income, marital status, family, or race/ethnicity (Debronte, 2013).

Body Mass Index (BMI): according to CDC is a person's weight in kilograms divided by the square of height in meters. In children and adolescents, BMI is age and sex specific, and it is often referred to as BMI for age (CDC, 2015). Underweight is defined as less than 5th percentile; normal or healthy weight is 5th percentile, normal or healthy weight is 5th percentile to less than the 85th percentile; overweight is 85th to less than 95th percentile, and obese is equal or greater than the 95th percentile (CDC, 2015).

Risk factors: defined as feature, quality, or exposure of an individual that increase the probability of developing a disease or injury (WHO, 2009). Examples of risk factors includes: underweight, high blood pressure, unsafe sex, tobacco and alcohol consumption, unsafe water, sanitation, and hygiene (WHO, 2009).

WIC Program: is a special supplemental nutritional program for women, infants, and children which helps eligible participants to eat healthy (Mallberg, 2014).

Social Cognitive Theory (SCT): Developed by Albert Bandura in 1986 and posits that people are not driven by inner forces, but rather by external factors; which suggest that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior (Bandura, 1986).

Assumptions

The following assumptions were made in the study: It was erroneously presumed that bilingual person can interpret accurately, because they are bilingual. Truthfully, unless one receives interpreter specific training, they are likely to add or omit information in the discussion between the examiner and the sample person. They also have the

propensity to throw in their own opinions and assumptions into the discussion stemming the conduction of incomplete and/or imprecise information (EPA, 2003).

That working with an interpreter comes effortlessly, this is often not the truth. Utilizing an interpreter to collect survey information is not as undemanding as is commonly assumed. In the framework of NHANES, examiners encounter who have limited experience working through interpreters are more likely to circumvent speaking to the sample person, which isolates the sample person by altering the exchange (EPA, 2003).

Limitations

A focal limitation of cross-sectional studies such as NHANES is the incapability to determine the chronological sequence of exposure and outcome, the key property of a cause and effect relation (Lakind, Goodman, & Naiman, 2012). While many NHANES based studies include the warning that the NHANES cross-sectional study design limits one's ability to understand the true relationship between the exposure and the health outcome, the findings which have been interpreted as showing a link between various exposure and disease risk rather than frequency, as a result allowing casual interferences (Lakind, Goodman, & Naiman, 2012). Likewise, with the use of secondary data sets creates limitations to the utilization of self-reported data.

Scope and Delimitations

The WIC program is a special supplemental nutrition program for women, infants, and children (WIC) which provides Federal grants to states for supplemental

foods, health care referrals, and nutrition education for low income pregnant, breastfeeding postpartum women, and to infants and children up to the age of 5 who are found to be at nutritional risk. A recent study in the WIC participation which may be partially attributable to a slowly improving economy following the recent recession, but also may be in response to declining birth and total fertility rates in the United States (Martin, Hamilton, Osterman, Curtis, & Mathews, 2015). The incentives of WIC are designed to improve the nutrition and health of the nation's low-income pregnant women, new mothers, infants and young children by providing more healthy choices to meet their needs during critical periods of growth and development (USDA, 2014). The WIC food package includes single strength juice, milk or substitutions like yogurt, cheese, soy beverage, and tofu (USDA, 2014). Also, breakfast cereal, fruits and vegetables, whole wheat bread, canned fish, dry or canned legumes, and peanut butter to improve the health status of WIC participants (USDA, 2014). The delimitations of the research include that subjects were participants in the WIC program.

Summary and Conclusion

This section addressed the demographic factors associated with childhood obesity among low income children 2-4 years participating in the special supplemental nutrition program for women, infants, and children in the United States including District of Columbia, and three territories in 2014. In 2014 approximately three-quarters of all WIC members reported income at or below the federal poverty recommendations, and more

than a third of the participants gave an account of incomes equal to or less than 350 percent of the federal poverty recommendations (Thorn, et al., 2015).

The framework that guided this study is the social cognitive theory (SCT) which posits that people are not driven by inner forces, but rather by external forces, which suggest that learning occurs in a social context with a dynamic and reciprocal interaction of the person, environment, and behavior (Bandura, 1986; Gibbs, et al., 2011).

.

Section 2: Research Design and Data Collection

Introduction

This study investigated the demographic factors associated with obesity among WIC enrolled preschool children in the United State and territories. This section describe population, sample, sampling procedures, instrumentation, data collection procedure, and analysis process of the study.

The study employed a quantitative cross-sectional study design with three independent variables (age, gender, and race/ethnicity) by utilizing secondary data collected from the National Health and Nutrition Examination Survey (NHANES) designed to assess the health and nutritional status of children and adults in the United States (CDC, 2017). The study purpose is to investigate how the independent variables, both individually and collectively are related to childhood obesity. The unique purposes of this database are it provide descriptive or related information; and it provide information on the reciprocal relationships of health and nutritional variables within the population groups (CDC, 2017). Additional benefits of using NHANES are to measure the health and nutritional status of the United States population and specific subgroups and to ultimately monitor changes in health and nutritional status (CDC, 2017).

Demographics of the United States of America

The United States is the third most populated country worldwide falling far behind China and India according to the U.S. Census Bureau's population clock with guesstimated population of 328,285,992 as of January 2019 (www.census.gov/popclock).

The largest state in the United States by population is California with a population of over 39.5 million residents (United States Census Bureau, 2010). New York city is the largest city in the United States with a remarkable 8.5 million population (www.census.gov/popclock).

The population growth is gaining ground among minorities. According to the U.S. Census Bureau, the ballpark figure for 2012, 50.4% of American children who were under the age of 1 belonged to racial and ethnic minority groups (Morello, Carol, & Mellnik, 2012). As shown in table 3, White Americans represent the racial majority in the United States while African American are the largest racial minority aggregating to a projected 17.8% of the total United States population making up the largest ethnic minority. The White, non-Hispanic or Latino population constitute 61.3% of the nation's total, with the total White population including White Hispanics and Latino being 76.9% (www.census.gov, n.d.).

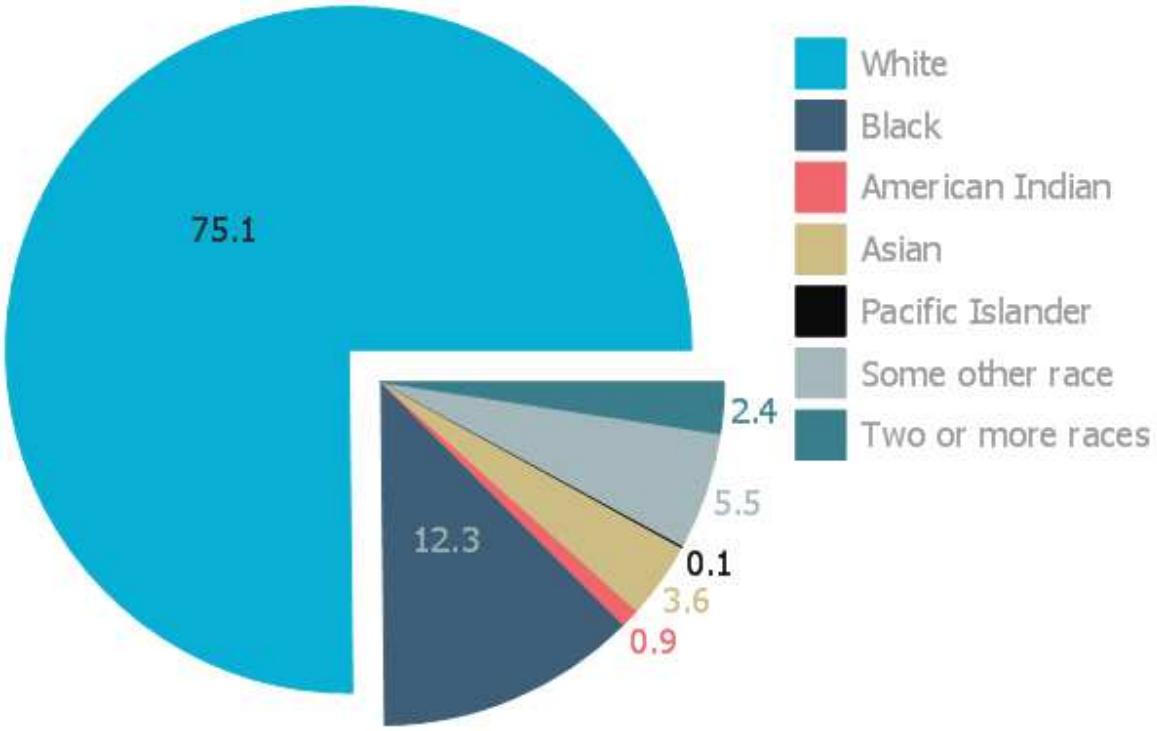

Figure 3. Demographic Breakdown

Research Design and Rationale

The NHANES (1999-2016) is a survey studies proposed to appraise the health and nutritional status of children and adults in the United States (National Center for Health Statistics (n.d.). The distinctiveness of this survey is that it intermixes interview and physical examinations. The NHANES interview includes demographic, socio-economic, dietary and health related questions. The finding from the survey are then used to determine the prevalence of major diseases including childhood obesity and the risk factors related to the diseases.

The sample of the survey was selected to represent the U.S. population of ages 2-4. All the counties in the U.S. were divided into 15 groups based on their characteristics (CDC, n.d.). One county was selected from each large group, which together form the 15 counties in the NHANES survey (CDC, n.d.). Within each county, smaller groups are formed, and between 20 and 24 of these groups are selected and the houses within those selected small groups were identified, and a sample of about 30 households were selected within each group (CDC, n.d.).

The NHANES interviewers went to participants home to collect information on age, race, gender, household income, and educational background on all persons in the household, including children ages 2-5 both WIC and non-WIC participants. The NHANES interviewer then collect family questionnaire which includes occupation, smoking, demographics, and food consumption (CDC, 2017), and sample person questionnaire which includes: health insurance, medical history, dietary behavior, and weight history (CDC, 2017).

The variables that guided this study was taken from NHANES for preschool WIC participants ages 2-4 years old. The data correlated to the independent variables and consist of the following: age, race, and gender, and the dependent variable is childhood obesity. A cross-sectional design was selected to answer the proposed research questions as this allowed information to be documented without affecting the study environment and as well facilitate comparison of several different variables at several times (Fink, 2010; Institute for Work and Health, 2015). Cross sectional design provided the reference

point demographic data which includes: gender, race, education, income, and health (Fink, 2010). It also enables a bigger sample size as it is less time consuming, and more economical to perform than other research designs (Prentice-Dunn & Prentice-Dunn, 2012). Finally, the results from cross-sectional design provides characteristics of the population being studied and disease which could be used to enhance knowledge in public health research (Prentice-Dunn & Prentice-Dunn, 2012; University of Michigan, 2010).

Methodology

Population

The study utilized secondary data available on CDC website on National Center for Chronic Disease Prevention and Health Promotion of 2-4 years old obese United States preschoolers, who are WIC participants in 2014, and met the 185% standard for the federal poverty threshold, and considered obese by measure of their BMI levels equal to or greater than the 95^{th} percentile based on gender and age.

Sampling and Procedures Used to Collect Data

The approach that was used to analyze the data was design-based analysis (Creswell, 2014). This approach considered features of the survey design such as differential selection probabilities and geographic clustering.

Data that was used for this study was obtained from National Health and Nutrition Examination Survey generated by CDC which involved randomly selected participants across the United States. Participation in the survey was confidential and voluntary; and

selected participants received personal interview, clinical tests, measurements, and physical examinations from the WIC clinics where participant receive services.

Power Analysis.

Power analysis can be done prior (*priori* or prospectively) or post (*post hoc* or retrospectively) for collection of power analysis data (Ellis, 2010). Sample size calculation is of paramount need when planning a study, which should be based on the type of research questions and study design (Nayak, 2010). In-order to draw a precise and accurate conclusion, obtaining an appropriate sample size is very important (Nayak, 2010). A smaller sample will produce a result not sufficiently powered to detect a difference between the groups, which may result in a false negative resulting in type II error (Nayak, 2010). Using a small sample could also result in unconvincing result and null trial due to insufficient number of subjects studied (Moher, Dulberg, & Wells, 1994). Likewise, using a large sample size also has consequences like wastage of limited available resources, unethical, and finally in a randomized controlled-trials, more people will be denied a better regimen by giving placebo (Nayak, 2010). In a sample size calculation, the three main factors that must be considered includes α or type 1 error, β or type II error and clinically significant difference or the effect size (Nayak, 2010). The occurrence of type 1 error is related to failure to accept the null hypothesis when it is true (Nayak, 2010). This is set at 5%. To lower α error, the sample size must be increased (Nayak, 2010). Failure to reject the null hypothesis is called type II error or β-error (Nayak, 2010). Traditionally, it can set at 20%, 10%, or 5%. The power of the study is

equal to I-type II error; therefore, any study should be at least 80% powered (Nayak, 2010). When the power of study increased from 80% to 90% or 95%, then the sample size increases too. Finally, the third factor is the effect size (Nayak, 2010).

Data Analysis

The statistical analyses were conducted using statistical software version 25.0 (SPSS Inc., Chicago, Illinois). The crude prevalence of obesity was calculated for the entire United States and District of Columbia. Obesity was considered as the dependent variable while stratifications of gender, age, and race were regarded as independent variables.

The summary statistics were determined for the stratification level along with confidence interval estimated of obesity. Univariate analysis was used for simple descriptive measures such as percentages, medians, and standard deviations to describe all study participants.

Bivariate analysis was used to demonstrate the association between independent and dependent variables and finally a logistic regression of all independent variables and the dependent variable were done.

Instrumentation and Measurement

Validity and Reliability

The validity and reliability of NHANES collects information on children and adults and combines face to face interviews with physical examination measures (Pierannunzi, Hu, & Balluz, 2013). NHANES data has been collected periodically until

1999 when it became a continuous survey with data released every two years (CDC, n.d.).

The NHANES was designed to assess the health and nutritional status of children and adults in the United States (CDC, 2017). The standard variable of NHANES involved collection of data through a computer algorithm which randomly select participants for a research (CDC, 2017). A special feature of this survey instrument is the collection of health examination data for a national representative sample of the participants and civilian noninstitutionalized U.S. populations. The survey consists of questionnaires, which is administered in the home and is followed by a standardized health examination in specially equipped mobile examination centers (MECs). The analytic goals of NHANES includes estimating the number and percentage of persons in the U.S. population and in designated subgroups with selected diseases and risk factors, monitor trends in the prevalence, awareness, treatment, and control of selected disease, monitor trends in risk behaviors and environment exposures (CDC, 2017). Studying the relationship among diet, nutrition, and health, exploring emerging public health issues and new technologies and providing baseline health characteristics that can be linked to mortality data (CDC, 2017).

Threat Validity

Threat to validity could be either internal or external. Internal validity has to do with the rigor of the study design (Slack & Draugalis, 2001). It is the sine qua non of research, without which a study would be a throwaway (Campbell & Stanley, 1963).

Threats to internal validity is anything that might affect the precision of one's results. Controlling for potential confounding variables minimizes the potential for an alternative explanation for treatment effects and provides more confidence that effects are due to the independent variable (Slack & Draugalis, 2001). There are eight threats to internal validity which includes: history, maturation, testing, instrumentation, regression, selection, experimental mortality, and an interaction of threats (Cook & Campbell, 1979).

External validity is linked to generalizing (Trochim, 2006). It refers to the estimated truth of conclusion that involve generalizations (Trochim, 2006). External validity is true to which the conclusions in a study would hold for other persons in other places and at other times (Trochim, 2006). The threat to the external validity of a study tend to be caused by the actions of participants involved in the study, problem with the sample or how it was created, or issues beyond the control of the person conducting the study (Terrell, 2016). For example, if the threats to external validity is recognized, one could design a study to control for them (Terrell, 2016). Researchers must recognize the threat to external validity and decide whether its rigorousness such that it completely abrogates the results of the proposed study, there researchers need to acknowledge the threat and its impending effect on the generalizability of the results (Trochim, 2006).

In establishing internal and external validity to determine if they are relevant to readers, practices, is assessing the statistical conclusion. The internal validity can be assessed only when the conclusion is valid. Likewise, external validity is assessed only if internal validity is established (Campbell & Stanley,1963; Cook & Campbell, 1979). If

there is no significant difference among groups or the reader conclude, the difference is not valid, it means there is no treatment effect and no cause and effect relationship to assess (Slack & Draugalis, 2001). External validity can be improved based on the sampling model by doing a good job drawing a sample from a population. For example, it is advisable to use random selection instead of non-random procedure and after selection is made, it is important to ensure that respondents participate in the study and keep the dropout rates low as much as possible (Trochim, 2006). The second approach would be to use the theory of proximal similarity more effectively by describing the ways one's contexts and others differ by providing tons of data about the degree of relationship between various groups of people, places, and even times (Trochim, 2006).

Ethical Considerations

Ethical considerations impact and correlate to many aspects of the research process and could help researchers to decide whether a field of study is ethically acceptable, and whether a study gets the moral support and approval from professionals, the scientific community, and the society (Behi & Nolan, n.d.). Immediately after verbal consent was received from the parent or guardian, the survey staff went to work, and every part of the survey was recorded as part of the ethical considerations, likewise, permission must be obtained from the proper institutional review board (Terrell, 2016).

The participants completing the survey must be made aware that their privacy is safeguarded, and no results, individual, or aggregate would be trailed back to a single person (Terrell, 2016). The data collected need to be received, stored, used, and reported

in a manner that ensures that only the individual concerned, is aware of their source (Behi & Nolan, n.d.). This means that even the researcher should not be able to pinpoint the source once the data is received or collected (Behi & Nolan, n.d.). As every human being has the right to privacy, therefore research participants may not want information about themselves or their views and attitudes, to be identified and allow availability in the public domain (Brown, 1993).

Summary

The study was designed to examine the demographic factors like gender, age, and race/ethnicity associated with obesity among American women, infants, and children preschool participants. WIC is a special supplemental nutrition program established for women, infants, and children established to prevent poor birth outcomes, such as infant mortality and low birth weight by enriching the nutrition and health of the participants. In analyzing the data SPSS statistical software version 25.0 (SPSS Inc, Chicago, Ill) was used (Nelson, Chiasson, & Ford, 2004). Statistical difference in BMI was assessed among demographic groups using x^2 tests (Nelson, Chiasson, & Ford, 2004). Odds ratios (ORs) and 95% confidence intervals (Cls) was calculated for the relationship between demographic factors and childhood obesity among WIC participant preschoolers (Nelson, Chiasson, & Ford, 2004). Adjusted odds ratios (ORs) and the 95% confidence intervals (Cls) was estimated and logistic regression analysis was conducted separately for boys and girls, and age was controlled (Nelson, Chiasson, & Ford, 2004). Subsequently, race/ethnicity also was controlled after analysis had been conducted for combined ethnic

groups in boys and girls. Finally, statistical tests were conducted at the $p = 0.05$ significant level (Zhang & Wang, 2004)..

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this study was to examine the demographic factors associated with childhood obesity among preschool WIC participants in the 50 states, the District of Columbia, and three U.S. territories in 2014. By understanding the demographic factors associated with childhood obesity among WIC participants, guideline could be developed to strengthen nutrition education, and consequentially enabling WIC nutrition services to better meet the challenges of today (USDA, 2018). The result section of this study comprises of univariate analysis for simple descriptive measures such as percentages, median, and standard deviation to describe all study participants (see tables 1-3). Chi-square test was used to answer research questions 1-3.

The three resolute research questions to objectify my findings from this study includes:

Research Question 1: Is there any association between gender and obesity among WIC participants children?

H_{01}: There are no significant association between gender and obesity among WIC participants children.

H_{A1}: There are significant association between gender and obesity among WIC participants children.

Research Question 2: Is there any association between age and obesity among WIC participants children?

H_{02}: There are no significant association between age and obesity among WIC participants children.

H_{A2}: There are significant association between age and obesity among WIC participants children.

Research Question 3: Is there any association between race and obesity among WIC participants children?

H_{03}: There are no significant association between race and obesity among WIC participants children.

H_{A3}: There are significant association between race and obesity among WIC participants children.

In section 3, the data collection progression and the time frame for the secondary data utilized in this study was particularized. The secondary data was assessed, and its capability to effectively represent a large sample for a broader overview. An inclusive review and the summary of all findings was provided, as they relate to the research questions and hypotheses of this study as well as an exclusive descriptive statistic of significance in substantiating or invalidating the hypotheses.

Description of the Secondary Data

The study utilized the dataset from 2014 Women, Infant, and Children Participant and Program Characteristics (WIC-PC) from the open source Data.gov website. The demographic dataset was provided by Centers for Disease Control and Prevention (CDC) aggregated at the state level of 2 to 4 years old obese preschoolers who are WIC

participants in 2014 and met the 185% standard of the federal poverty threshold and considered obese by measure of their BMI levels equal to or greater than the 95th percentile based on gender and age.

Study Sample

The 2014 WIC participants data of the preschoolers in the United States and territories was cleansed and rearranged in a way that it will be easier to analyze. Individuals from the 50 U.S. states, District of Columbia, Guam, Puerto Rico, and U.S. Virgin Island were used for the study population. The final data set provided an adequate sample size of 3,011,119 participants for analysis and adequate to maintain a statistical strength.

Analysis Results

In this section, I present the results of the data analysis on gender, age, and race and their association with obesity outcomes in the WIC population using SPSS version 25.0 to answer the three research questions. Survey or sampling weights were applied for analysis. Survey weights denotes a certain number of people in a limited population. For the fact that my data is survey in nature, it was analyzed using survey weights

Univariate Analysis/Descriptive Statistics

The dataset comprised of 1,529,432 males and 1,481,687 females totaling 3,011,119 participants. Of this dataset, 14.7% (n = 224,827) males were obese, and 13.2% (n = 195,583) females were obese (See table 1). Also, within 24-35 months old participants, 12.1% (n =144,797) were obese; among 36-47 months old participants,

14.7% (n =162,367) were obese, and within 48-59 months old participants, 16% (n = 113,649) were obese (See table 2). Within the racial groups, 11.3% (n = 95,168) non-Hispanic white were obese, 11.7% (n =70,829) non-Hispanic black were obese, 17.5% (n = 243,096) Hispanic were obese, 10.1% (n =12,606) Asian/Pacific Islander were obese, and finally 13.9% (n = 5,048) American Indians/Alaskan native were obese (See table 3).

Table 1

Frequency and Percent of Obese by Gender

Gender	Total	N	%	P-value
Male	1,529,432	224,827	14.7	0.000
Female	1,481,687	195,583	13.2	

Table 2

Frequency and Percent of Obesity by Age

Age (month)	Total	N	%	P-value
24-35	1,196,672	144,797	12.1	0.000
36-47	1,104,538	162,367	14.7	
48-59	710,309	113,649	16.0	

Table 3

Frequency and Obese by Race

Race/Ethnicity	Total	N	%	P-value
White	842,192	95,168	11.3	0.000
Black	605,378	70,829	11.7	
Hispanic	1,389,121	243,096	17.5	
Asian/Pacific Islander	124,808	12,606	10.1	
American Indian/Alaskan	36,314	5,048	13.9	

Bivariate Analysis

To be able to understand the data effectually, a bivariate analysis was conducted using cross-tabulation and chi-square analysis to examine the association between predictors, covariances (gender, age, and race) and outcome variable (obesity).

Obesity by Gender

Of the 1,481,687 female participants, 206,872 (13.2%) were obese and 1,274,815 (86.8%) were non-obese (see table 4). Of the 1,529,432 male participants, 224,827 (14.7%) were obese, and 1,304,605 (85.3%) were non-obese. Male participants were significantly more likely to be obese than the females ($p < 0.05$).

A chi-square test for association was conducted between gender and obesity. All expected cell frequencies were greater than five. There was a statistically significant association between gender and obesity, $\chi^2(1) = 1409.652$, $p < .001$ (see table 5).

Table 4

Bivariate Analysis

Variables		BMI (Normal) N (%)	BMI (Obese) N (%)	P-Value
Gender				0.000
	Female	1,286,104 (86.8%)	195,583 (13.2%)	
	Male	1,304,605 (85.3%)	224,827 (14.7%0	
Age (Months)				0.000

	24-35	1,051,875 (87.9%)	144,797 (12.1%)	
	36-47	942,171 (85.3%)	162,367 (14.7%)	
	48-59	596,660 (84%)	113,649 (16.0%)	
Race/Ethnicity				0.000
	White	747,024 (88.7%)	95,168 (11.3%)	
	Black	534,549 (88.3%)	70,829 (11.7%)	
	Hispanic	1,146,025 (82.5%)	243,096 (17.5%)	
	Asian/Pacific Islander	112,202 (89.9%)	12,606 (10.1%)	
	American Indian/Alaskan	31,266 (86.1%)	5,048 (13.9%)	

Table 5

Chi-Square Test of Association between Gender and Obesity

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1409.652[a]	1	.000
Continuity Correction[b]	1409.527	1	.000
Likelihood Ratio	1410.910	1	.000

N of Valid Cases	3011119

Obesity by Age of Participants

As shown in table 4, among participants ages 24-35 months, 144,797 (12.1%) were obese, while 1,051,875 (87.9%) were non-obese. Among the 36-47 months old participants, 162,367 (14.7%) were obese, while 942,171 (85.3%) were non-obese. Finally, among 48-59 months old participants, 113,649 (16%) were obese, while 611,054 (84%) are non-obese.

A Chi-square test for association was conducted between age of participants and obesity. There was a statistically significant association between age of participants and obesity, χ^2 (2) = 6405.734, $p < .001$ (see table 6).

Table 6

Chi-Square Test of Association between Age and Obesity

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6405.734	2	.000
Likelihood Ratio	6448.023	2	.000
N of Valid Cases	3011519		

Obesity by Race

Among non-Hispanic White participants, 95,168 (11.3%) are obese, while 747,024 (88.7%) were non-obese. Among the non-Hispanic Black participants, 70,829 (11.7%) were obese, while 534,549 (88.3%) were non-obese. Among the Hispanic, 243,096 (17.5%) were obese, while 1,146,025 (82.5%) were non-obese. Among the Asian/Pacific Islander, 12,606 (10.1%) were obese, while 112,202 (89.9%) were non-obese. Finally, among the American Indians/Alaskan Native, 5,048 (13.9%) were obese, while 31,266 (86.1%) were non-obese (see table 4).

A Chi-square test for association was conducted between race and obesity. There was a statistically significant association between race and obesity, χ^2 (4) = 23008.737, p < .001 (see table 7).

Table 7

Chi-Square Test of Association between Race and Obesity

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23008.737	4	.000
Likelihood Ratio	23039.406	4	.000
N of Valid Cases	2997813		

Multivariate Analysis

Predictors for Obesity

A multivariate logistic regression model concurrently analyzed the effect of gender, age, and race on the likelihood of obesity compared to non-obesity in the sample population, (N = 540). A binomial logistic regression attempts to predict the probability that an observation falls into one or two categories of a dichotomous dependent variable based on one or more independent variables that can be either continuous or categorical. In SPSS, output for logistic regression provides several pieces of information that helped in interpreting the results of logistic regression using these three variables (gender, age, and race) as predictors of childhood obesity among WIC participants. When the three predictors were considered together, the Model or equation was significant, χ^2 (3) = 50.586, $p < .001$ (see Table 8).

The logistic regression model showed no statistical significance between gender and obesity, OR 1.117 (95% Cl = .027, 46.435), $p = .954$; however significant at $p < 0.05$ level as demonstrated for age and obesity, OR .002 (95% Cl = , .000, .053), $p <.001$, and race and obesity OR .000 (95% cl = .000, .000), $p < .001$ (Table 10

Table 8

Omnibus Tests of Model Coefficients

		Chi-Square	df	Significance
Step1	Step	50.586	3	.000
	Block	50.586	3	.000

	Model	50.586	3	.000

Table 9

Nagelkerke R Square Test

Step	-2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
1	698.013[a]	.089	.119

Table 10

Logistic Regression Predicting Likelihood of Obesity Based on Age, Gender, and Race

		B	S.E	Wald	df	Sig	Exp(B)	95%C.l	
								Lower	Upper
Step1[a]	Gender	.110	1.902	.003	1	.954	1.117	.027	46.435
	Age	-6.414	1.334	20.186	1	.000	.002	.000	.053
	Race	-9.954	1.016	95.949	1	.000	.000	.000	000
	Constant	-.999	.315	10.047	1	.002	.368		

Summary

In this section, I hypothesized three research questions: Is there any association between gender and obesity among WIC participant children, is there any association

between age and obesity among WIC participant children, and lastly, Is there any association between race and obesity among WIC participant children? To test these hypotheses, the dataset from 2014 Women, Infant, and Children Participant and Program Characteristics (WIC-PC) from the open source Data.gov website was used. The demographic dataset was provided by Centers for Disease Control and Prevention (CDC) aggregated at the state level.

In presenting the results for research question 1, the frequency and percent of obese by gender was assessed, and the results of the analysis indicated that there was significant difference in the mean percent of obesity rate between male and female children included in the study (14.7% and 13.2% respectively). To understand the data effectually a bivariate analysis was conducted using cross-tabulation and chi square analysis to examine the association between gender and obesity. Male participants were significantly more likely to be obese than the females ($p < 0.05$). A logistic regression was performed to ascertain the effects of age, gender, and race in the likelihood that the participants are obese. When the three predictors were considered together, the model was significant, $\chi^2(3) = 50.586$, $p < .001$.

For research question 2, the frequency and percent of obese by age were assessed. The results of the analysis showed that within age group, 24-35 months, 12.1% were obese, within 36-47 months, 14.7% were obese, and within 48-59 months, 16% were obese. When bivariate analysis was applied using cross-tabulation and chi-square analysis, there was a statistically association between age of participants and obesity,

$\chi^2(2) = 6405.734$, $p < .001$. The 48-59 months old participants were significantly more likely to be categorized as obese when compared to children ages 24-35 and 36-47 months.

For research question 3, the frequency and percent of obese by race were assessed. The results of the analysis showed that within race, 11.3% of non-Hispanic White were obese, 11.7% of non-Hispanic Black were obese, 17.5% of Hispanic were obese, 10.1% of Asian/Pacific Islander were obese, and 13.9% American Indians/Alaskan natives were obese. When bivariate analysis was conducted between race and obesity using cross-tabulation and chi square analysis, there was a statistically significant association between race and obesity, $\chi^2(4) = 23008.737$, $p < .001$. The Hispanic children were significantly more likely to be categorized as obese compared with other racial groups.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

This study was carried out to identify the demographic factors associated with childhood obesity among preschool WIC participants in the United States, District of Columbia, and three U.S. territories. Also, to investigate whether gender, age, and race were predictors of obesity outcomes in the sample of WIC participants. The main purpose of this study was to fill a gap about possible association among gender, age, race/ethnicity and obesity among preschool children enrolled in the WIC program. Several studies were conducted on the trends of childhood obesity among WIC participants. In piloting this study, data were obtained from the Women, Infant, and Children participant and Program Characteristics (WIC-PC) dataset from the open source Data.gov website. The dataset consists of states and territories aggregated data on the prevalence of obesity in 24 to 59 months old WIC participants in 2014. The prevalence rates were stratified in each state/territory based on gender (male or female), age (24 to 35 months, 36-47 months, and 48-59 months); and race (non-Hispanic white, non-Hispanic black, Hispanic, Asian/Pacific Islander, and American Indian/Alaskan native). The dataset also included an aggregated estimate of obesity in this population for each state/territory.

Interpretation of Findings

The independent variables of this study were gender, age, and race, while the dependent variable was obesity. The study identified childhood obesity prevalence among male to be 14.7% and 13.2% among females. This was consistent with Cantarero et al. (2016) findings that childhood obesity prevalence among male WIC participants was 12.7% and 11.4% among female participants. This study was consistent with the study by Patel (2018) whose study shows that 15.2% of the male participants were obese, and 14.2% of female were obese. Among the 24-35 months participants, 12.1% were obese, amid the 36-47 months old, 14.7% were obese, 16.0% were obese among 48-59 months old. This study aligned to previous study conducted by Patel (2018) which focused on demographic risk factors for obesity in WIC participants children aged 2 to 4 years old. The study showed that 14.7% of 24-35 months old were obese, 15.1% of the 36-47 months were obese, and 15.7% of the 48-59 months old were obese. Within the racial groups, the prevalence amidst the white was 11.3%, black 11.7%, Hispanic 17.5%, Asian/Pacific Islander 10.1%, and 13.9% among American Indians/Alaskan native. This showed some variation with a similar study conducted by Cantarero, et al. (2016) in which 17.9% of the white participants were obese, 15.8% of the blacks were obese, 23.2% of the Hispanics were obese, 33.3% of the American Indian/Pacific were obese, and 19.8% of the Asian/Alaskan natives were obese.

Within the racial groups, the prevalence amidst the White participants was 11.3%, Black participants 11.7%, Hispanics 17.5%, Asian/Pacific Islanders 10.1%, and 13.9%

among American Indians/Alaskan native. This study showed some variations with other studies done by Cantarero, et al. (2016). Among the Non-Hispanic White, 6.7% were obese, 13.3% among the Hispanic, and 19.6% among the American Indians.

A chi square test for association was conducted between gender and obesity, and there was a statistically significant association between gender and obesity. The findings were consistent with that of Contarero, et al. (2016) who found a statistically significant association between gender and obesity among kindergarteners in Southwestern United States, ($p < .001$). There was an association found between age of participants and obesity. A chi-square test showed a statistically significant association between the age of participants and obesity. Cantarero, et al. (2016) and Patel (2018) demonstrated in their studies, that there is association between the age of participants and obesity ($p <.001$). Finally, there was a statistically significant association found between race and obesity which was consistent with the study of Cantarero et al., (2016) who found a positive association between ethnicity and obesity in their study: trends in early childhood obesity in a large urban school district in the Southwestern United States between 2007-2014, ($p < .001$).

When logistic regression was performed to ascertain the effects of gender, age, and race on the likelihood that the participants are obese, $\chi^2 (3) = 50.586$, $p < .001$. The model explained 12% (Nagelkerke R^2) of the variance in obesity and correctly classified 59% of cases. Sensitivity was 61.9%, specificity was 55.6%, positive predictive value was 58%, and negative predictive value was 59%. Of the three predictive variables only 2

were statistically significant: age and race (as shown in table 10). This was consistent with the study conducted by Cantarero, et al. (2016) who found a statistically significant relationship among children who were less than 5 years old.

The study was grounded on the theoretical framework, social cognitive theory to understand the demographical factors associated with childhood obesity. The research findings do line up with the integral of the theory which postulate that human behavior outcome of dynamic interactions between personal, behavioral, and environmental factors (Nixon, Moore, Douthwaite, Gibson, Vogele, Kreichauf, et al. 2012). The behavioral factors involve health-related knowledge and skills referred to as behavioral capability, and skills in regulating and acting (Nixon et al. 2012). The findings of this study suggest that among the U.S WIC participants, consideration should be given to other justifying conditions that contribute to lack of association between demographic factors and childhood obesity outcomes. Nixon, et al. (2012) utilized several interventions grounded in the SCT among preschoolers ages 4-6 which demonstrated positive outcomes in creating significant changes in healthy eating and/or physical activity.

Limitations of the Study

The mutual purpose of the study was to examine the demographic factors associated with childhood obesity among preschool WIC participants in the 50 states, the District of Columbia, and three U.S. territories in 2014.

A major limitation to this study was that it was not the geographically representative of the entire nation which makes it impossible to achieve a good geographical spread as the National Health and Nutritional Examination Survey (NHANES) two teams could only visit a total of 16 places a year (CDC.gov., 2017).

Another limitation of this study was its ecological approach in combining aggregate obesity rate from multiple sub-populations across the United States, District of Columbia, and territories. A significant physiognomy of the WIC participants could be justified by using broad aggregated data than discrete level data would permit (Patel, 2018).

Another limitation of this study was that the study was entirely non-experimental, based on statistical divergences between children who are WIC participants and non-participants. To the same extent, the gold standard for assessing the usefulness of any study is the randomized control trial, designed to minimalize the risk that factors unconnected to the study will manipulate the results (Carlson & Neuberger, 2017). Because this study was deficient of randomized control trial, the study outcome might be biased because the low-income WIC preschoolers were self-selected (Carlson & Neuberger, 2017).

Recommendations

This study outcomes presented several limitations to be addressed for future research. The study was implemented to examine the demographic factors associated with childhood obesity among preschool WIC participants. Based on the findings,

information and insights gained while conducting this study, it is necessary to make some recommendation for future study.

There is need for future researchers to discuss ultramodern strategies to better recruit and retain WIC participants in the United States and the territories. These approaches should focus on strategies to address ongoing challenges and pioneering ideas that would increase recruitment of WIC participation. These should address barriers of accessing WIC, stigma associated with participation in WIC, transport challenges, and assimilating applications and reapplication across programs as much as possible including early childhood education (National WIC Association, 2019). The approaches could involve effective multicultural and multilingual outreach that will widen the reach and efficacy of WIC, helping overcome barriers to WIC participation, incorporating extensive fallacy about eligibility, limited access to information about WIC benefits, and how they could apply, and outdated notions of program promotion (FRAC, 2019).

Also, implementing effective WIC outreach by utilizing the outreach power of positive word of mouth recommendations, and offer attractive WIC promotional materials to share. This could be done for the local WIC agencies to employ current or former WIC participants or other advocates as outreach workers in the communities (FRAC, 2019).

Implication for Professional Practice and Social Change

Walden University defines positive social change as a purposeful progression of originating and applying ideas, policies, and events to propagandize the importance, how

dignify and the development of individuals, communities, organizations, institutions, culture, and societies which could result in the improvements of human and social condition (Walden University, 2012).

This study intends to maintain a positive social change by ensuring that WIC participants have an improved access to health care (Carlson & Neuberger, 2018). Also ensuring that the WIC participants are yielding by consuming the revised food packages which have fewer calories associated with healthy weight (Carlson & Neuberger, 2018). The revised food package has been found to reduce cases of anemia due to depletion of iron. Iron is an essential mineral that conveys oxygen throughout the body and helps muscles deposit and utilize oxygen (Carlson & Neuberger, 2017). As part of positive social change, consumption of WIC revised food package could improve cognitive development which could enable children to do well in school and abate the damaging effects of poverty (Carlson & Neuberger, 2018). Some new researches suggest that prenatal and early childhood participation in WIC is associated with improved cognitive development and academic achievement (Jackson, 2015). Finally, participating in WIC program could impact neighborhood food environment by providing nutritious foods which could help create healthier neighborhood food environment and improving access to fruits, vegetables, and whole grains for WIC participants (Carlson & Neuberger, 2018).

Discussion/Findings

The results of the analyses indicated that the percentage of children categorized as being obese were normally distributed within two of the age categories: 36-47 and 48-59

months included within the analysis. The findings of this study on WIC participants aged 24-59 months over all fifty states, DC, and four territorial regions of the United States indicate that children who are 48-59 months old (16.0%) are significantly more likely to be categorized as obese compared to the other two age groups within the analysis (12.1% and 14.7%).

The results of the analyses indicated that the percentage of children categorized as being obese were normally distributed within two of the racial groups like Hispanic and American Indian/Alaskan natives included within the analysis. Children who are Hispanic decent (17.5%) and American Indian/Alaskan native (13.9%) are significantly more likely to be categorized as obese compared to the other three racial groups included within the analysis.

The results of the analyses indicated that both variables (Male and Female) are normally distributed. The results of the analyses indicated that there were significant differences in the mean percent obesity rate between male and female children included within the study. Male children (14.7%) were significantly more likely to be reported as being obese compared to female children (13.2%).

Conclusion

The WIC program has three key constituents in terms of advantages: supply of food of high nutrient quality, nutrition education, and referrals to professional of health and social services.

The inclusive results of the data analyses indicated that children who are between 36 and 59 months old are at much higher risk of being obese compared to children who are 24 to 35 months old. Children who are of Hispanic and American Indian/Alaskan native decent were significantly more likely to be obese than other racial groups. There was significant rate of obesity among males than females. The data analysis suggests the evolution period between ages 24 to 36 months may be a better period of obesity intervention by utilizing nutrition and physical activity. Also, to instruct pregnant women, and ensure parents and families have the proper information about healthy behaviors and inspire stakeholders across diverse settings and sectors to originate supportive nutrition and physical activity environments. For this population of children, cultural appropriate intervention could be made to deal with children from various culture by understanding cultural characteristic.

In order to effect an effectual social change to reverse the epidemic of obesity, this study tends to reduce childhood obesity through a three prong strategy, which includes modifying relative food prices, increasing exposure and gaining access to healthy food and lowering exposure and access to unhealthy foods, and improving the image of healthy food while making unhealthy food less appealing (Frieden, Dietz, & Collins, 2010).

.

References

Anderson, E., Winett, R., & Wojcik, J. (2007). Self-regulation, self-efficacy, outcome expectations, and social support: Social cognitive theory and nutrition behavior. *Annals of Behavioral Medicine,* 34(3), 304-312.

Bandura, A. (1986). *Social Foundation of Thought and Action*. Englewood Cliffs, New Jersey: Prentice-Hall

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education Behavior*, 31(2), 143-164.

Baranowski, D., Buday, R., Lu, A., & Baranowski, J.C. (2003). Design of video games for children's diet and physical activity behavior change. *International Journal Computer Science Sport,* 9 (2), 3-17.

Behi, R. & Nolan, M. (1995). Ethical issues in Research. *British Journal of Nursing*, 4(12), 712-716.

Benjamin, R.M. (2010). The Surgeon General's Vision for a healthy and fit nation. *Public Health Report*, 125(4), 514-515.

Bilic-Kirin, V., Gmajnic, R., Burazin, J., Milicic, V., Bujan, V., & Ivanko, M. (2014). Association between socioeconomic status and obesity in children. *Collegium Antropologicum*, 38(2), 553-558.

Biro, F.M. & Wien, M. (2010). Childhood obesity and adult morbidities. *American Journal Clinical Nutrition*, 91, 1499S-1505S.

Boyle, S., Jones, G., & Walters, S. (2010). Physical activity, weight status, and diet in adolescents: are children meeting the guidelines? *Health*, 2, 1142-1149.

Brown, K.H. (1993). Descriptive and normative ethics: class, context, and confidentiality for mothers with HIV. *Social Science Medicine*, 36(3), 195-302.

Campbell, D.T. & Stanley, J.C. (1963). *Experimental and quasi-experimental designs for research*. Boston: Houghton Mifflin.

Campion, J., Milagro, F.L., & Martinez, J.A. (2009). Individuality and epigenetics in obesity. *Obesity Review*, 10, 383-92.

Cantarero, A., Myers, O., Scharmen, T., Kinyua, P., & Jimenez, E.Y. (2016). Trends in early childhood obesity in a large urban school district in the Southwestern United States, 2007-2014. *Preventing Chronic Disease*, 13, E74, 1-11.

Carlson, S., & Neuberger, Z. (2017). WIC works: Addressing the Nutrition and Health Needs of low-income families for 40 years. Center on Budget and Policy Priorities. Retrieved from http://www.cbpp.org/cms

Centers for Disease Control (2016). *Overweight and Obesity: Childhood Obesity Causes and consequences.* Retrieved from http://www.cdc.gov

Centers for Disease Control .gov., (2017). About the National Health and Nutrition Examination Survey. National Center for Health Statistics. Retrieved from https://www.cdc.gov/nchs/nhanes/about_nhanes.htm

Centers for Disease Control and Prevention (2009). Overweight and obesity: childhood overweight and obesity, consequences. Retrieved from http://www.cdc.gov/obesity/childhood/consequences.html

Centers for Disease Control and Prevention (2013). Vital signs: obesity among low-income preschool aged children- United States, 2008-2011. *MMWR Morbidity Mortality Weekly Report*, 62(31), 629-634.

Centers for Disease Control and Prevention (2014). Youth Risk Behavior Surveillance-United States, 2013. *Morbidity and Mortality Weekly Report*, 63(4), 1-172.

Centers for Disease Control and Prevention (2015). WIC 2-4 years old who have obesity. Retrieved from https://www.cdc.gov/nccdphp/dnpao/data-trends-maps/index.html.

Centers for Disease Control, (2017). *National Health and Nutrition Examination Survey*. Retrieved from http://www.cdc.gov

Centers for Disease Control, (n.d.). *National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity, and Obesity. Data, Trend, and Maps.* Retrieved from http://www.cdc.gov/nccdphp/dnpao/data-trend.maps/index.html

Chaparro, M.P. (2019). Winter 2019 WIC research to practice. Retrieved from http://www.nwica.org

Cook, T.D. & Campbell, D.T. (1979). *Quasi-experimentation: design and analysis issues for field settings*. Boston: Houghton Mifflin.

Creswell, J.W. (2014). *Research Design* (4th ed.) Los Angeles, CA: SAGE Publications.

Dabrowska, A. (2014). Childhood overweight and obesity. Congressional Research Service. Retrieved from http://fas.org/sgp/crs/misc/R41420.pdf

Davison, K.K., Jurkowski, J.M., & Lawson, H.A. (2013). Reframing family centered obesity prevention using the family ecological model. *Public Health Nutrition*, 16(10), 1861-1869.

De Onis, M., Blossner, M., & Borghi, E. (2010). Global prevalence and trends of overweight and obesity among preschool children. *American Journal of Clinical Nutrition*, 92(5), 1257-64.

Eagle, T.F., Sheetz, A., Gurm, R., Woodward, A.C., Kline-Rogers, E., Leibowitz, R. DuRussel-Weston, J. et al. (2012). *American Heart Journal*, 163, 836-43.

Ellis, P.D. (2010). *The essential guide to effect sizes: An introduction to Statistical Power, Meta-analysis and the Interpretation of Research Results*. United Kingdom: Cambridge University Press.

Faith, M.S., Van Horn, L., Appel, L.J., Burke, L.E., Carson, J.A., Franch, H.A., et al. (2012). Evaluating parents and adult caregivers as "agents of change" for treating obese children: evidence for parent behavior change strategies and research gaps: a scientific statement from the American Heart Association. *Circulation*, 125, 1186-1207.

Fink, A. (2010). *Conducting research literature reviews: From the internet to paper*. (Laureate Education, Inc., Custom ed.). Thousand Oaks, CA: Sage Publications.

Food Research and Action Center (2019). Making WIC work better: Strategies to reach more women and children and strengthen benefit use. Retrieved from http://www.FRAC.org .

Frar, C., Carroll, M., & Ogden, C. (2012). Prevalence of overweight and obesity among children and adolescents: United States, 1963-1965 through 2011-2012. Retrieved from http://www.cdc.gov/nchs/data/hestat/obesity-child-11-12/obesity-child-11-12.htm.

Freedman, D.S., Khan, L.K., Dietz, W.H., Srinivasan, S.R., & Berenson, G.S. (2001). Relationship of childhood obesity to coronary heart disease risk factors in adulthood: The Bogalusa heart study. *Pediatrics*, 108(3), 712-718.

Freedman, D.S., Khan, L.K., Serdula, M.K., Dietz, W.H., Srinivasan, S.R, Berenson, G.S. (2005). The relation of childhood BMI to adult adiposity: the Bogalusa heart study. *Pediatrics*, 115(1), 22-27.

Frieden, T.R., Dietz, W., & Collins, J. (2010). Reducing childhood obesity through policy change: Acting now to prevent obesity. *Health Affairs*, 29(3), 357-363.

Gibbs, L., Green, J., Waters, E., Gold, L.C., St Leger, L., & Swinburn, B. (2011). A settings-based theoretical framework for obesity prevention community interventions and research. *Australian and New Zealand Journal of Public health*, 35(2), 104-106.

Gordon- Larsen, P. The, N.S., & Adair, L.S. (2010). Longitudinal trends in obesity in the United States from adolescence to the third decade of life. *Obesity*, 18(9), 1801 1804.

Healthy Americans, (2016). Special issue brief: Obesity rates among WIC children. Retrieved from http://healthyamericans.org/report/130/

Huen, K., Harley, K., Beckman, K., Eskenazi, B. & Holland, N. (2013). Associations of PON1 and Genetic Ancestry with obesity in Early Childhood. *PLOS ONE*, 8(5), 1-9.

Institute for Work and Health (2015). What researchers mean by cross-sectional vs longitudinal studies? Retrieved from https://www.iwh.on.ca/wrmb/cross-sectional-vs-longitudinal-studies

Jensen, M.D., Ryan, D.H., Apovian, C.M., et al. (2014). 2013 AHA/ACC/TOS guideline for the measurement of overweight and obesity in adults: a report of the American College of Cardiology/American Heart Association Task force on Practice Guidelines and the obesity society. *Journal American College Cardiology*, 63, 25 (part B), 2985-3023.

Keane, E., Kearney, P.M., Perry, I.J., Kelleher, C.C., & Harrington, J.M. (2014). Trends and Prevalence of overweight and obesity in the Republic of Ireland from 2002-2012: a systemic review. *BMC Public Health*, 14, 974-989.

Kranjac, A.W. & Wagmiller, R.L. (2016). Association between age and obesity over time. *Pediatric*, 137(5), 2015-2096.

Martinson, M.L., McLanahan, S., & Brooks-Gunn, J. (2012). Race/Ethnic and nativity disparities in child overweight in the United States and England. *The Annals of the American Academy of Political and Social Science*, 643(1), 219-238.

Maynard, L.M., Galuska, D.A., D.A, Blank, H.M., & Serdula, M.K. (2003). Maternal perception of weight status of children. *Pediatrics*, 111, 1226-1231.

McIntosh, J. (2015). *How do race and ethnicity influence childhood obesity*? Retrieved from http://medicalnewstoday.com

Mohamed, S.M. (2015). Childhood obesity: Epidemiology, Determinants, and Prevention. *Journal Nutritional Disorder Therapy*, 5(2), 1-4.

Moher, D., Dulberg, C.S., & Wells, G.A. (1994). Statistical power, sample size, and their reporting in randomized controlled trials. *JAMA*, 272, 122-4.

Morrison, K.M., Shin, S., Tarnopolsky, M., & Taylor, V.H. (2015). Association of depression and health related quality of life with body composition in children and youth with obesity. *Journal of Affective Disorders,* 172, 18-23.

Muhammad, N.A., Omar, K., Shah, S.A., Muthupalaniappen, L.A., & Arshad, F. (2008). Parental perception of the children's weight status, and its association with their nutrition and obesity knowledge. *Asia Pacific Journal Clinical Nutrition*, 17(4), 597-602.

Natale, R., Scott, S.H., Messiah, S.E., Schrack, M.M., Uhlhorn, S.B., & Delamater, A. (2013). Design and methods for evaluating an early childhood obesity prevention program in the childcare center setting. *BMC Public Health*, 13(78), 1471-1481.

National Center for Health Statistics (2013). *Adolescent and School Health*. Retrieved from Centers for Disease Control and Prevention.

National center for Health Statistics, (2014). *Health, United States, 2013*. U.S. Department of Health and Human Services. DHHS Publication No. 2014-1232.

Nayak, B.K. (2010). Understanding the relevance of sample size calculation. *Indian Journal of Ophthalmology*, 58(6), 469-470.

Nixon, C.A., Moore, H.J., Douthwaite, W., Gibson, E.L., Vogele, C., Kreichauf, S., et al. (2012). Identifying effective behavioral models and behavior change strategies underpinning preschool and school-based obesity prevention interventions aimed at 4-6 years old: a systemic review. *Obesity Review*, 13, suppl. 1, 106-17.

Ogden, C.L., Carroll, M.D., Kit, B.K., & Flegal, K.M. (2014). Prevalence of childhood obesity in the United States, 2011-2012. *Journal of American Medical Association*, 311(8), 806-814.

Ogden, C.L., Lamb, M.M., Carroll, M.D., B.K. & Flegal, K.M. (2010). Obesity and Socioeconomic Status in Children and Adolescent: United States, 2005-2008. *National Center for Health Statistics Data Brief*, 51, 1-8.

Pan, L., Freedman, D.S., Sharma, A.J., Castellanos-Brown, K., Park, S., Smith, R.B., & Blanch, H.M. (2016). Trends in obesity among participants age 2-4years in the special supplemental nutrition program for women, infants, and children- United States, 2000 – 2014. *Morbidity and Mortality Weekly Report*, 65(45), 1256-1260.

Patel, P.B. (2018). Demographic risk factors for obesity in WIC participants children aged 2 to 4 years old. Retrieved from https://www.researchgate.net/Publication/327979538.

Pena, M.M., Dixon, & Taveras, E.M. (2012). Are you taking to me? The important of ethnicity and culture in childhood obesity prevention and management. *Childhood Obesity*, 8(1), 23-27.

Pierannunzi, C., Hu, S.S., & Balluz, L. (2013). A systemic review of publications assessing reliability and validity of the Behavioral Risk factor surveillance system (BRFSS), 2004-2011. *BMC Medical Research Methodology*, 13, 49-63.

Pollock, N.K. (2015). Childhood obesity, bone development, and cardiometabolic risk factors. *Molecular and cell Endocrinology*, 410, 52-63.

Prentice-Dunn, H. & Prentice-Dunn, S. (2012). Physical activity, sedentary behavior, childhood obesity: A review of cross-sectional studies. *Psychology, Health, and Medicine*, 17(3), 255-273.

Renee, J. (2017). Obesity History in America. Retrieved from http://www.livestrong.com

Skinner, A.C. & Shelton, J.A. (2014). Prevalence and trends in obesity and severe obesity among children in the United States, 1999-2012. *JAMA Pediatrics, 168(6), 561-566.*

Slack, M.K. & Draugalis, J.R. (2001). Establishing the internal and External validity of experimental Studies. *American Journal Health System Pharmacy*, 58(22), 1-17.

State of Obesity, (n.d.). *Obesity among WIC participants ages 2-4, 2000-2014*. Retrieved from https://stateofobesity.org/wic

Tandon, P.S., Zhou, C., Sallis, J.F., Cain, K.L., Frank, L.D., & Saelens, B.E. (2012). Home environment relationship with children's physical activity, sedentary time, and screen time by socioeconomic status. *International Journal of Behavioral Nutrition and Physical Activity*, 9(88), 1-9.

Terrell, S.R. (2016). *Writing a proposal for your dissertation*. New York: The Guilford Press.

The Trust for America's Health (2010). "F as in fat: how obesity threatens America's future," Issue Report, Robert Wood Johnson Foundation. Retrieved http://healthyamericans.org/reports/obesity2010/obesity2010Report.pdf/

Thorn, B., Tadler, C., Huret, N., Trippe, C., Ayo, E., Mendelson, M., et al., (2015). WIC participant and program characteristics 2014. Prepared by Insight Policy Research: U.S. Department of Agriculture, Food and Nutrition Service.

Trochim, W.M.K. (2006). Threats to Internal and External Validity. Web Center for Social Research Methods. Retrieved from https://socialresearchmethods.net/kb/external.php

U.S. Department of Agriculture, Food, and Nutrition Service (2014a). WIC income eligibility guidelines, 2013-2014. Retrieved from http://www.fns.usda.gov/sites/default/files/FY2013-2014-WIC-IEGS-WEB.pdf

United States Census Bureau (2010). Census state area measurement and Internal point coordinates. Retrieved from http://www.census.gov/geo/www/2010/census/stateareas-intpt.html

United States Department of Agriculture (2006). *Food and Nutrition Service -WIC program nutrition education guidance*. Retrieved January 31, 2018 from http://www.nal.usda.gov/wicworks/Learning/Center/ntredguidance.pdf

United States Department of Agriculture, (n.d.). *The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC Program)*. Retrieved from http://www.fns.usda.gov/wic/wic-food-packages

University of Michigan (2010). Cross-sectional study/Prevalence study. Retrieved from https://practice.sph.umich.edu/micphp/epicentral/cross-sectional.php

Van Dijk, C.E., & Innis, S.M. (2009). Growth curve standards and the assessment of early excess weight gain in infancy. *Pediatrics*, 123(1), 102-108.

Walden University Student handbook, (2012). Walden University.

Whitaker, R., Wright, J., Pepe, M., Seidel, K., & Dietz, W. (1997). Predicting obesity in young adulthood from childhood and parental obesity. *New England Journal of Medicine*, 333(13), 869-873.

World Health Organization, (2006). *World health Organization Child Growth Standard*. Retrieved from http://who.int

Xiao, Y., Qiao, Y., Pan, L., Liu, J., Zhang, T., Li, N., et al. (2015). Trends in the prevalence of overweight and obesity among Chinese Preschool Children from 2006-2014. *PLOS ONE*, 10(8), 1-10.

Young-Hyman, D. (2000). Caregiver perception of children's obesity related health risk: A study of African American families. *Obesity Research*, 8, 241-248.

Zhang, Q. & Wang, Y. (2004). Trends in association between obesity and socioeconomic status in U.S. adults: 1971 to 2000. *Obesity Research*, 12(10), 1622-1632.