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Association Between Parental Socioeconomic Status and Childhood Obesity in the Southwest Geopolitical Zone of Nigeria

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Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Globally, childhood obesity is a major social and public health concern characterized by complications such as high cholesterol and high blood pressure. The purpose of this quantitative cross-sectional study was to examine the association between childhood obesity in children age 6–12 years and the socioeconomic status of their parents in the Southwest geopolitical zone of Nigeria. Social cognitive theory served as the theoretical framework for the study. Questionnaire data were collected from 384 parents/guardians of children age 6–12 years across three states in the Southwest geopolitical zone of Nigeria. Data were analyzed using descriptive statistics and multiple logistic regression at $p < 0.05$. Results of binomial logistic regression indicated a significant association between parents' socioeconomic status, as measured by annual household income, and childhood obesity. However, child's physical activity and child's nutritional behavior did not significantly predict childhood obesity. Results of multivariate analysis indicated no significant associations between parents' socioeconomic status, child's physical activity, or child's nutritional behavior and childhood obesity after adjusting for child's age, child's sex, state of residence, and parents' marital status. In the final model, child's age was a significant factor associated with childhood obesity. Results could be used to amend and improve existing obesity-related interventions for prevention of childhood obesity.

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Dedication

This research work is dedicated to Almighty God who is my source and my all in all. To Him alone be all the Glory. Without Him in the very first place I am nothing, and without Him this dissertation would not have seen the light of the day. May His name be glorified for ever and ever.

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Chapter 1: Introduction to the Study

Obesity is a major public health concern and one of the main disease-causing factors globally (Flegal, 2012). Obesity has reached a pandemic level in most developed countries, and it is increasing in most developing countries like Nigeria (Vazquez & Torres, 2012). The World Health Organization (WHO, 2016b) established that undernutrition and obesity are coexisting and there is an increase in the epidemic of obesity and overweight globally.

This condition is termed *globesity*, which refers to the spread of obesity and overweight among different individuals in different parts of the world; overweight and obesity are now pandemics because they have extended to most developing and low per capita income countries (Ogden, 2008). Amidu et al. (2013) concluded that obesity is observed in adults and is prevalent among adolescents and children; the childhood obesity pandemic has also emerged globally. Julie et al. (2012) also affirmed that there is an increase in childhood obesity at a rate that is faster than obesity in adults.

Flegal (2012) added that in the last 20 years, the incidence of childhood obesity has doubled and the number of adolescents who are obese has tripled. In the United States, 32% of adolescents and children between the ages of 2 and 19 years were overweight with body mass index (BMI) at or above the 85^{th} percentile, and 17% were obese with BMI at or above the 95^{th} percentile (Flegal, 2012). National Health and Nutrition Examination Survey (NHANES, 2007) data showed some differences among ethnic/racial groups, with non-Hispanic Black girls and Hispanic boys disproportionately

affected by obesity (NHANES, 2007); sociodemographic factors such as race seems to be factors to consider when trying to generalize obesity (WHO, 2021).

Nguyen et al. (2011) suggested that childhood obesity is a major problem in Europe, as studies conducted in England and Scotland indicated that there is a distinct socioeconomic gradient with high incidence of obesity and overweight in the lower socioeconomic group. Countries in the Mediterranean region showed a higher rate of childhood overweight, while in Africa there was an increase in the rate of obesity as well (Nguyen et al., 2011). Pangani et al. (2016) advanced the knowledge of childhood obesity among children age 6–12 years, noting it is a major threat to other parts of the world besides Europe and the United States, with Africa experiencing worst case proportions. The nationwide enKid study in Spain indicated prevalence of 13.9% for obesity and 12.4% for overweight among 2–24-year-olds, while the highest values observed were between ages 6 and 13 years (Seo & Sa, 2010). Vazquez and Torres (2012) concluded that the prevalence of obesity and overweight in school-age children from 34 countries was similar, as Malta (25.4%), the United States (25.1%), and Wales (21.2%) were the three countries with the highest prevalence of overweight. The countries with the highest prevalence of obesity among children age 6–12 years were Malta (7.9%), the United States (6.8%), and England (5.1%).

According to the U.S. Department of Health and Human Services (2006), the goal of reducing the prevalence of obesity in the United States to 5% in children was not met after 10 years of projection, and obesity is still related to health problems in adults, adolescents, and children. Statistics from the 2005–2006 NHANES (2007) indicated that

on the 2000 BMI for age growth charts, 31.9% of adolescents and children age 2–19 years in the United States was at or above the 85th percentile.

High BMI in children age 6–12 years may have immediate consequences on their health, with impact on high cholesterol and high blood pressure (WHO, 2016b). These are risk factors for cardiovascular disease. Over 70% of obese children have at least one cardiovascular disease risk factor, while 39% have two or more risk factors (Julie et al., 2012; WHO, 2016b). Children with obesity are more likely to have increased risk of impaired glucose tolerance, insulin resistance, and type 2 diabetes (WHO, 2016b). Julie et al. (2012) found that obesity among children of age 5–12 years has become an epidemic in industrialized and developing countries with socioeconomic status playing a role.

The International Obesity Task Force (IOTF, 2013) found that several countries around the world are reporting increasing levels of obesity; hence, obesity is the millennium disease. The WHO (2016b) predicted that by 2025, 400 million children of age 4–12 years might be overweight and 200 million will be obese. This problem of childhood obesity seems pronounced in the United States and is also on the rise in middle- and low-income countries (WHO, 2016b).

Chapter 1 of the current study includes the background and problem statement of childhood obesity in Nigeria, consisting of literature on childhood obesity and parental socioeconomic status on the holistic development of children ages 6–12 years. I also present the purpose of the study, research questions and hypotheses, theoretical framework, nature of the study, and definitions of terms. The assumptions, scope and

delimitations, limitations, significance, and social change implications are also provided in this chapter. The chapter concludes with a summary addressing the study area, target population, research gap addressed, and contribution to social change.

Background

Socioeconomic status plays a vital role in the increase in childhood obesity, type 2 diabetes, and cardiovascular disease. The 2007 Centers for Disease Control and Prevention (CDC) statistics indicated that over one third of U.S. children (13.3% of boys and 15.3% of girls) were obese in 2005–2006 (CDC, 2016). Freedman et al. (2007) found that socioeconomic status influences childhood levels of BMI and is positively related to increased levels of adult BMI and adiposity. Children who are obese experience physical and psychological health problems, with overweight children often growing up to become overweight adults (Baker et al., 2007; Bhave et al., 2004).

The term socioeconomic status is generally used to identify a person's status relative to others based on characteristics such as income, qualifications, type of occupation, and where they live (National Obesity Observatory, 2012). Several measures have been developed to classify people into groups based on socioeconomic characteristics, and these measures may be based on individual, household, or regional characteristics that are used to assess inequalities between social groups (Rebecca, 2009). According to the United Nations (2019), Africa has major nutritional problems such as hunger, underweight, and stunting with 20%–25% of preschoolers in sub-Saharan Africa presenting with some form of nutritional problem. Obesity among children age 5–12 years is on the rise in Africa and has doubled over the past 2 decades from 4% in 1990 to

8.5% in 2010 (de Onis et al., 2010). Obesity among children age 6–12 years is higher in Northern Africa than the rest of the continent (Salanave et al., 2009).

Overweight and obesity have been observed in 1 in every 6 preschool-age children in Northern Africa. Over 20% of Egypt's preschoolers were overweight or obese in 2008, compared with 5% in Sudan. In sub-Saharan Africa, overweight and obesity rates among preschoolers are in the single digits with about 9% in Middle Africa, 6% in Western Africa, 7% in Eastern Africa, and 8% in Southern Africa. These rates have doubled or tripled what they were 2 decades ago. Only Southern Africa has seen the rate drop slightly since 1990 (de Onis et al., 2010). In South Africa, about 1% of youths age 8–11 years were overweight or obese in 1994 based on the IOTF cut points (Armstrong et al., 2011).

By 2006, about 17% of South African girls and 11% of boys age 6–13 years were overweight or obese (Malina, 2015). These estimates on obesity prevalence among children in Africa underestimate the public health burden of obesity in the African continent because most African countries do not have adequate records (Ansa et al., 2001). Senbanjo and Adejuyigbe (2007) stated that the rapid increase in level of childhood obesity among children of age 6–12 years in Nigeria with respect to their parents' socioeconomic status has reached an alarming state. Childhood obesity's negative effect on the psychological and physical well-being of children within that age group is evident with the mass occurrence of noncommunicable diseases such as diabetes, angina pectoris, osteoarthritis, and coronary thrombosis (Senbanjo and Adejuyigbe, 2007).

The factors of obesity development in Nigerian children have not been well established, but obesity is agreed to be a condition with various causes such as lifestyle preference (faddism), cultural/traditional food practices, and environmental factors, which play pivotal role in the rising prevalence of obesity globally. Amarasinghe et al. (2009) observed that children age 5–11 years whose parents are of lower socioeconomic status (categorized as being poor) tend to suffer from underweight, while obesity and overweight are thought to be the outcome of an increase in fat and calorie intake among children whose parents are of high socioeconomic status (categorized as being rich) in Nigeria. On the other hand, there are indications that increased portion size, excessive sugar intake by soft drinks, and steady decline in physical activity have been implicated in the rising rates of overweight and obesity among children of age 6–12 years in Nigeria and around the world (Bosu, 2014).

Chukwunonso (2014) noted that childhood obesity among children age 6–12 years in Nigeria is not a strange phenomenon, and it affects children's emotional well-being, physical health, academic performance, social dispositions and interactions, self-esteem, and quality of life. As a result, conditions such as neurological, cardiovascular, metabolic, orthopedic, pulmonary, hepatic, and renal disorders are also known to be associated with childhood obesity (Chukwunonso, 2014). Wang et al. (2002) also observed that socioeconomic status has been linked with obesity in developed and developing countries. Prevalence of obesity among children age 6–12 years in Nigeria is higher among low socioeconomic status individuals (Senbanjo and Adejuyigbe, 2007). Individuals with high socioeconomic status tend to be more enlightened regarding

nutrients derived from what they eat, need for physical activity, and negative impact of sedentary living.

Healthy energy-dense foods are more expensive than less healthy energy-dense foods, so low socioeconomic status individuals in Nigeria cannot afford to be thin (Caballero, 2005). In addition, most school activities in Nigeria have become sedentary and, as a result, more children age 6–12 years have to give up physical exercise (Ansa et al., 2001). Elechi et al. (2015) stressed that obesity among school children age 6–12 years in Nigeria results in fewer social and physical opportunities because it affects a child's ability to do required tasks. Elechi et al. observed that there is a causal relationship between childhood obesity and socioeconomic status. Adedeji et al. (2011) further noted that in Nigeria, most obese children age 6–12 years tend to suffer because they are laughed at, mocked, despised, dissociated from, and stigmatized. This may result in poor academic performance and negative social dispositions.

The National Demographic Health Survey (NDHS, 2009) indicated that children living in the area of greatest relative disadvantage had higher overweight prevalence in Nigeria. The relationship between socioeconomic status and obesity among children age 5–12 years whether male or female in developing countries like Nigeria seems strong and consistent with findings from other studies on obesity and socioeconomic status in neighboring African countries such as South Africa, Tanzania, Egypt, and Ethiopia (Wang & Lobstein, 2006). Considering the other part of the study, which had to do with the relationship between sociodemographic characteristics and obesity among children age 6–12 years, ethnicity and race also influenced obesity among children and adults

(Trust for America's Health & Salud America, 2014). The relationship between socioeconomic status, ethnicity, and obesity among children age 6–12 years had been established with some tribes in Nigeria such as the Efiks and Kalabaris in the south-south and Idomas in the north central. These tribes believe that the weight of a child depicts the socioeconomic status of the parents. On the other hand, those from the south-west believe that being slim is ideal and overweight is seen as undesirable (NDHS, 2009). These beliefs may be influenced by the availability of the types of food present in the region, though cultural beliefs and practices should not be overlooked.

The NDHS (2009) found significant variation in obesity prevalence among adolescents and children from some ethnic groups in Nigeria with respect to their parents' socioeconomic status. This survey did not take into consideration the different geopolitical zones for purposes of comparison. South-south adolescents and north-west children age 6–12 years were most likely to be obese while children of same age group in the south west and north central were least likely to be obese (NDHS, 2009). Adedeji et al. (2011) found that indigenous 4–12-year-old children in the northern region were 1.5 times more likely to be in a higher weight category than nonindigenous children in the southern region of Nigeria, and the difference between indigenous and nonindigenous weight outcomes appears to be even more pronounced in childhood. In all of these findings, there is the need for additional studies and better measurements to find solutions to the problem of the relationship between childhood obesity and socioeconomic status on well-being of children age 6–12 years. A better analytical method is also needed to

evaluate the relationship between these variables and obesity in children (Trust for America's Health & Salud America, 2014).

Rogers et al. (2015) suggested that to better understand the relationship among childhood obesity, race/ethnicity, and socioeconomic status, better measures are needed to quantify the biological effects of obesity among children age 6–12 years. A systematic study of biological factors that may differ among racial/ethnic groups and whether these biological factors have a direct effect on obesity development among children age 6–12 years is required. Also, culture, which is a subset of race, has been found to influence the risk of obesity in children age 6–12 years in Nigeria. Cultural differences may account in part for the disparities in childhood obesity with respect to socioeconomic status (Akali et al., 2015).

Increased cultural changes and the dynamic diversity of culture in Nigeria calls for additional research to determine whether cultural patterns of shared understandings influence obesity in children age 6–12 years in Nigeria. Ogunbode et al. (2011) found that the influence of ethnicity and race on preventive efforts in the public health domain and health care in the clinical setting requires more evaluation and understanding. This research will result in a better understanding of how to document the effect of childhood obesity on the well-being of the child. The economic costs of managing obesity among children age 6–12 years seem policy relevant but have yet to be considered in Nigeria. The current study was conducted to investigate the association between childhood obesity and parental socioeconomic status in six geopolitical zones of Nigeria.

Problem Statement

Globally, childhood obesity is a major social and public health concern (Safiya et al., 2014). The risks associated with this condition are disproportionately distributed across racial/ethnic and socioeconomic groups (Pampel et al., 2012). Childhood obesity in Nigeria is increasing, and there is a need to combat the problem. Opara et al. (2010) reported that the prevalence of obesity among primary school pupils age 6–12 years was 11.3% in Nigeria, and the complications of childhood obesity include high blood pressure and high cholesterol. These complications are risk factors for cardiovascular diseases, impaired glucose tolerance, resistance of insulin, type 2 diabetes, asthma and sleep apnea, musculoskeletal discomfort, fatty liver disease, gall stones and gastroesophageal reflux, as well as anxiety and depression (CDC, 2016).

Obesity can result in low self-esteem, lower self-reported quality of life, and reduced opportunity for education, marriage, and occupation (Eke et al., 2015; Rawana et al., 2010; Senbanjo et al., 2013). In Nigeria, several studies indicated that childhood obesity is a major global public health challenge in children age 6–12 years with a record between 0.0%-2.8% due to eroding culture of engaging in physical activities among this group and the paucity of information about parental awareness of the predisposing factors and how to prevent or mitigate them in Nigeria (Chukwunonso, 2014; Nnoka et al., 2016). The current study was intended to contribute information that would fill these gaps regarding obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria.

Purpose of the Study

Nigeria is diverse in religion, tradition, culture, and region. Researchers had not looked at comparative prevalence of childhood obesity bearing in mind the diverse nature of the country. The purpose of the current study was to examine the association between the socioeconomic status of parents and obesity among children age 6–12 years in the Southwest geopolitical zone of Nigeria. I also sought to determine parents' knowledge of obesity and how to prevent it.

Research Questions and Hypotheses

The research questions (RQs) and hypotheses for the study were as follows:

RQ1: Is there an association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o1: There is no association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a1: There is a significant association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

RQ2: Is there an association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o2: There is no association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a2: There is a significant association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

RQ3: Is there an association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o3: There is no association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a3: There is a significant association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from

restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

Theoretical Framework

The social cognitive theory (SCT) was the model used for this study because it focused on individual and social environmental factors for intervention in health promotion. The goal of this model is behavioral health change. The key constructs of the SCT include observational learning, reinforcement, self-efficacy, and self-control, which can appropriate changes in the social environment to produce changes in the individual (Bandura, 2004). In the current study, the theory's application was appropriate in examining how contextual interventions and reinforcing factors in a child's social environment interact in molding healthy or unhealthy lifestyles and weight management. SCT can inform development and implementation of integrated public health policies at the school level and may assist local policymakers in decision making (Michie et al., 2011). One premise of SCT is that people learn not only through their experiences but also by observing the actions of others and the results of those actions. SCT explains human behavior in a three-way dynamics reciprocal model whereby personal factors, environmental influences, and behavior continually interact. The association between participation in physical exercise and childhood obesity can be used as an example of the operationalization of the SCT.

Nature of the Study

I used a quantitative cross-sectional design to examine the association between parental socioeconomic status and childhood obesity. Comparisons of these variables

were made from the data collected from children age 6–12 years in the Southwest geopolitical zone of Nigeria. Data were analyzed using bivariate analysis to examine the association between parents' socioeconomic status and obesity in children.

Definition of Key Terms

Adiposity: A condition of being severely overweight or obese (Freedman et al., 2007)

At risk of being obese: BMI equal to or greater than the 85th percentile and less than 95th percentile for children (CDC, 2013).

Body mass index (BMI): A measure of the weight of a person in relation to the square of their height (kg/m^2; CDC, 2013).

Childhood obesity: Excess body fat among children in the 85th percentile and lower than 95th percentile (WHO, 1996).

Children: Individuals age 6–12 years (NDHS, 2009).

Health service professionals: Trained health personnel who have the potential to reduce childhood obesity (Budd et al., 2011).

NDHS: National Demographic Health Survey

Obesogenic environment: An environment promoting excessive weight gain (Gilliland et al., 2010).

Parental socioeconomic status: Parents' status relative to others based on characteristics such as income, education, family type, occupation, and residence (Vukojevic et al., 2017). Respondents' reported annual household income was used to examine parental socioeconomic status in the current study (NDHS, 2009).

Southwest geopolitical zone: One of the six major divisions of modern Nigeria based on similarity of ethnic groups and political history (Adeniyi et al., 2019).

Assumptions

My main assumption was that with the consideration of the data privacy and academic purpose of the information essential in understanding and mitigating the obesity burden in the country, the participants provided accurate and valid information. I acknowledged participants' daily activities substantially changed with the COVID-19 outbreak, and the new lifestyles likely influenced dietary diversity and food consumption. However, since there was no model for assessing the variation in behavior changes during data collection, I assumed that there was even application and observation of COVID-19 prevention measures in the study areas limiting disproportionate effect on participants' daily normal lives. Further, I used variable categories (socioeconomic status, physical activities, and households' nutrition behaviors) representing characteristics that we believed the application of COVID-19 containment measures uniformly affected across the population.

Scope and Delimitations

This study addressed the association between parental socioeconomic status and childhood obesity in the Southwest geopolitical zone of Nigeria. The participants children age 6–12 years and parents who were resident in Nigeria within the selected states in the Southwest geopolitical zone who were willing to participate in the study without any coercion or undue enticement. Children who were not 6–12 years of age, whose exact birth date was not available on their information record sheet, who did not have written

informed parental consent, who were not resident in the Southwest geopolitical zone of Nigeria within the selected states in the geopolitical zone, or who declined to participate in the study were excluded from the study. The SCT was adopted for the study because it helped to explain how obese children acquire and maintain certain behavioral patterns (e.g., feeding pattern, participation in physical exercise, and nutritional education), while also providing the basis for intervention strategies (see Bandura, 1997).

Limitations

The study was cross-sectional in design, which subjected the findings to critique in terms of internal validity. Findings were subjected to several limitations such as limitation of the sample to only three selected states from the Southwest geopolitical zone in Nigeria, limited time to conduct the study, and limited financial resources to include more respondents. However, these limitations could be controlled for in future studies using a mixed-methods design that involves the combination of quantitative and qualitative methods of data collection to obtain more robust empirical findings.

Significance

Nigeria is diverse in terms of religion, tradition, culture, and region. Researchers had not looked at the comparative prevalence of childhood obesity bearing in mind the diverse nature of the country. There were no articles that reported on parents' awareness of the predisposing risk factors associated with this condition to mitigate the increase of childhood obesity among children age 6–12 years in Nigeria. Adekanmbi et al. (2013) explored variations in childhood stunting in Nigeria using league tables, control charts, and spatial analysis. They found that childhood stunting in Nigeria was at an average of

about 39%. Knowledge of the factors that may be responsible for these anomalies may help in plans for mitigation.

Akali et al. (2015) investigated socioeconomic status, lifestyle and childhood obesity in Gombe, Nigeria. They found that obesity was prevalent in children whose parents belonged to the middle and upper socioeconomic class. This was not wide enough considering the diverse nature of Nigeria in terms of regions, states, and sociocultural settings. In another study on prevalence of obesity among Nigerian schoolchildren, Akesode and Ajibode (1983) found that obesity was prevalent among schoolchildren in Nigeria and identified the need for preventive intervention from the state and federal government of Nigeria. Amidu et al. (2013) investigated the determinants of obesity among children age 6–12 years in Tamale Metropolis. They found that obesity was caused by polymorphous factors and reported that attempts to mitigate obesity among children should be holistic in approach. Amuta and Houmsou (2009) assessed the status of nutrition of school-age children in Makurdi, Benue State in Nigeria. They discovered that nutritional imbalance existed among schoolchildren in Makurdi, a location in the North Central region of the country.

Bakari et al. (2006) examined obesity, overweight, and underweight in suburban Northern Nigeria. They found that there was an increasing prevalence of obesity, overweight, and underweight among adults in suburban Northern Nigeria. Other studies carried out to investigate the association between childhood obesity and socioeconomic status of parents based on the new WHO standard addressed the global trend and prevalence of obesity and overweight among preschool children and indicated a dramatic

increase in childhood obesity and overweight since 1990 (de Onis et al., 2010). Starting at infancy, there is the need for effective intervention with a view to reversing the anticipated trend. Opara et al. (2010) studied the prevalence of obesity, overweight, and stunting in school children in Uyo, Nigeria. Though this study provided information about obesity, stunting, and underweight, it was limited to Uyo, which is in the south-south zone of the country.

Findings from the current study may provide information about the socioeconomic factors that predispose children age 6–12 years to obesity in the Southwest geopolitical zone and by extension the heterogeneous Nigerian setting. Findings may promote awareness among parents, caregivers, and relatives regarding ways to ensure prevention of the condition in this age group. Furthermore, the findings may be useful to government ministries and agencies, nongovernmental agencies, and other stakeholders in planning effective and result-oriented interventions on obesity in children age 6–12 years. Lastly, this study may serve as a reference for future researchers in the field of childhood obesity.

Implications

The results from this study may have substantial implications for social change and may provide suggestions on the requirement of school authorities to factor in physical activity and other healthy living practices into the education system. This study also revealed the influence of parents and caregivers on the health of children, which may inform program and interventions aimed at reducing childhood obesity. The study may

also provide suggestions for altering the cultural values, behaviors, and norms of parents and caregivers across various socioeconomic statuses.

Summary

The focus of this study was the association between parental socioeconomic status and obesity in children in the Southwest geopolitical zone of Nigeria. Findings may inform how the negative effect of childhood obesity on children age 6–12 years can be prevented or mitigated. Chapter 1 comprised the introduction of the study, including views of different scholars on childhood obesity and parental socioeconomic status. The problem statement, purpose of the study, research questions and hypotheses, conceptual framework for the study, nature of the study, definitions of terms, scope and delimitations of the study, limitations, and significance of the study were provided in this chapter. The next chapter contains a review of literature on childhood obesity and the possible role played by parental socioeconomic status in different parts of Nigeria.

Chapter 2: Literature Review

To date, most studies conducted have focused on the causes and ways of preventing the increase in childhood obesity in different localities in Nigeria, but none have addressed the association between parental socioeconomic status and childhood obesity in the Southwest geopolitical zone of Nigeria. The current study may be of value to the body of knowledge and mitigation of childhood obesity in Nigeria. Furthermore, the adoption of the SCT for the study helped to guide the formation of research questions and the thrust of this investigation.

This chapter presents some basic propositions that will help in understanding the association between parental socioeconomic status and childhood obesity in the Southwest geopolitical zone of Nigeria. It also provides other measures that might be helpful in mitigating the increase in childhood obesity, irrespective of the parents' socioeconomic characteristics such as sex, age, marital status, religion, ethnicity, education, income, and family type. This chapter also contains the literature search strategy, a description of the theoretical framework, and a thorough review of the literature related to the study topic.

Literature Search Strategy

The primary goal of this literature review was to examine existing research related to childhood obesity among children of age 6–12 years with reference to their parental socioeconomic status. Inference was made with respect to the relationship between both variables. Another main objective of the literature review was to describe SCT and how it explains the association between childhood obesity and parental socioeconomic status.

To review scholarly peer-reviewed information, I accessed several articles from different scholars and journals. The key search strategy for this literature review included the definition of inclusion and exclusion criteria. The criteria provided a foundation for the review by indicating which study to include or exclude and helped to define which variable to use or not to use in the study.

The inclusion criteria for the literature review also included constructs of interest, including sample characteristics, study design, time frame, and publication type. The key search terms included *childhood obesity*, *parental socioeconomics*, *demographic information*, *causes of childhood obesity*, *factors influencing childhood obesity*, *consequences of childhood obesity on children age 6-12 years*, and *support required by obese children*. Relevance of articles, year of conduct of study, and time of publication served as guides for the scope of the literature review.

Theoretical Foundation

SCT was adopted for this study because of its suitability and clear explanation of the relationship among its components (behavioral factors, personal factors, and environmental factors) with reference to this study's variables (childhood obesity and parental socioeconomic status). The research question, which focused on the association between childhood obesity and participation in physical exercises, operationalized the use of this theory in this study. In 1941, Miller and Dollard proposed the theory of social learning, which was broadened in 1963 by Bandura and Walters with the principles of observational learning and vicarious reinforcement. In 1977, Bandura called the new theory SCT to emphasize the major role cognition plays in encoding and performing

behaviors, and he argued that human behavior is caused by personal, behavioral, and environmental influences (McAlister et al., 2008).

SCT is relevant to health communication. First, the theory deals with cognitive and emotional aspects of behavior for understanding behavioral change. Second, the concepts of the SCT provide ways for new behavioral research in health education. Ideas for other theoretical areas such as psychology are welcome to provide new insights and understanding (McAlister et al., 2008). SCT explains how people acquire and maintain certain behavioral patterns, while also providing the basis for intervention strategies (Bandura, 1997). Evaluating behavioral change in the current study depends on factors such as environment, children/parents, and their behavior. SCT provides a framework for designing, implementing, and evaluating programs. Core Areas of the SCT include environment, which refers to the factors that can affect a person's behavior.

There are social and physical environments. The social environment includes family members, friends, and colleagues. The physical environment is the size of a room, the ambient temperature, or the availability of certain foods; environment and situation provide the framework for understanding behavior (McAlister et al., 2008). The situation refers to the cognitive or mental representations of the environment that may affect a person's behavior, and the situation is a person's perception of the place, time, physical features, and activity (Glanz et al., 2002).

There are three factors (environment, people, and behavior) that are constantly influencing each other. Behavior is not simply the result of the environment and the person, just as the environment is not simply the result of the person and behavior (Glanz

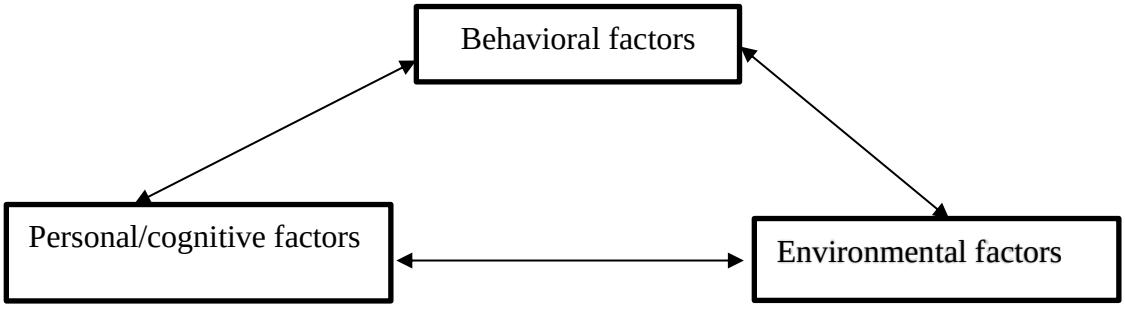
et al., 2002). The environment provides models for behavior. Observational learning occurs when a person watches the actions of another person and the reinforcements that the person receives (Bandura, 1997). The concept of behavior can be viewed in many ways.

Behavioral capability means that if a person is to perform behavior, they must know what the behavior is and have the skills to perform it. In childhood obesity prevention and education, parental impact is considered the major contributing factor. SCT was an appropriate framework for the current study because it focuses on both individual and social environmental factors for intervention in health promotion. The goal of this model is behavioral health change, and its key constructs include observational learning, reinforcement, self-efficacy, and self-control, which can appropriate changes in the social environment that will produce changes in the individual (Bandura, 2004).

The SCT was suitable for the current study because it explained development and implementation of integrated public health policies at the school level with the aid of a tool that may assist local policymakers (see Michie et al., 2011). Most people learn not only through their experiences but also by observing the actions of others as well as the attendant results of those actions. SCT, which explains human behaviour in a three-way, dynamic, reciprocal model in which personal factors, environmental influences, and behavior continually interact, was used as the framework for childhood obesity intervention because it emphasizes prevention (see Figure 1).

Figure 1

Social Cognitive Theory Framework



Note. Overview of the social cognitive theory by Glanz et al. (2002).

The SCT had been adopted to explain how obese children age 6–12 years initiates and maintain a given behavior or body state/size (i.e., childhood obesity) by emphasizing the role of interactions among various cognitive, environmental, and behavioral factors (i.e., reciprocal determinism). Behavior refers to the way an overweight or obese child of age 6–12 years reacts to inputs from their social and/or physical environment (e.g., self-regulation of types of food to consume and when to engage in physical exercises). Cognition refers to mental processes that occur within an overweight or obese child of age 6–12 years, such as behavioral capability, outcome expectancies, emotional coping responses, and feelings of self-efficacy with reference to the child's body size. Environment refers to factors that are physically external to an overweight or obese child of age 6–12 years that can impact their behavior toward being prone to obesity. Environment comprises social factors such as family, friends, observational learning, and

physical factors that include weather and availability of food products, which may lead to obesity and/or overweight after consumption.

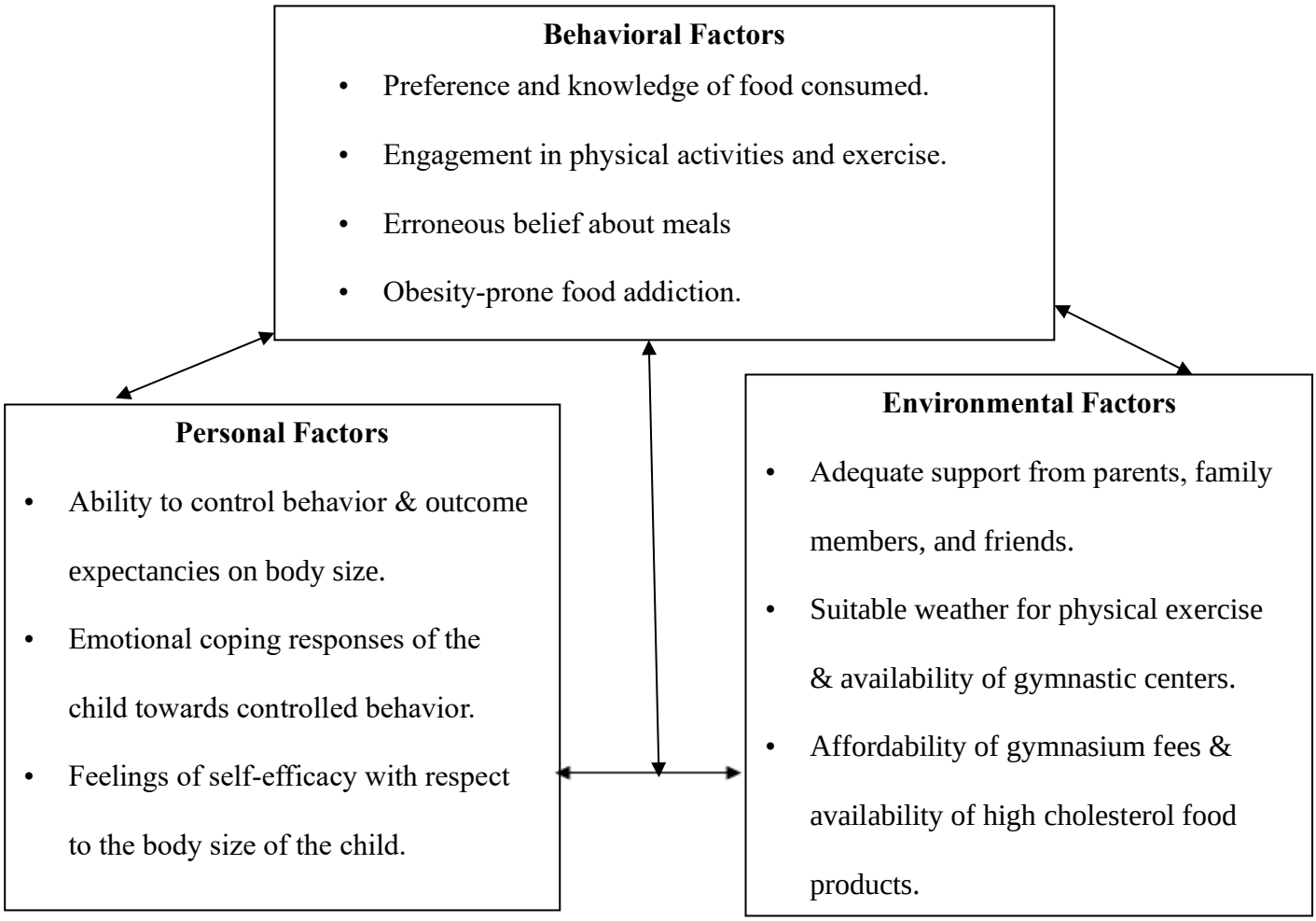
Although there are three basic influencing factors of SCT, the behavioral aspect of SCT was applied in the current study because of its importance in mitigating childhood obesity with respect to socioeconomic status. SCT includes several behavioral subconstructs that were applied in the study. Behavioral capability referred to the knowledge, skill, interest, and health information possessed by an obese child of age 6–12 years to perform positive behaviors that are capable of aiding reduction and/or management of obesity. Reciprocal determinism was the interaction between the obese child of age 6–12 years and the environment in which the behavior is performed, which may have a positive or negative effect on the obese child of age 6–12 years and may have a positive or negative effect on their immediate environment. Emotional coping responses referred to the adopted strategies, skills, or health information that have been acquired and used by an obese child of age 6–12 years to deal with emotional stimuli resulting from being obese.

Outcome expectations referred to the beliefs of an obese child of age 6-12 years about the likelihood and value of the consequences of their choices regarding obesity or being overweight. Self-efficacy referred to the obese child of age 6-12 years gaining confidence and engaging in positive behaviors that would bring about a reduction of risk of being obese and/or overweight. Collective efficacy referred to the ability of an obese child of age 6-12 years to perform actions with their peers to bring about a reduction of risk of being obese or overweight. Observational learning referred to the behavioral

acquisition experienced by watching the actions and outcomes of others aimed at body size management, whether negative or positive, including credible role models such as nutritionists, physical educators, and gymnasts. Incentive motivation referred to the use of rewards and punishments to modify food intake, sedentary lifestyle, and physical inactivity (i.e., increasing taxes on obesity-prone products). The behavioral components of SCT were used to help me investigate the association between childhood obesity and parental socioeconomic status in the Southwest geopolitical zones of Nigeria (see Figure 2).

Figure 2

Application of the Social Cognitive Theory to the Study



Literature Review

Childhood obesity being a public health concern has been discovered to be associated with severe negative social and health consequences in different countries and continent (Camacho-Minano et al., 2011). According to Waters et al. (2011), childhood obesity rates continue to rise in countries such as Mexico, India, China and Canada, but seem to be declining in some age groups in the United States, Australia and some European countries. WHO (2010) reported that obesity remains the fifth largest global risk factor for mortality in different countries in the world.

Health risks associated with being obese include cardiovascular diseases (such as coronary artery disease and stroke), diabetes, hypertension, osteoarthritis, certain cancers and gallbladder disease (Ministry of Health Promotion, 2010). Also, the significant increases in the rates of chronic diseases may likely result in the decline in life expectancy in the developed world (Julie et al., 2012). In the words of Niehoff (2009), childhood obesity does not only result into health risks among children of age 6-12 years in the world at large but yields a negative social and economic outcome such as diminished quality of a child's life, decreased self-esteem and depressive symptoms, thereby predisposing these obese children to negative teasing, discrimination, victimization, and social exclusion (Katz et al., 2008).

Foltz et al. (2012) asserted that childhood obesity is associated with school absenteeism and poor school performance of pupils. Kesten et al. (2011) stated that once a child is obese, it is seemly difficult to reverse through interventions. Hence, they suggest an urgent need to address overweight and obesity levels in childhood, since

childhood obesity is an independent risk factor for adult obesity with long-term negative consequences. Gortmaker et al. (2011) described childhood obesity as a dynamic complex interaction between individual biology, eating behaviors and physical activity, set within a social, cultural environmental landscape, which clarifies why treatment and prevention strategies following simple recommendations for reducing energy intake and massive call for increase in energy expenditure are often unsuccessful.

The Ontario Ministry of Health Promotion (2010) emphasized that prevention still offers a less expensive approach to childhood obesity as opposed to treatment. Most research findings showed that preventive interventions to childhood obesity are considered effective to mitigate multifarious causes of childhood obesity. Hence, there is a need to develop effective preventive interventions and approach to reduce the prevalence of obesity in children before they reach adulthood. De Bourdeaudhuij, Van and Spittaels (2011) noted that most initiatives have focused on health education to increase knowledge, awareness, attitudes, and motivation towards reducing childhood obesity.

These preventive approaches and interventions on childhood obesity have been monolithic as most of them concentrated on either nutrition or physical activity separately, resulting into a slower progressive positive change on the behavior and BMI of these obese children of age 6-12years (Centers for Disease Control and Prevention, 2011). De Bourdeaudhuij et al. (2011) recorded from their study that in recent years, most preventive interventions now consider the broader abetting effect of ‘obesogenic environment’ which are related to physical activity and/or nutrition. They noted that this

must be investigated critically in order to improve healthy behaviors of children of age 6-12years old. De Onis et al. (2010) in a global study of over 130 countries found out that obesity prevalence is strictly linked to social inequality in economic status. Eke, Ubesia and Ibe (2015) noted that in Nigeria just as in other developing countries, childhood Obesity is now on the rise. This is particularly noticeable more in the urban area.

It is essential that in trying to prevent childhood obesity in ages 6-12 years, the gap in health inequalities must also be addressed to mitigate the risk of childhood obesity across the whole population of Nigeria, or specifically aimed at those children who are at greatest risk. Waters et al. (2011) stated that successful childhood obesity prevention can be achieved through a combination of population -based initiatives, both at the national level and as part of local `settings-based` approaches. School and community-based approach should be adopted, with absolute comprehension of the impact of adopted preventive interventions and approaches toward reducing childhood obesity in the school and community, the extent to which these approaches work equitably and their safety on the pupils.

The WHO (2010) confirmed that schools are an ideal setting for propagating preventive measure that support healthy behaviors as most children are schooled outside their home and spend more time in school, save during the weekends. Kesten, Griffiths and Cameron (2011) also supported that the school-setting seem most suitable for mitigating obesity among children, as it possesses and provides conventional infrastructure, safe and supportive physical environment, children-friendly policies, structured curricula, and staff that can be used in executing any childhood obesity

mitigation program. In addition, Van Cauwenberghe et al. (2010) agreed that to effectively mitigate the rate of obesity among children of 6-12years from diverse ethnic and socio-economic groups in Nigeria and beyond, the school-based setting approach is most preferable.

To ensure that childhood obesity is reduced to a minimum among ages 6-12 years, the intervention approach should begin from primary schools and, this demand creating a comprehensive physical education syllabus which provides for physical exercise at the grassroots level; formulation of meal policies for all pupils at the primary school level and continuous education for parents as regards nutritional balance in parents-teacher meetings (Institute of Medicine, 2012). Also, it has been discovered that in high-income countries, childhood obesity prevalence is slightly higher among children of age 6-12years usually from lower socio-economic groups and more benefits may be derived from prevention exertions by more children from higher socioeconomic status groups due to less parental involvement from lower socioeconomic status groups in school–based programs, and to avoid aggravating socioeconomic status inequalities, interventions targeting schools in lower socioeconomic status areas may be required (WHO, 2016b).

Global Perspective on Childhood Obesity

Obesity among children is an accepted global pandemic in the 21st century but varies with age grouping (Monasta et al., 2011). Conversely, it affects a child's body-heart and lungs, muscles and bones, kidneys and digestive tract, and hormones that control blood sugar; puberty also leads to severe emotional and social burden (World

Health Organization, 2012). Also, obese children are more susceptible to overweight, diseases and disability at adulthood (Singh et al., 2008).

De Onis et al. (2010) in a global study stated that more than 43 million preschool obese children between ages 1-5 years were discovered in 2010, most likely about 60% increase in prevalence since 1990. The rise in childhood obesity has effects all both from high and low socioeconomic groups, but the poor suffers more because of their socioeconomic status. Also, de Onis et al. (2010) stated that of the world's 43 million overweight and obese preschoolers, 35 million live in developing countries like Nigeria, and by 2020, if the current epidemic continues unabated, 9% of all preschoolers will be overweight or obese.

Popkin et al. (2006) stated in their study that socioeconomic status has a significant association with obesity among adults than with children of ages 6-12 years, but in the U.S., Brazil, China, and other developed countries, the reverse is the case. Also, United Nations (2019) emphasized that Southeastern Asia and sub-Saharan Africa, where majority still struggle with child hunger, obesity seem less pronounce. However, with the advent of civilization and industrialization globally, there is an increase in wealth, which consequently leads to increase in weight (Nigeria inclusive). Popkin et al. (2012), noted that "nutrition transition" has a significant link with socioeconomic status, as some developing countries are confronted with infectious diseases associated with malnutrition, leading to increase in chronic diseases, such as Obesity. Attempts to track prevalence of childhood obesity globally has almost become impossible, as different countries lack national surveys and stored record on obesity among children while the

few countries who do, have outdated record (Popkin, et al., 2012). Globally, the trend of obesity among children aged 2-12years is documented as follows:

North America

Ogden et al. (2012) noted that the prevalence of obesity among children has skyrocketed in the last three decades. The United States of America has the highest obesity rates in the world, as one out of six children is obese, and one out of three children is overweight or obese. Though the overall U.S. child obesity rate has held steady since 2008, some groups have continued to see increases, while some other groups have obesity at a higher rate than others:

In the 1970s, 5 percent of children in the United States within ages 2 to 19 were found to be obese, according to the CDC's current definition; by 2008, nearly 17 percent of children were obese, a percentage that held steady through 2010 (CDC, 2010). There is a higher incidence of childhood obesity among males (19%) than among female children (15%) (Ogden et al., 2012). Between 1999 and 2010, there was a significant rise in childhood obesity among non-Hispanic black boys; while there has been a steady prevalence among girls of all ages from different ethnic groups (Ogden et al., 2012). Also, Infants in the United State of America usually do maintain weight for recumbent length of about 10%, which is homogeneous to the BMI adopted for children from birth to age 2 (Center for Disease Control and Prevention, 2010). Between 1999 and 2010, 67% of Mexican American infants were more likely to possess a higher weight for recumbent length than non-Hispanic white infants (Ogden, et. al., 2012).

The Public Health Agency of Canada (2011) observed that from the late 1970s, there has been a significant increase in obesity among children in Canada which is dependent on the socioeconomic status of the parents. Besides, obesity among children remains significantly lower when compared with the United States (Juliet, 2012). In 2007-2008, nearly 9 percent of Canadian youth ages 6 to 17 were obese. Based on the International Obesity Task Force (IOTF, 2013) age-specific cutoffs, child obesity is a bigger problem among Canada's Aboriginal groups. A survey of Aboriginal groups who live outside of reservations found that in 2006, nearly 33 percent of children ages 6 to 8 were obese, as were 13 percent of children ages 9 to 14 (Public Health Agency of Canada, 2011).

Latin America and the Caribbean

World Health Organization, (1998) noted that data on childhood obesity are limited from the Latin America and the Caribbean region, but that does not exempt the region from this pandemic (childhood obesity), as more children are overweight and obese than underweight in the same region.

Preschoolers. De Onis et al. (2010) stated that in 2010, about 7% of children (age 1-5years) were estimated to be overweight or obese in Latin America and the Caribbean according to the WHO (2006) development canons, while under-nutrition vestiges a distress in this age group. Notwithstanding, in the past two decades, the expanse has experienced considerable decline in child underweight from 7% in 1990 to 3% in 2010 (United Nations, 2019).

School-Age Children and Adolescents. Nationally representative data are limited in these age groups, but available data suggest that obesity remains a public health concern. For instance, in Argentina, investigators measured heights and weights from a representative sample of 1,688 children ages 10 to 11 in Buenos Aires' public schools and found that 35 percent of the children were overweight or obese, using the CDC (2010)'s definition, and about 4% were underweight. Kovalskys, Rausch and de Gregorio (2011) noted that there is an association between stunting and overweight in several developing countries as their socioeconomic status seem meager, and stunting may increase the chances of obesity later in life.

Asia

South Asian countries like Bangladesh, India, and Pakistan have low obesity prevalence among children of age 6-12 years, despite their large populations, as child hunger and stunting remain evidently prevalent (de Onis et al., 2010). Overall, in Asia 5% of preschoolers were considered obese in 2010, a 53% increase in prevalence since 1990, which translates into 17.7 million Asian preschoolers being obese, except in Japan (de Onis et al., 2010). Many of these estimates of child obesity prevalence in Asia likely underestimate the true public health burden of obesity among children of age 3-12years.

Preschoolers. De Onis et al. (2010) stated that prevalence of obesity among preschoolers seem of higher index in Western Asia, but lower in the Eastern, Southeastern, or South-Central Asia with an estimated value of 15%, 5%, 5%, and 4% respectively.

School-Age Children and Adolescents. Ji and Cheng (2009) stated that in China, over the past 20 years, nationally representative studies of youth ages 8 to 18 have shown a dramatic rise in obesity. In 1985, only 2% of boys and 1% of girls were overweight or obese, based on Chinese-specific cut points (at age 18, a BMI of 24 for overweight and 28 for obesity) (Ji & Cheng (2009). By 2005, roughly 14% of boys and 9% of girls were overweight or obese. In India, the largest study to date covered five urban areas and included nearly 40,000 children ages 8 to 18. It found that 14% were overweight or obese; a number that, if extrapolated to urban youth across India, amounts to an estimated 15 million children (Gupta, et al., 2012). In Western Asia, the Arabian Gulf States have especially high rates of overweight and obesity among schoolchildren. A nationally representative Kuwaiti survey in 2006 found that about 44% of boys and 46% of girls ages 10 to 14 were overweight or obese, according to the CDC's pre-2000 definition (Ng et al., 2011*)*.

Oceania

Olds et al. (2009) in a systematic review of 41 studies from 1985 through 2008 in Australia found that obesity rates in children ages 2 to 18 rose through the mid-1990s but have held relatively stable since then. In 2008, 21 to 25% of Australian boys and girls were overweight or obese, and 5 to 6% were obese (Townsend et al., 2012). A nationally representative data revealed that about 28 percent of children of ages 5 to 14 were overweight or obese in 2006-2007 in New Zealand, a rate that has been fixed since 2002 (Townsend et al., 2012). Grummer-Strawn, Reinold & Krebs (2010) declared that there is an increase in prevalence of obesity globally. Unfortunately, some of these obese children

find it difficult to lose weight which makes prevention at an early stage, the best available alternative (Monasta, Lobstein, Cole, Vignerová & Cattaneo, 2011).

Europe

Lien et al. (2010) surprisingly discovered that Europe lacks adequate information bank on childhood obesity, until recently. Cattaneo et al. (2010) further supported the fact that until recently, the available information on childhood obesity in Europe lacks consistency but showed that there was an increase in the incidence of childhood obesity.

Preschoolers. Cattaneo et al. (2010) confirmed that childhood obesity is highest in Spain (32%) and lowest in Romania (12%). There has been a continuous and steady decline in the past few decades in obesity among children in countries such as Czech Republic, France, the Netherlands, and Romania, except in England, where an increase in prevalence was recorded from about 18% in 1995 to 23 percent in 2002 (WHO, 2010; WHO, 2016a).

School-Age Children. According to World Health Organization (2010), 24% of European children ages 6 to 9 are obese. This is from the first analysis conducted in 2007-2008 data from 13 countries, which include Belgium, Bulgaria, Cyprus, Czech Republic, Ireland, Italy, Latvia, Lithuania, Malta, Norway, Portugal, Slovenia, and Sweden.

Adolescents. Lien et al. (2010), stated in their study that Cyprus, Greece, Spain, and England have some of the highest obesity rates among youth ages 10 to 18, according to a recent systematic review of studies from 30 countries (the 27 EU members plus Iceland, Norway, and Switzerland). But the data are limited and of varying quality. Only

18 of 30 countries had nationally representative data from measured heights and weights. Fourteen countries had trend data available, though some were based on self-reported measures with small samples, with most of these countries showing increase in obesity rates over the past few decades (Townsend et al., 2012).

Africa

Studies have been carried out in different states in Nigeria investigating the prevalence of overweight and obesity among children. A cross-sectional, descriptive study carried out among school age children in Benin, Nigeria reported that 7.7% and 3.1% respondents was overweight and obesity respectively giving a combined proportion of 10.8%. The females, 16.6% had a significantly higher proportion of overweight and obesity than the males, 3 3.5% (Adam & Isah, 2017). Studies carried out in Benue State and Ile-Ife, Osun State in Nigeria reported 9.7% and 13.7% prevalence of overweight respectively (Adegoke et al., 2009; Musa et al., 2012). The prevalence of overweight reported in Southern Nigeria is relatively lower with Abia, Port Harcourt, Anambra and Owerri having a prevalence of 6.7%, 5.7%, 4.1% and 1.6% respectively (Nnebue et al., 2016 & Ben-Bassey et al., 2007; Nwabueze et al., 2015; Okoh et al., 2012). According to United Nations (2019), 25% of preschoolers in sub-Saharan Africa are underweight, as the region is vividly characterized of hunger, underweight, and stunting. De Onis, et al. (2010) noted that there seem to be an increase in obesity incidence among school children due to the impact of globalization between 1990 (4%) to 8.5% in 2010.

Preschoolers. De Onis et al. (2010) found out that Northern Africa has the highest rate of childhood obesity in the world as one in six preschool-aged children is

obese. About 20% of Egypt's preschoolers were obese in 2008, compared with 5% in Sudan (United Nations, 2019). In sub-Saharan Africa, overweight and obesity rates among preschoolers are still in the single digits-roughly 9% in Middle Africa, 6% in Western Africa, 7% in Eastern Africa, and 8% in Southern Africa. For most of the region, these rates are double or triple what they were two decades ago. Only Southern Africa has seen the rate drop slightly since 1990 (de Onis et al., 2010*)*.

Children and Adolescents. Armstrong, Lambert, and Lambert (2011) stated that in 1994, about 1% of children ages 8 to 11 were obese based on the IOTF cut points. By 2006, about 17 % of South African girls and 11% of boys ages 6 to 13 were obese (Gupta, Goel, Shah & Misra, 2012). These available records of prevalence of childhood obesity in Africa does not correlate with the true picture, as Africa as a continent lacks the culture of keeping records, hence the true picture of the public health burden of obesity among children cannot be ascertained (Ansa et al., 2001).

Causes of Obesity Among Children

Presently, there is a global rise in epidemiological and nutritional imbalance, which is expressed with signs such as anemia, zinc deficiencies and stunted growth in both male and female children and other non-communicable diseases such as cardiovascular defects, obesity, diabetes, cancer etc. (Popkin & Doak, 2004). In his study, Gupta (2009) stated that boys (age 5-14 years) are less prone to being obese than girls of the same age range, owing to inherent hormonal differences and the socioeconomic status of their parents. The genesis of coronary heart disease as well as Type 2 Diabetes is said to begin in childhood, as childhood obesity serves as a major factor usually due to the

individual parents' socioeconomic status (Bhave, Bavdekar & Otiv, 2004). However, the challenges associated with different forms of the global malnutrition problem, is that it unconsciously neglects dealing with the causes of nutritional deficiencies that results into under-nourishment, obesity, and other non-communicable diseases among children (Chhatwal et al., 2004; Khadilkar & Khadilkar, 2004; Panjikkaran & Kumari, 2009).

Subramanyam and Rafi (2003) stated that one of the major public health concerns in developing countries like Nigeria in this 21st century is childhood obesity. This is now becoming common with both high and low socio-economic profiles whose incomes can buy whatever they desire in urban settlement. Although, Khadilkar and Khadilkar (2004) found out that the definition of overweight and obesity over time has changed in different articles and parts of the world. It can sometimes be described as an excess of or extra body fat (BF) as there is no agreement on a cut-off point for excess fatness of childhood obesity or overweight. However, most health service professionals (such as health educators, medical doctors, guidance counselor, dieticians, sport personnel etc.) can help in mitigating childhood obesity among children of ages 6-12 years. Williams et al. (1992), in their study on 3,320 children in within ages 5–18 years classified children as fat if their percentage of body fat is equal to or more than 30% for females 25% for males.

The Center for Disease Control and Prevention (2013) defined "at risk for overweight" as those who are between the range of 85th and 95th percentile of the total body mass index while those termed overweight are said to be above or just at the 95th percentile of body mass index (BMI) for age. The European researchers on their part

classified obesity as above or just at the 95th percentile of BMI and overweight as at above or at 85th percentile. There is obesity increase among children as a result of result of imbalance between expenditure and energy intake, while the increase in positive energy balance has a close association with parental socioeconomic status, dietary intake preference and the adopted lifestyle. Conversely, there is growing evidence showing that a child's genetic background has a very important role in the determination of risk associated with obesity, regardless sometimes of the parent's socioeconomic status and race. This is influenced by inherited factor which cannot be moderated or controlled by the child (Lazarus, Baur, Webb & Blyth, 1996).

Genetic characteristics of children of age 6-12yers in Nigeria, parent's socioeconomic status, lifestyle, cultural feeding practices, ethnicity, and environmental factors work together in the formation process of childhood obesity. Anderson and Butcher (2006) found out that the biggest factor considered as a major catalyst of obesity among children of age 6-12 years is genetic inheritance of the child. This usually requires contributing support of both environmental and behavioral factors to influence weight gain among children in any territory. Certain government and her social policies potentially promote the escalation of obesity among children of ages 6-12 years through the proliferation of eateries and junk food centers as most children are addicted to eating of junk food (Chapman & Maclean 1993).

The Dublin Department of Health and Children (2005) suggested that investment and policies are important in changing social perception of eating behavior as well as food, thereby reducing proliferation of obesity among children of age 6-12 years. There

has been extensive study on dietary factors on its possible contributions resulting in the increasing rates of obesity. The factors examined include portion sizes, sugary beverages, fast food consumption, and snacks foods. In recent years, increased fast food consumption has been closely linked with childhood obesity. Most families, particularly those who have two parents that work away from the home, prefer these places. The junk food seems both convenient and inexpensive, not knowing that foods that are served at these restaurants most times usually have low nutritional values and high calories (Niehoff, 2009). Another study carried out looked at the eating habits of overweight and lean adolescents at fast food restaurants. It was discovered that both lean and overweight consumed more calories eating fast food as compared to when they would typically eat in a home setting. The lean group in compensation or anticipation for the excess calories taken during the regular fast-food meal tends to want to compensate for the higher caloric intake by way of adjusting their caloric intake before or after the fast-food meal (Ebbelling, Sinclair, Pereira, Garcia-Lago, Feldman & Ludwig, 2004).

There are many studies that have shown gain in weight with continuous fast-food consumption, but it is difficult to establish a causal relationship between childhood obesity and fast-food consumption among children of age 6-12 years. In her study, Rebecca (2009) found out that obesity has no single causative factor and cannot be ascribed to one. However, lack of appropriate action such as involvement in active physical activity by the child may result into the formation of obesity and a state of being over-weight at an early age. Van et al. (2011) summarized the causes of obesity into six (6) sub-units which are:

1. Physical cause: refers to absolute or seldom involvement in physical activity by the child, thus resulting into gradual but continuous increase in body size.
2. Psychological cause: refers to lack mental anguish in trying to solve puzzle by the child whether at home or in school which consequently result into a state of rest within the child's body, and as such fatty tissue are piled up.
3. Socioeconomic status of parent: children from higher socioeconomic status are more likely prone to being obese because of the high level of accessibility, availability and affordability of luxuries which conforms them to a sedentary lifestyle and eventually predispose them to obesity.
4. Material cause: refers to the improper usage of material comfort (such as toys, board games, charts etc.) that are intended to build the child holistically, rather instead of helping the child positively, it is therefore abetting obesity in the child as a result of addiction to the material comfort.
5. Socio-demographic cause refers to the negative impact that socio-demographic cravings or status of the parent has over the child. For instance, some parents in an attempt to attain certain education status, tend to over-feed their child, so as to afford them enough time for their personal studies.
6. Relative Neglect: refers to the deliberate refusal or 'beyond-power' of the child to engage in physical activity, may be due to congenital condition e.g., mongoloid syndrome, genetic impairment e.g., sickle cell anemic condition etc. This may gradually graduate into obesity.

According to the United States Centers for Disease Control and Prevention (2010), over one-third of the children in the United State of America are obese. The study carried out by CDC among children in Nigeria however gave a lower prevalence of 9.9%. This is based on CDC (2016) definition of obesity which states that a child 2 to 5 feet 4 inches tall is obese if he or she weighs 104 pounds or more. Also, a child 3 to 5 feet 9 inches is obese if the child weighs 133 pounds or more (Brian, 2013). Obesity is related to some of the leading causes of death, including heart disease, some cancers, stroke, and type 2 diabetes. Its levels have been rising for all socioeconomic groups with some groups more affected than others (WHO, 2016a).

A study published in Social Science and Medicine used data for 67 countries representing all the regions of the world to examine how economic development, socioeconomic status and obesity were related. The study found out that obesity rose with a nation's economic development, but also that socioeconomic status as it related to obesity changed. In lower-income countries, people with higher SES were more likely to be obese (Fred, Justin & Patrick, 2012). In high-income countries, those with higher SES were less likely to be obese. This may be that in lower-income countries, higher SES leads to consuming high-calorie food and avoiding physically tough tasks, while in higher-income countries, individuals with higher SES may respond with healthy eating and regular exercise. The implication is that while economic development improves health, problems of malnutrition are replaced by problems of overconsumption that differentially affects high SES groups. This is one of the reasons that explain why some

developing countries such as Nigeria and India, are facing continued high levels of malnutrition along with a rise in obesity (Ravishankar, 2012).

In a related study published in the Sociology of Health and Illness, it examined how weight and lifestyle were related. Using data from 17 nations mostly in Europe, the study found out that activities such as reading, attending cultural events, and going to the movies were associated just as much as exercise was with a lower BMI and those who participated in activities such as watching TV, attending sporting events, and shopping had higher BMI (Fred, 2012). Other researchers, in a study published in Demography, also looked at how SES is related to obesity in the transition to early adulthood in the United States. They found a more nuanced relationship, as boys with a middle-class upbringing and lifestyle by parents with higher SES were almost as likely to be obese as those brought up in lower SES households but working now in lower-status jobs. For girls however, the relationships varied by race (Scharoun-Lee et al., 2011). For white females, all higher SES groups had a greater risk of obesity compared with the most advantaged (lower SES). In contrast, among girls (emerging women), only those from working-poor households who now had lower SES were at increased obesity risk compared with the most advantaged group (Scharoun-Lee et al., 2011). Several studies have revealed that factors that increase the risk of being obese affect SES groups differently and may cause disparities in obesity between socioeconomic groups that worsen health and shorten longevity for those who are most disadvantaged (CDC, 2016).

Factors Influencing Childhood Obesity and Overweight (6–12years)

Vazquez and Torres (2012) stated that family history, psychological factors, and lifestyle do play a role in childhood obesity, as children whose parents or other family members are overweight or obese are more likely to follow suit. The main cause of childhood obesity is a combination of eating too much and exercising too little, as a poor diet such as fast food, candy, and soft drinks containing high levels of fat or sugar and few nutrients can cause kids to gain weight quickly. Convenience foods, such as frozen dinners, salty snacks, and canned pastas, can also contribute to unhealthy weight gain. Some children become obese because their parents do not know how to choose or prepare healthy foods (Rawana, Morgan, Nguyen & Craig, 2010). In some families, due to their low socioeconomic status, they may not be able to readily afford fresh fruits, vegetables and meats and this may consequently lead to childhood diabetes in the early years of development (Niehoff, 2009). Not enough physical activity can be another cause of childhood obesity. People of all ages tend to gain weight when they're less active, including children. Exercise burns calories and help an individual to maintain a healthy weight. Hence, children who aren't encouraged to be active may be less likely to burn extra calories through sports, time on the playground, or other forms of physical activity.

Psychological issues may also lead to obesity in some children. Kids and teens that are bored, stressed, or depressed may eat more to cope with negative emotions (Kapil & Bhadoria, 2014). Childhood obesity is a serious health threat to children. Kids in the obese category have surpassed simply being overweight or obese and are at risk for several chronic health conditions, as poor health stemming from childhood obesity can

continue into adulthood (Renman, Engstr, Silfverdal & Aman, 2009). Childhood obesity does not just affect physical health. Children who are overweight or obese can become depressed and have poor self-image and self-esteem.

Children who are obese have a higher risk of developing health problems than their peers who maintain a healthy weight and are at risk of diabetes, heart disease, sleep disorder, joint pain and asthma among the most serious health risks (Austin et al. 2009) According to Mayor Clinic 2016 Publication on childhood obesity, many factors usually work in combination to increase the child's risk of becoming overweight or obese usually between ages 6-12 years. The factors include:

Environmental Factors

While it's been said that extensive television viewing as well as other electronic media usage has been implicated in the sedentary lifestyles of children, other environment factors have reduced physical activity opportunity. There is decrease in the opportunities to be physically active and safe environment recent years. In the past, most children rode their bike or walk to school. In a 2002 study, 53% of parents drove their children (age 6-12years) to school. Of these, 66% said they drove their children to school since their homes were not close to their school. Other reasons highlighted include fear of child predators, out of convenience for the child and no safe walking route. Children who do not have access to safe, well-lit walking routes or who live in unsafe areas have less chances to be physically active, thereby increasing the rate of susceptibility to childhood obesity among children of age 6- 12 years (Anderson & Butcher, 2006).

Socio-Cultural Factors

Socio-cultural factors have been discovered to affect the obesity development among children in most developing countries (Budd & Hayman, 2008). In Nigeria, food can be used to welcome strangers, reward for kind deeds, means to control others, and socializing purpose which abet the risk of developing obesity among children of age 6-12 years in the country.

Family Factors

Family factors can significantly influence the onset of stunting or childhood obesity among children, as the available food becomes the preferences of family members, whether it is healthy for consumption at that time of the day or not. Hence, childhood obesity is unconsciously abetted among the children. (Moens et al., 2009)

Psychological Factors

The psychological impacts of obesity among children include the following.

Depression and Anxiety. Depression and anxiety are signs of childhood obesity which can be felt by the child alone but noticed by others around the child. These depressive and anxious tendencies exhibited by the child are often ignored by adults and considered as indolence (Britz et al., 2000; Goldfield et al., 2010). There are some other studies that showed no significant relationship between increased anxiety symptoms and increase in BMI (Tanofsky-Kraff et al., 2004).

Low Self-Esteem. Obese children have lower self-esteem, when compared with those who are not obese. (Zametkin et al., 2004) Thus, the global approach of measuring self-esteem of obese children, with non-obese children can be misleading as the social

and physical domains of self-esteem appears to be where there is high vulnerability of these obese children (Schwimmer, Burwinkle & Varni, 2003).

Body Dissatisfaction. According to O'Dea (2005), obese male children have a higher body satisfaction than their female counterpart at all ages, as the western cultural ideals of being beautiful is reflected in thinness for females, while it is advisable for males to be both muscular and/or lean. Austin et al. (2009) and Kostanski et al. (2004) affirmed that male children with BMIs at the high and low extremes have high levels of dissatisfaction with their body, but there is body dissatisfaction with female children for increase in Body Mass Index (BMI).

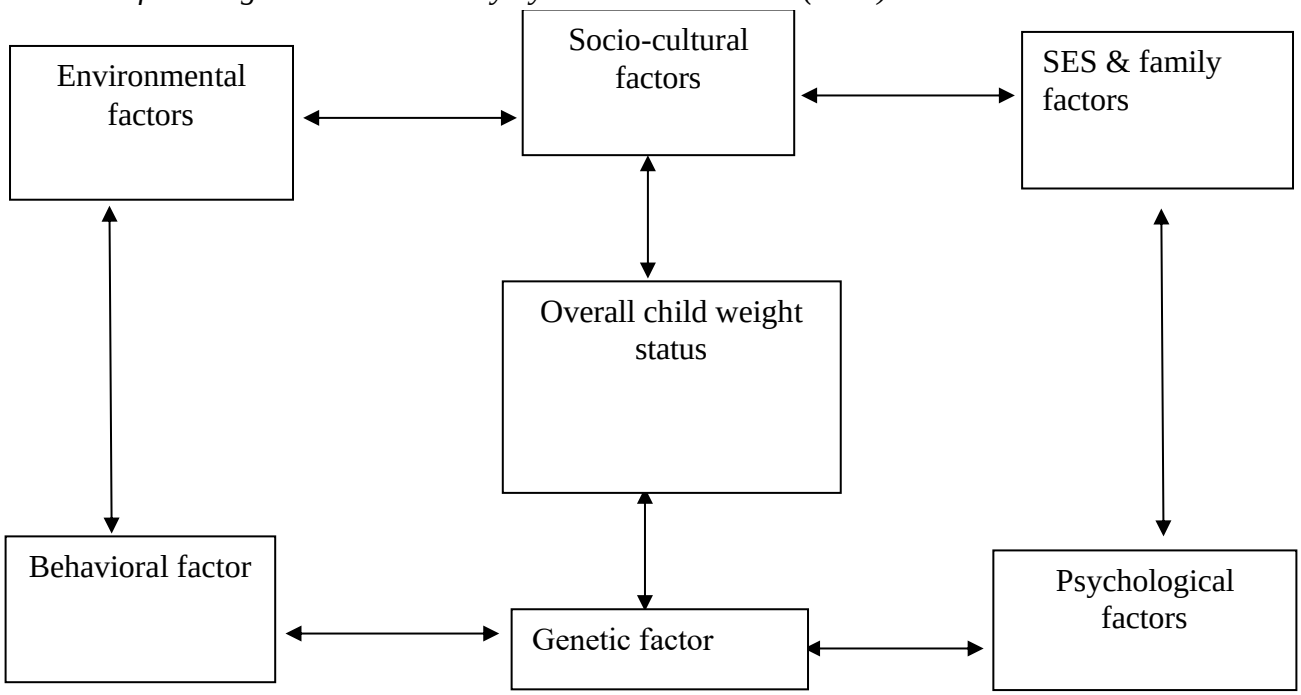
Eating Disorder Symptoms. Lundstedt et al. (2006) stated that eating disorders symptoms has been found to be associated with obese female children. Decaluwxe and Braet (2003) affirmed that higher prevalence of eating-related pathology is associate with obese children, thus resulting into anorexia, bulimia nervosa and impulse regulation.

Emotional Problems. Cornette (2008) investigated the psychological impact of children being obese or overweight. A literature review of studies carried out over a period of 10years (1995-2005) with sample sizes over 50 showed that all those that participated reported some degree of psychosocial impact resulting from the status of their weight, which was heightened by lack of control overeating in female children.

According to Davison and Birch (2001), factors influencing childhood obesity and over-weight among children of age 6-12 years are numerous, interwoven and can be summarized using cuboidal (see Figure 3)

Figure 3

Factors Influencing Childhood Obesity by Davison and Birch (2001)



Consequences of Obesity on Children Age 6–12years

Obesity among children of age 6-12 years can extremely affect the overall health of a child physically, socially, mentally, and emotionally resulting to low self-esteem, weak academic achievement and decreased quality of life. These potential consequences can be categorized under the following sub-headings:

Medical Consequences

Medical conditions associated with childhood obesity among children include: Type 2 diabetes, cardiovascular disease, asthma, sleep apnea, cholelithiasis (gallstones), hepatic steatosis, menstrual abnormalities, impaired balance high cholesterol, glucose intolerance and insulin resistance, skin conditions, and orthopedic condition. Death can sometimes result in the very worst cases of these health conditions, (Niehoff, 2009).

Socio-Emotional Consequences

Obese children of ages 6-12 years are implicated in numerous medical concerns. Schwimmer, Burwinkle & Varni (2003) noted that childhood obesity affects the optimum social and emotional health status of children, usually between the ages of 6-12 years, thereby predisposing the child to stigmatizing and least socially acceptable conditions. Most obese and overweight children are sometimes teased or even bullied on account of their weight. The American Academy of Pediatrics (2003) documented that all obese children are also confronted with diverse socio-discrimination, unpleasant remarks and segregation, as they are often excluded from activities regardless of their parents' socio-economics status, particularly competitive activities that require physical activity.

Budd & Hayman (2008), in their study noted that it is strenuous for most obese children to engage in recreational sport activities as they are ridiculed by their peers and do express difficulty in their respiration, leading to negative body image, low self-confidence and low self-esteem, which can limit their academic achievement. The negative implications of childhood obesity on social dispositions, is that they tend to shield themselves from negative remarks, attitude and behavior of other peers that are negative by withdrawing to a presumed safe place like their homes, to seek for comfort through consumption of more food (Niehoff, 2009).

Academic Consequences

The association between childhood obesity and academic performance has also been found to affect school performance negatively. Most obese children compared to their peers of normal weight were four times more likely to report having academic problems and they are also very likely to be frequently from school, particularly those with chronic health conditions. This in turn will ultimately affect academic performance negatively (Schwimmer et. al., 2003). The rise in occurrence of childhood obesity in Nigeria as a developing country can be reduced, if the Ministry of health, Ministry of Education and other health agencies will focus on the causes of childhood obesity and preventive measures, rather than embark on lip service. Hence nutritional and physical activity intervention programs within the primary school setting where the child attends will be more operative at checking childhood obesity.

Many obesity problems could be avoided if parents enforce a better and healthier lifestyle at home. What children learn at home about the choices of right nutrition

exercise and healthy eating will ultimately impact on other aspects of their life. This will have the most impact and also influence their decision making in their food selection to be consumed at fast food restaurant and school and their decision to be active. Focusing on these causes can reduce childhood obesity which in turn will lead to a healthier society over time

Self-Challenges of Children Who are Obese or Overweight

Gilliland et al. (2010) noted that the following challenges may be experienced by children of age 6-12 years who are either obese or overweight. However, their challenges may vary according to their socioeconomic status and level of social support received. The general challenges can be summarized as follows for both developed and developing countries such as Nigeria.

Difficulty in Adjusting to a New Mental Capacity

Every day, new intellectual skills are discovered and improved upon because of surrounding influences and the access to the world at large through various media. However, a child of age 6-12 who is obese begins to analyze facts in a more abstract and more funny way, as they easily recall or see what was done wrong in past events to them because of their body make up, what should have been done. As such they are usually less active to act upon social events that involved their peers.

Difficulty in Establishing Active Personal Goals

A child of age 6-12 years who is obese or overweight being an individual also has some wishes, desires, dream, and goals in mind to fulfill, but due to his body size, he finds it very difficult usually when he is among his peers to establish or express such

personal desires. This is likely due to the fear of being ridiculed. Such a child tends to live a reclusive life. However, to help such, the warmth of all significant others such as friends, relatives, family members, neighbors, religious and social organization members should be harnessed to make life meaningful for the child.

Displeasure in Acknowledgement of Body Status

Actual acknowledgement of being obese does not occur spontaneously to a child until he encounters a social, emotional, mental, physical, and psychological hurdle that he finds difficult to do independently, which his peers easily perform. Often this brings sadness and distortion in moral judgments and in behavior of the obese child.

Difficult in Establishing Healthy Friendships

Every individual wants company, but for the obese children, they find it difficult in establishing healthy friendships with being ridiculed or nicknamed. Therefore, the role of group is fundamental in maintaining the obese child's health status. For this reason, all significant others as listed earlier must become associates and integrated into the life of such obese child, without segregating blindly. Obesity comes with its natural and unforeseen challenges and must be prevented at all costs.

Difficulty in Temperament Control

With the ridiculing and nicknaming by peers, children of who are obese might have difficulty controlling their temperament most times. This is not because they are not well trained at home or are unruly, but every human has a limit of endurance. Hence, should be guarded by relevant authority in school usually by the classroom teacher, parents at home and/or caregiver by ensuring that relevant health information and

education on their body's physiology is explained to them, and health norms which must be practiced with complete responsibility by the child as he grows up (Vazquez & Torres, 2012).

Support Required by Obese Children

Elechi et al. (2015) noted that the population of children by weight status can be classified into four groups using sex as well as age specific percentiles of BMI:

- Underweight (<5th percentile);
- Normal (>5thpercentile, <85th percentile);
- Overweight (≥85th percentile);
- Obese (>95th percentile).

Therefore, an obese child is classed under the fourth group (>95th percentile) and often time are being referred to as fat. Causes of obesity vary in different cultures in Nigeria. While some ethnic groups refer to obesity as sign of wealth, others in the south-west zone of Nigeria detest it. Most obese children who cannot manage independently at home are moved to nursing homes (specialized home) to receive support and nursing care from healthcare professionals. Senbanjo et al. (2007) observed that care management study is relevant while offering care to children who are obese. Michie, Van Stralen and West (2011) stated in their study that the following support categories are required by children who are obese.

Physical Support

Obese children experience physical changes such as increase in body size, increased fat tissue and thickened round skin which is natural. The body changes of these

obese children may affect their movement; reduce muscle strength and inability to balance. This then predisposes them to risk factors of falls, ankle pain and fractures which causes injuries among the obese. Some of these obese children are institutionalized due to physical impairments that result from falls leading to difficulty in movement. They may require support in tasks such as daily personal hygiene, mobility, and assistance because of inability to perform activities independently (Vazquez & Torres, 2012). Other obese children experience problems in walking due to inability of managing a proper body balance. Thus, they require assistive devices such as walking sticks and other instruments that can facilitate their independence.

Psychological Support

The obese phase of life for children is associated with various body and mental changes. Diseases in the obese community usually affect their hope and optimistic behavior concerning health condition in regard to the future. Most of them think of death when affected by diseases and some even experience diminished memory or a complete loss of memory. Sometimes this is due to fear of the unknown, which impairs them cognitively (American Academy of Pediatrics, 2003). Obese children that have poor memory require constant orientation of the surrounding environment, and current events. Caring for residents with dementia has been described as physically, emotionally, and mentally exhausting, as it is associated with constant restlessness, mental confusion and sometimes aggressive behavior. This trait which is also shown by some of the obese children can be due to poor hormonal coordination within the child (Cornette, 2008).

Social Support

Social support is an important aspect required by different age groups especially children, teenagers, and the elderly. Emotional participation of an individual in different activities promotes the well-being by realizing a sense of belonging to the society particularly for the obese. In a study by Alli, Fang and Rizzo (2010), a non-obese child may live alone with few social contacts and not experience loneliness, but the presence or absence of loved ones is a major risk factor of loneliness to majority of the children who are obese. Because they tend to feel abandoned. Hence, nurses or caregivers offer social help to the obese child whether through celebrating events together, singing, creating arts and crafts. This is to ensure social participation of the obese child and consequently help in alleviating loneliness, and depression.

Creating in an obese child a sense of acceptance, recognition and love in the society, maintenance of social contacts, experiencing social support from family members and significant ones are important in offering social needs to an obese child, as fulfillment of social needs is an important aspect that results into wellbeing of the obese (Allen et al., 2006). World Health Organization (2004) asserted that childhood obesity is a 21st century public health challenge that is yet to be overcome both in developed and developing countries. Globally, over 40 million children in the world are obese and their prevalence has been estimated to reach 60 million by the year 2020 (de Onis, Blössner & Borghi, 2010). Schaible and Kaufmann (2007) observed that there is a possibility of a galloping rise in the prevalence of childhood obesity in more developing countries like Nigeria. This may be due to poor socioeconomic strata and deficient behavioral lifestyle

such as non-involvement in physical exercise, poor nutritional intake, smoking, and faddism.

Childhood obesity often results in a wide range of unsolicited psychosocial and medical costs, including poor self-esteem and self-image, problems of integration with peers, depression, anxiety, and the chronic diseases attributable to excess adiposity. Obese children and adolescents are often victims of stigmatization. Lake, Power and Cole (1997) stated that in young girls of ages 8-12 years, obesity has been additionally linked to potential menstrual disorders, fertility challenges and high blood pressure during pregnancy. More worrisome is the fact that childhood obesity is known to track into adulthood (Baker, Olsen & Sørensen, 2007).

The periods of severe fluctuations in body adiposity that takes place in children are very important period in obesity development. Studies on the tracking of obesity indicated that 70-80% of obese children and adolescents become obese adults (Niclasen, Petzold & Schnohr, 2007). It is reported that from age 6, about half of obese children turn out to become obese adults while just about a tenth of non-obese children eventually becomes obese adults (Guo et al., 2002). An attempt to address childhood overweight and obesity in a timely manner not only preserves children and adolescents from morbidity and possible mortality, but also saves adults of the future from similar burdens.

Nigeria, a developing country, is currently experiencing the double burden of nutritional disorders. There is the co-existence of both under- and over-nutrition within the same population. Such nutritional disorder does not favor any economy that seeks to attain “industrial and economic development”. This ultimately calls for urgent public

health action. Akesode and Ajibode (1983) in their study noted that several reviews of the literature on child overweight and obesity in Nigeria have been conducted using internationally accepted methods. Only cross-sectional studies published between January 1983 and December 2013, which investigated obesity and overweight in adolescents and children in Nigerian using anthropometric tools, can be traced, and included in this study. Adesina, et al. (2012) confirmed that increase in height and weight among children in Nigeria comes with a concomitant increase in fat mass especially in girls and muscle mass in boys. The combination of the high-energy demands in adolescence, the adolescent growth spurt and the often inappropriate and inadequate diet available to children and adolescents especially in resource-poor settings results in the poor nutritional status of adolescents.

James (2004) described obesity as the accumulation of unnecessary adipose tissue to a degree where it impairs physical and psychosocial health. It is diagnosed in childhood as BMI ≥ 95th percentile for gender and age. Cole et al. (2000) tracked obesity among children (ages 4-12 years) into adulthood and found that obesity at childhood results in several health consequences experienced in most developing countries. Guo et al. (2002) after analyzing lifelong data from the Feels longitudinal study and estimating the probabilities of having a BMI > 30 kg/m 2 at age 35, concluded that individuals who end their adolescence with moderately elevated BMI have a higher likelihood of becoming obese as adults.

There is an association between childhood obesity and other chronic comorbidities like type 2 diabetes, liver and renal disease, insulin resistance, certain

cancers hypertension, hyperlipidemia, reproductive dysfunction, and poor motor development. This highlights the public health significance of obesity (WHO 2012). Thus, it is important that a systematic and regular surveillance of the prevalence and trends in obesity among children be carried out with a view of mitigating this public health challenge (Schwiebbe et al., 2012). Chukwunonso (2014) stated that several reviewed papers were published between 1983 and 2000 on obesity as its affects both children and adolescents. Between 2001 and 2010, 17 (40%) of the papers were published, as much as 23 (55%) of the papers were published between 2011 and 2013. Most of the reviewed papers (69%) were conducted in urban centers in Nigeria. Only 10% of the papers investigated children and adolescents in both urban and rural areas while 7% of the papers were conducted in semi-urban areas. The distribution of the reviewed papers showed that 26% of the papers were conducted in Northern Nigeria, and 35% of the subjects studied were from the same region (Onyiriuka et al., 2013). As much as 74% of the papers and 65% of the participants were from the South of Nigeria. The South-West geopolitical zone contributed the most, with 51% of the reviewed papers and 44% of the subjects, while the North-East geopolitical zone contributed the least, with 5% of the papers and 2% of the studied population (Goon et al., 2011). Only two reviewed papers used the Triceps Skin fold Thickness (TSFT) technique in diagnosing overweight and obesity (Ahmad et al., 2013; Akesode & Ajibode, 1983).

Senbanjo et al. (2013) used the waist circumference technique to define visceral obesity while two other studies employed both derivatives of the waist circumference and BMI (Sabageh & Ojofeitimi, 2013; Senbanjo & Oshikoya, 2012). All the other papers

reviewed used the BMI as the diagnostic parameter. The WHO reference standards were the most used reference cut-off points for diagnosing overweight and obesity in the reviewed papers. They were used in 50% of the reviewed papers. The International Obesity Task Force (IOTF) reference standard was the next most used method and was employed by 24% of the reviewed papers. World Health Organization (2014) stated that the right means of diagnosing obesity in children globally has remained controversial, several national and international agencies, and expert groups still stick to BMI classifications.

The advantages of the BMI diagnostic for which experts recommend, include its simplicity, strong correlation with body fat (more so at extremes of BMI), weak association with height, and sensitivity and specificity at the 85th or 95th percentile for age and gender (Krebs & Jacobson, 2003). Its simplicity and non-requirement for elaborate and expensive equipment make using the BMI affordable in developing countries, though the gender- and age-specific tables make diagnosis a little cumbersome (World Health Organization, 2006). The studies that investigated obesity in both children and adolescents in Nigeria noted that the prevalence figures have not changed so much between 1983 and 2013.

Akesode and Ajibode (1983) used the TSFT method and reported a prevalence of 3.2% for males and 5.1% for female children living in an urban area. The only exceptions are the studies carried out by Owa and Adejuyigba (1997) and Opara et al. (2010). The study reported obesity prevalence of 18.0% and 11.1% for male and female children

respectively. Both studies adopted the gold standard BMI-for-age criteria as against the TSFT method.

Irrespective of these apparent outliers, the weight of the evidence is in favor of the fact that obesity prevalence data in studies that investigated both children and adolescents have not changed dramatically in the last 30 years, as it remains high. Senbanjo & Adejuyigbe (2007) study used only 270 subjects in Nigeria, and it revealed that the prevalence (13.7%) of overweight in both children and adolescents is lower in a rural area than in urban area. However, two subsequent independent studies of about 600 subjects each reported a prevalence of 0.0% in a rural (Ayoola et al., 2009) and an urban setting (Amuta & Houmsou, 2009).

The prevalence of overweight and obesity in Nigerian children reported in more recent studies that each recruited more than 1500 subjects is 5-12% for both gender (Ene-Obong et al., 2012; Izuora et al., 2013). Nonetheless, from Senbanjo and Adejuyigbe's study in 2007, it is difficult to determine if the finding was an isolated case or representation of that period, because the former is however unlikely. Nonetheless, if the studies reporting an absence of overweight in children and adolescents are overlooked, the prevalence of overweight in children and adolescents between 2007 and 2013 has either remained steady or declined (Ejike, et al., 2013; Ibegbu et al., 2013;).

Three papers however reported prevalence values of 13.8%, (Oduwole et al., 2012) 18.6%, (Onyiriuka et al., 2013) and 18.9%. (Atiku & Yunusa, 2009). For the prevalence of obesity among children and adolescents in subgroup, also between 2007 and 2013, the values ranged from 0.0% to 2.8%. As was the case with overweight, two

studies reported prevalence values of 4.2% and 9.4% for male and female children that are apparently outliers (Oduwole, et al., 2012; Sabageh & Ojofeitimi, 2013). One of these two studies reported a general prevalence of 37.2% for both genders when obesity was defined using waist-to-height ratio or waist-to-hip ratio (Oduwole et al., 2012), A different study found visceral obesity in Nigerian children to be 24.5% and a general obesity prevalence of 5% (Senbanjo & Oshikoya, 2012). A 2013 study on children and adolescent obesity in Nigeria that used the TSFT method reported a prevalence of 0.8% for obesity which is a lot less than the 3.2% to 5.1% reported in the 1983 study (Akesode & Ajibode, 1983). Given the available data from several reviews, it appears both overweight and obesity are more prevalent in children than in adolescents (Rokholm, Baker & Sørensen, 2010; Schmidt et al., 2013).

The prevalence of both disorders has apparently remained within the same range in the last 30 years, and it is now evident that they continue to rise in Nigeria (Senbanjo & Oshikoya, 2012). In other countries such as Mexico, India, China, Vietnam, US and Australia, the incidence of obesity and overweight has reportedly plateaued in the past decade (Townsend et al., 2012; Rokholm et al., 2010). There are reports of declining rates in some countries such as Germany (Moss et al., 2012).

With a prevalence rate of 0.0-2.8% and 0.0-5.8% for obesity in the “adolescents only” and “children and adolescents” subgroups, respectively, and prevalence rate of 1.0-8.6% and 5.0-12.0% for overweight in the subgroups respectively, it implies that prevalence rates in Nigeria are still lower than the figures reported in most of the available literature. Some of the figures from around the world buttress this point. For

instance, overweight/obesity incidence increased significantly in both boys and girls in China from 1.8% and 0.4%, respectively, between 1981 and 1985 to 13.1% and 7.5%, respectively, between 2006 and 2010 (Yu et al., 2012). A comparison of data from 35 countries showed that there were large variations in children overweight and obese in those countries.

Due et al. (2009) found that the prevalence of obesity in children (%; boys vs. girls) in France was 1.6 vs 1.4, Scotland 3.0 vs 2.7, Canada 4.4 vs 3.5, USA 8.2 vs 5.2, and Malta 10.2 vs 5.0 respectively. Overweight and obesity prevalence in South African children has also reached 17.2-22.8% (Armstrong et al., 2006). Shalom et al. (2012) stated that the occurrence of obesity increased from 6.3% in early childhood to peak at 9.2% in middle childhood. It then declined steadily to the lowest value of 2.1% in late adolescence. Obesity was more prevalent in children (6.0-9.2%) than in adolescents (2.1-3.4%). The high incidence of obesity among children in Nigeria means that the problems of under-nutrition as well as over-nutrition exist in these age groups. Parental SES and SDS may also have a role to play in this, as children of the affluent (higher SES) are predisposed to obesity and overweight due to over-nutrition, whereas underweight due to under-nutrition may pervade in children of the less affluent families resulting from lower parental SES & SDS (Durazo-Arvizu et al., 2008). The adolescents have lower prevalence of obesity compared with the children in Nigeria, hence a positive preventive measure should be implemented to curtail the rapid increase in childhood obesity in Nigeria (Ngowu et al. 2008). Obesity in children has been implicated as a significant risk for adult obesity and myriad co-morbidities obesity (Reilly, 2005)

In all the age groups, apart from early childhood (ages 2-4 years), the percentage prevalence of weight excess is usually higher than that of weight deficiency (Bakari et al., 2007). Weight excess (overweight and obesity) was more prevalent in girls of ages 6-12 years in Nigeria compared to boys of the same age group. The implication of the findings is that although over-nutrition and under-nutrition coexist, the challenge of over-nutrition appears to be of greater consequence in older children of ages 6-12 years in Nigeria, whereas under-nutrition pervades in early childhood.

Caballero (2005) stated that it is shown that weight deficiency and weight excess co-exist in Nigerian children and adolescents, while weight excess, mainly overweight, prevails in older children and adolescents. Underweight still pervades in early childhood. Therefore, more attention should be given to adequately feed and nurture pre-school and primary school pupils (children in general between ages 1-12 years) so as to reduce the incidence of weight deficiency. However, weight abnormality in children appears to decline with age. The incidence is consistently reduced as the age of the subjects increase, save in genetically influenced cases (Akpa & Mato, 2008). It is significant to note that the prevalence of obesity and overweight is a derivative of the incidence and the duration of the disorder among children. A stable prevalence necessarily does not indicate that the incidence and duration are both stable. Thus, if the incidence of childhood obesity continues to rise while the duration of the condition shortens, the prevalence will remain stable. It is, therefore, important to study the underlying characteristics of the trends reported in order to appreciate better the data and develop appropriate public health responses.

Summary and Conclusions

In this chapter, discussion on the reviewed literature was elaborately done in relation to the study. The topics for the review were, global perspective on childhood obesity, theories on socioeconomic status and obesity among children, causes of obesity and over-weight among children of age 6-12 years, factors influencing childhood obesity and overweight (6-12years), consequences of obesity on children of age 6-12years, self-challenges of children who are obese or overweight (ages 6-12 years). Other areas of this chapter looked at, support required by the obese (children of age 6-12 years), empirical review on prevalence of childhood obesity & SES in Nigeria. Conceptual framework: The Social Cognitive Theory and its application formed the framework of the study.

Obesity in children is a public health problem in Nigeria which requires a definite prophylactic approach towards reducing its harmful long-term impact on children ages 6-12years, irrespective of their parental socioeconomic status. Chapter three provides the methodology background, addressing the variables and the data analyses for this study.

Chapter 3: Research Method

Nigeria is diverse in terms of religion, tradition, culture, and region. Researchers had not looked at comparative prevalence of childhood obesity bearing in mind the diverse nature of the country. Also, studies did not address the parent's awareness of the predisposing risk factors associated with this condition to mitigate the increase of childhood obesity among children aged 6–12 years in Nigeria. The purpose of the current study was to examine the association between parents' socioeconomic status and obesity among children aged 6–12 years in the Southwest geopolitical zone of Nigeria. Parents' knowledge about obesity and its prevention were also investigated. This chapter includes a description of the step-by-step approach that was adopted during the execution of the study and how each step was carried out.

Research Design and Rationale

Obesity among children aged 6–12 years in Nigeria and parental socioeconomic status were the main variables under consideration in this study. The study was conducted using cross-sectional methodology. Cross-sectional studies are cost-effective in descriptive research for the analysis and assessment of associations between quantitative variables (S. Ahmad et al., 2019).

Variables Used in This Study

Dependent Variable

The dependent variable in the study was childhood obesity. This variable was measured by calculating the BMI of the children using their weights and heights.

Independent Variables of Interest

The independent variables of interest in this study were parent socioeconomic status, child physical activity behavior, and child nutrition behavior. Parent socioeconomic status was categorized into low, middle, and high based on the amount of annual household income reported by the respondents (see Appendix B. Child physical activity behavior was calculated by scoring the physical activity practice questions using the practice scale. Those who scored above the mean value were categorized as physically active (see Appendix B). Child nutrition behavior was calculated by scoring the questions relating to nutritional behavior. Behavior was categorized as either good or poor based on the mean score (see Appendix B). Breakfast was used to measure nutritional behavior because breakfast is an important strategy used in mitigating childhood obesity. Children who eat a healthy breakfast are fueled with energy needed to start the day, and research showed the children are less likely to snack on unhealthy items throughout the day and are less likely to overeat at lunch time (Khalifa et al., 2014). Monzani et al. (2019) found that children who skip breakfast tend to have poorer nutrient intake compared to those who eat it. Other variables used this study were food classes that significantly influence healthy weight, such as fruits, vegetables, and soda drinks. Potatoes are rich in fiber and are a possible substitute for other root crops with higher calorie content.

Potential Confounding Variables

Potential confounding variables were child's sex, child's age, parent's marital status, and state of residence. Table 1 provides additional detailed information about each variable in the study.

Table 1

Description of Variables

Variable name	Type of variable	Categorical breakdown
Child weight status	Categorical	Underweight Normal weight Overweight Obese
Parent socioeconomic status	Categorical	Low income Middle income High income
Child physical activity behavior	Categorical	Not physically active (≤ 8 points)* Physically active (> 8 points) *
Child nutrition behavior	Categorical	Poor nutritional behavior Good nutritional behavior
Child sex	Categorical	Female Male
Child age	Categorical	6–8 years 9–10 years 11–12 years
Parent marital status	Categorical	Single Married Other (divorced, separated, widowed)
State of residence	Categorical	Oyo State Lagos State Ondo State

*See Appendix B for further details.

Methodology

A cross-sectional study design was used to examine the socioeconomic characteristics that may be associated with childhood obesity in the Southwest geopolitical zone of Nigeria. This design was selected because the information on the outcome, childhood obesity and the exposure, and socioeconomic risk factors were collected at the same point in time. This design allowed me to assess the overall

prevalence of childhood obesity and the risk factors that were associated with childhood obesity. The one limitation of this design was that I was not able to ascribe a causal association because I was unable to determine temporal order from a cross-sectional study design.

Study Population

The population for the study comprised parents of primary school pupils age 6–12 years in the Southwest geopolitical zone in Nigeria. Three hundred and eighty-four parents were sampled for the study (64 parents from each of the three states in the Southwest geopolitical zone).

Sample and Sampling Procedures

A multistage stratified random sampling procedure was used in conducting the survey for this study because it provided equal chance for respondents to be selected in each state. In the first stage, simple random sampling was used to select three states in the Southwest senatorial district. In the second stage, simple random sampling was adopted to select two local government areas in each state. In the third stage, simple random sampling technique was used to select two schools each from the selected six local government areas; 64 participants were selected from each of the six schools giving a total of 384 participants. In the fourth stage, purposive sampling was used to select all six primary schools from the six local government areas that were used for the study.

In the fifth stage, convenience sampling was used to select 384 participants from all the six primary schools in the six local government areas in the three states in the Southwest geopolitical zone of Nigeria. Data collection occurred in the communities

where the schools were situated due to school closures because of the COVID-19 pandemic. This differed from the initial plan of selecting participants directly from the schools. The sampling frame was based on the inclusion and exclusion criteria.

The inclusion criteria were that the participants for the study were parents/guardians of primary school pupils (children) age 6–12 years who are resident in the Southwest geopolitical zone of Nigeria within the selected local government area and were willing to participate in the study without any coercion or undue enticement. The exclusion criteria were the following:

- parents/guardians whose wards are <6 or >12 years of age,
- parents/guardians who did not live in the Southwest geopolitical zone of Nigeria,
- parents/guardians whose wards did not attend the selected schools, and
- people who were not parents/guardians of primary school pupils.

The sample size for this study was calculated using the Leslie Kesh model of 1978 as used by Elechi et al. (2015):

$$N = \frac{Z^2pq}{d^2}$$

Where N = minimum sample size required

Z = confidence limit of survey at 95% (1.96)

P = the proportion of the target population estimated to have a particular phenomenon of interest in the study.

q = 1-p

d = absolute deviation from true value (degree of accuracy) = 5%

$$\frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.05)^2} = 384$$

= 128 participants from three states of the Southwest geopolitical zone of Nigeria.

= 64 participants from one public primary school in each state

= 64 participants from one private primary school in each state

= 384 participants from three states in the Southwest geopolitical zone of Nigeria.

The sample size determination formula was justifiable for the study because the population of primary school pupils of age 6-12 years and parents' residence in the Southwest geopolitical zone of Nigeria was above 1,000.

Procedures for Recruitment, Participation, and Data Collection

Valid informed consent from the 384 participants (parents/guardians of primary school pupils age 6–12 years) across three states in the Southwest geopolitical zone of Nigeria was obtained from the parents. A letter of introduction from Walden University was presented to the respondents, and the proposed use of the study was included as an introductory part of the questionnaire. The demographic questionnaire and consent form for participation were given to the parents for them to complete and return. The data collection, analysis, and report were carried out thereafter.

Sampling Procedure

A multistage sampling method was employed in this study:

Stage 1

Simple random sampling was used to select 50% of the six identified states in the Southwest Senatorial District through balloting, which led to the selection of three states.

Stage 2

Simple random sampling was used to select two local government areas in each of the three states in the Southwest geopolitical zone. Six selected local government areas were sampled for the study, as represented in Table 2.

Stage 3

Random sampling was used to select two schools from each selected states (one school from each local government areas), as represented in Table 3.

Stage 4

Sixty-four participants were apportioned to each selected school (see Table 4).

Stage 5

Data were collected by convenience sampling from 64 participants in the communities where the schools were situated because schools were closed as part of the COVID-19 lockdown and preventive measures.

Table 2

Government Areas Selected from the Southwest Geopolitical Zone in Nigeria

Serial number	Selected state	Local government area
1	Lagos State	Mushin
		Surulere
2	Ondo State	Owo
		Akure South
3	Oyo State	Ibadan North
		Lagelu

Figure 4

Geopolitical Zones of Nigeria Depicted by Omatsone (2013)

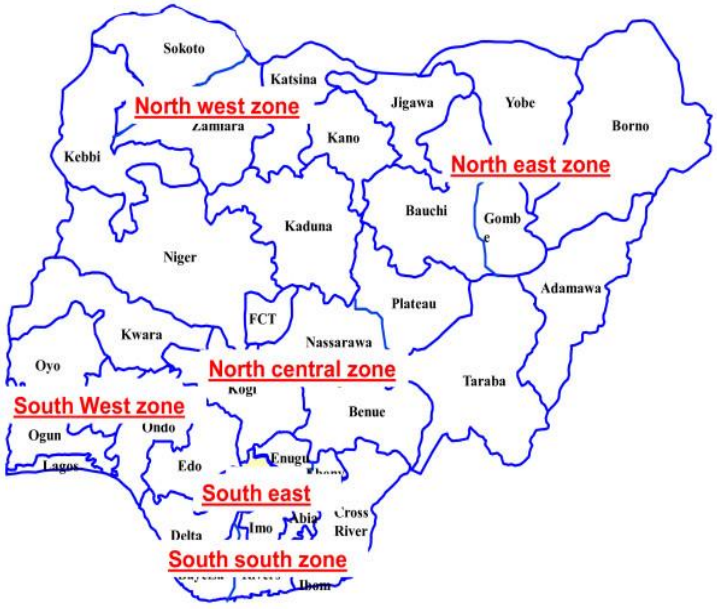


Table 3

Primary Schools from the Local Government Areas Selected for the Study

Serial number	Selected state	Local government area	Number of primary schools	Name of primary school
1	Lagos	Mushin	2	Durot Private Primary School
		Surulere	2	Surulere Nursery/Primary School
2	Ondo	Owo	2	Government Primary School, Igboroko
		Akure South	2	Subeb Model Primary School
3	Oyo	Ibadan North	2	Subuola Memorial Nursery, Primary School
		Lagelu	2	IDC Primary School

Table 4

Number of Participants from Each State

Serial Number	Selected state	Local government area	Number of parents to sample		
			Male	Female	Total
1.	Lagos	Mushin	32	32	64
		Surulere	32	32	64
2.	Ondo	Owo	32	32	64
		Akure South	32	32	64
3.	Oyo	Ibadan North	32	32	64
		Akure South	32	32	64
Total	3	6	192	192	384

Instrumentation

The instrument used for this study was a semi-structured questionnaire constructed with reference to the specific objectives of the study. The adopted model for

the study was the Social Cognitive Theory. The questionnaires were given to the parents directly by the researcher. All participants were contacted directly in their communities by the researcher. The questionnaire used was in four (4) sections. Section A was on parents' sociodemographic information. Section B was on Child's demographic information. Section C was on child's participation in physical activities while section D was on child's nutritional behavior.

Since the questionnaire for this study had not been used in previous research, it was validated within a subset of the target population. This was accomplished through pilot testing. The pilot study was a small-scale study done with a view to testing the questionnaire, research protocols, sample recruitment strategies, and other research techniques in preparation for the main study (Lancaster, Dodd & Williamson, 2004). This was conducted to identify potential problem areas and possible shortfalls in the research instruments and protocol before its implementation during the main study itself (Kraemer et al., 2006). It also tested if the questionnaire was asking the intended questions and see if the format was comprehensible to the intended participants (Hassan et al., 2006).

Pilot testing of the instrument was conducted with 38 participants, 10% of the intended study sample size, in Ogbomosho town of the South-West geopolitical zone of Nigeria. This region was chosen because this area had similar characteristics of the target population of this study. Data were collected in the same method as the primary study. Once data were collected, they were analyzed for internal consistencies and correlation amongst the respondents. The internal consistency was a measure of reliability as it checked if the responses were consistent. This was measured using the Cronbach's Alpha

(CA). The Cronbach Alpha values range from 0 – 1.0, with the standard reliability value of 0.70 adopted in the study. A value of 0.71 was obtained which was acceptable. This helped in confirming the reliability of the questionnaire. Face validity was established prior to commencement of the pilot. It involved an expert who understood the study that was conducted going through the questionnaire to ensure it captured the actual topic under investigation. The face validity process also involved an expert on questionnaire construction going through the survey to check for errors such as confusing, and leading questions. The last step in the pilot study process involved revision of the questionnaire based on the response from the participants (Collingridge, 2014).

Operationalization

This study involved one dependent variable; childhood obesity and three independent variables; parents' socioeconomic status, child's participation in physical exercise and nutrition behavior. A coding guide was developed on the categorization of socioeconomic status of parents of these children aged 6-12years. An annual income raging from less than ₦30,000.00 to ₦100,000.00 per annum, was regarded as low-socioeconomic status and annual income between ₦100,000.00 to ₦300,000.00, was regarded as mid-socioeconomic income while an annual income of above ₦300,000.00 per annum was regarded as high-socioeconomic status. Frequency count and simple percentage were used to determine the significance of the research questions and binomial and multiple regression analysis were used to check for association for each of the research hypothesis tested. Statistical Package for Social Sciences (SPSS) version 21 was used for all analyses. A level of $p<0.05$ was considered as statistically significant.

Data Analysis Plan

Statistical Package for Social Sciences (SPSS) was used for the data analysis to determine regression coefficient analysis as well as in the determination of level of significance of each research question. Bivariate and multivariate regression analyses were used to analyze the association between obesity in the primary school pupils and their parents' socioeconomic status in the Southwest geopolitical zone of Nigeria. To describe the data and association between the dependent and independent variables with respect to the pre-stated research questions and hypotheses, the following research questions below were required. The research questions and hypothesis for the study are as follows:

RQ1: Is there an association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o1: There is no association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a1: There is a significant association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

The dependent variable in the study was childhood obesity, measured by calculating the BMI of the children using their weights and heights. The independent variable was parent's socioeconomic status, categorized into low, middle, and high based on the amount of annual household income reported by the respondents. Potential confounding variables considered in the study were child's sex, child's age, parent's marital status, and state of residence. Bivariate analysis was used to explore the independent relationship between parents' socioeconomic status and childhood obesity. Multivariable analysis was used to explore the relationship between parents' socioeconomic status and obesity controlling for child sex, parents' marital status, child age, and state of residence.

RQ2: Is there an association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o2: There is no association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a2: There is a significant association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

The dependent variable in the study was childhood obesity, measured by calculating the BMI of the children using their weights and heights. The independent variable was child's physical activity, calculated by scoring the physical activity practice questions using the practice scale. Those who scored above the mean value were categorized as physically active. Potential confounding variables considered in the study were child's sex, child's age, parent's marital status, and state of residence. Bivariate analysis was used to explore the independent relationship between child physical activity and childhood obesity. Multivariable analysis was used to explore the relationship between child's physical activity and obesity controlling for child sex, parents' marital status, child age, and state of residence.

RQ3: Is there an association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o3: There is no association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a3: There is a significant association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

The dependent variable in the study was childhood obesity, measured by calculating the BMI of the children using their weights and heights. The independent variable was child nutrition behavior was calculated by scoring the questions relating to nutritional behavior. Behavior was categorized as either good or poor based on the mean score. Potential confounding variables considered in the study were child's sex, child's age, parent's marital status, and state of residence. Bivariate analysis was used to explore the independent relationship between child nutrition behavior and childhood obesity. Multivariable analysis was used to explore the relationship between child nutrition behavior and obesity controlling for child sex, parents' marital status, child age, and state of residence.

The researcher assigned a serial number to each copy of the questionnaire for easy identification. For each Research question, frequencies of all variables in the study were calculated with 95% confidence intervals to describe the sample. The relationship between each independent variable of interest and the outcome was determined using bivariate analysis at a significance cut off $p<0.05$. Multivariable regression was conducted to explore the relationship between each independent variable of interest with the outcome variable adjusting for potential associated confounders.

Threats to Validity

Respondents' fear from religious belief for participating in the study, and possible inability to generalize the findings of the study due to cross-sectional design adopted for the study, seemed to negate the purpose of the study which was to explore the association between parental socioeconomic status and childhood obesity in the Southwest

geopolitical zone of Nigeria. However, it was hoped that parents' knowledge about childhood obesity and how to reduce such occurrence were improved upon. To encourage parents to participate in the study against fear of religious, any of the pre-selected six local government area for the study was substituted with any nearby local government area in the same state with the same characteristics. Any primary school pupil whose parents refuse to participate in the study was substituted with the available participant in the community.

Ethical Considerations

Formal approval was obtained from all the participants. The study followed the standard ethical principles of the Declaration of Helsinki (1932) guiding the use of human participants in any research. Hence, respect for participants, voluntariness to participate and likely benefits of participating was fully provided in detail. Informed consent was obtained after provision of adequate, clear, and complete information about what the study entailed. Also, non-maleficence which refers to the deliberate conscious act of a researcher, not to expose the participants to any risk or injury during the execution of the study was duly considered. Prior to the study, an informed consent form was obtained from the participants with a clear statement on the objective of the study and voluntary nature of the study. Importantly, the participants were assured that their responses will be kept confidential, as there were no individual identifiers in the recorded data as well as on the instrument. The information related to the study was contained in a computer system, password-protected and accessible to the invigilator only.

Summary

The methods and procedures used on the collection and analysis of the data were comprehensively treated as stated**.** Frequencies were calculated with 95% confidence intervals to describe the sample. Bivariate analyses were conducted to explore the relationships between each exposure of interest with the outcome variable, and multivariate regression was conducted to explore the relationship between the exposure of interest and the outcome adjusting for potential confounders.

The research instrument was a questionnaire with four sections, which were distributed and administered to the 384 consenting participants in the Southwest geopolitical zone of Nigeria. Anthropometric measurements of pupils were reported by their parents and were used to calculate the Body Mass Index percentiles. Necessary inputs for computing BMI percentile included age of pupil, gender, height, and weight. Body mass index (BMI) percentiles were calculated using available BMI calculator. Interpretation of BMI percentile included the following: ≥95th percentile (obese), 85th to 95th percentile (overweight), 85th to 5th percentile (normal weight), and ≤5th percentile (underweight). The primary school children of age 6-12 years were categorized into four groups: underweight (<5th percentile), normal (>5thpercentile, <85thpercentile), overweight (≥85th percentile) and obese (>95th percentile) using sex and age specific percentiles of BMI. Chapter four discussed the results of the data collected in a chronological order as stated on the research instrument and as filled by the respondents. Thereafter, analyzed findings from chapter four are extensively discussed in chapter five under the following sub-headings, interpretation of findings, limitation of study,

recommendations, implications of findings for health promotion and education, and conclusion.

Chapter 4: Results

The purpose of this study was to explore the association between the socioeconomic status of parents and the weight status of their children in the Southwest geopolitical zone of Nigeria. Several studies in Nigeria indicated that childhood obesity is a major public health challenge in children age 6–12 years with a prevalence of up to 2.8% (Nnoka et al., 2016). This has been attributed to the eroding culture of engaging in physical activities among this group of children and the paucity of parental awareness of the predisposing factors and how to prevent or mitigate them in Nigeria (Chukwunonso, 2014). This study was intended to contribute to the literature and fill the gap regarding the association between parents' socioeconomic status and obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria. This study included three research questions with corresponding hypotheses.

RQ1: Is there an association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o1: There is no association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a1: There is a significant association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood

obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

RQ2: Is there an association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o2: There is no association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a2: There is a significant association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

RQ3: Is there an association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o3: There is no association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a3: There is a significant association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

This chapter presents the results of the study, which comprised simple descriptive statistics such as percentages, median, and standard deviation to describe all study participants, as summarized in tables and figures. Bivariate and multiple logistic regression were used to answer Research Questions 1–3. The statistical findings are organized and presented in relation to each research question and its corresponding hypotheses.

Pilot Study

Prior to the main study, a pilot study (pretest) was done among 38 respondents to test the reliability of the instrument. This was carried out in Osogbo in Osun State, a similar location to the place where the main study was carried out, and also in the Southwest geopolitical zone. The Cronbach's alpha coefficient was used to determine the reliability of the instrument. In this technique, a minimum coefficient score of 0.5 indicated that the instrument was reliable to some extent. The higher the coefficient score (i.e., as it approaches 1), the more reliable it was. In the study, the Cronbach's alpha coefficient score obtained was 0.75, indicating the instrument was reliable. No change was made to the questionnaire after the pilot study.

Data Collection

The data collection took a period of 3 weeks. The data were collected from 384 respondents from Oyo, Ondo, and Lagos State, Nigeria. The data were collected electronically using a questionnaire through Google Forms and the Kobo Collect app. Due to the COVID-19 pandemic, primary schools that were proposed to be recruitment points for respondents were closed. The data were therefore collected from respondents at their residence. This was done in compliance with COVID-19 guidelines involving social distancing, sanitizing before and after every encounter, and appropriately masking.

The parents of primary school children age 6–12 years were interviewed. Respondents who could use the technology responded using a Google Form, while the data from those who did not have access to the internet were collected using the Kobo Collect app. Data collected through the app were interviewer administered. The respondents were asked questions, and their answers were inserted. Data were collected from 384 participants with mothers being the majority (75.5%) of the respondents. Slightly more than half (54.7%) of the respondents had low family income. Children between ages 6 and 8 years (44.3%) were the largest age group, and most of the children had normal weight (77.3%). The sex ratio was fairly similar with 53.4% females and 46.6% males.

Results

Sociodemographic Characteristics

A total of 384 parents of primary school children aged 6–12 years participated in this study. The mean age of the parents was 38.73 ± 7.15 with the largest distribution

among the 30–39 age group (47.1%), followed by the 40–49 age group (37.8%). Most of the respondents were female (75.5%), in this case the mother of the children. The results also showed that most of the respondents were married (84.1%). More than half of the respondents had an annual household income of less than #100,000 (54.7%), while those with an income level higher than #300,000 were 19.3% (see Table 5).

Table 5

*Sociodemographic Characteristics of Parents (*N*=384)*

Demographic characteristic	*N* (%)	95% CI
Parent's age*		
21–29	31 (8.1)	5.2-11.0
30–39	181 (47.1)	42.3-52.5
40–49	145 (37.8)	32.6-42.6
50+	27 (7.0)	4.7-9.7
Parent's sex		
Female	290 (75.5)	71.0-79.6
Male	94 (24.5)	20.4-29.0
Marital status		
Single	28 (7.3)	5.0-9.9
Married	323 (84.1)	80.4-87.7
Others[+]	33 (8.6)	5.7-12.0
Household income		
less than #100,000	210 (54.7)	49.9-79.6
#100,000 - #300,000	100 (38.4)	21.4-40.5
Over #300,000	74 (19.3)	15.7-23.5

***$\bar{x}$ = 38.73 ± 7.15
[+]Divorced, separated, widowed

Children's ages ranged between 6 and 12 years with a mean of 8.88 ± 2.06. Children were 53.3% female and 46.8% male. Most (77.3%) of them had normal weight while only 4.9% were obese (see Table 6).

Table 6

*Demographic Characteristics of Children (*N*=384)*

Demographic Characteristic	*N* (%)	95 % CI
Child's age*		
6-8	170 (44.3)	39.1-49.5
9-10	113 (29.4)	25.0-34.1
11-12	101 (26.3)	22.1-30.7
Child's sex		
Female	205 (53.4)	48.3-58.5
Male	179 (46.6)	41.5-51.7
BMI		
Underweight	18 (4.7)	2.9-6.8
Normal weight	297 (77.3)	73.4-81.7
Overweight	50 (13.0)	9.9-16.4
Obese	19 (4.9)	2.6-7.0

***$\bar{x}$ = 8.88 ± 2.06

Parents' Socioeconomic Status and Childhood Obesity

RQ1: Is there an association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o1: There is no association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a1: There is a significant association between parents' socioeconomic status, as measured by the annual household income reported by the respondents, and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

Bivariate Analysis

A binomial logistic regression was conducted to determine the association between parents' socioeconomic status, as measured by family income reported by respondents, and childhood obesity in the population studied. The results showed that there was a significant association between the two variables. Primary school children aged 6–12 years with parents in the middle socioeconomic class were 1.9 times more likely to be obese than those in the low socioeconomic class. Also, children with parents in the high socioeconomic class were 2.1 times more likely to be obese than those in the low socioeconomic class (see Table 7).

Table 7

Bivariate Regression Analysis for Parent Income with Weight Status

Characteristics	Overweight v. Healthy Weight
	Unadjusted OR (95% CI)
Parent income	
Low	1.00[b]
Middle	1.9 (1.1-3.6)*
High	2.1 (1.1-4.1)*

N=384
1.00[b]: reference variable
*p<.05 **p<.01 ***p<.0001

Multivariate Analysis

Further analysis was carried out to adjust for potential confounders using the demographic characteristics as covariates. A statistically significant association was recorded between the variables. Primary school children ages 6-12 years with parents in the high socio-economic class were 2.4 times more likely to have childhood obesity compared with those in the low socio-economic class adjusting for confounders. There was no statistically significant relationship between children with parents in the middle socio-economic class and their obesity level when confounders were adjusted for. Therefore, the null hypothesis (H_{O1}) for this research question was rejected (see Table 8).

Table 8

Multivariate Analysis for Parents' Socioeconomic Status with Weight Status Adjusting for Confounders

Characteristic	Overweight v. healthy weight
	Adjusted OR (95% CI)
Parents socioeconomic status	
Low	1.00[b]
Middle	1.6 (0.8-3.2)
High	2.4 (1.1-5.1)*
Child sex	
Female	0.7 (0.4-1.2)
Male	1.00[b]
Marital status	
Married	1.8 (0.7-4.7)
Others	1.00[b]
Child Age	
6-8 years	1.00[b]
9-10 years	4.1 (1.9-8.7) ***
11-12 years	5.7 (2.6-12.2) ***
State of residence	
Oyo	1.00[b]
Lagos	3.2 (1.5-6.9) **
Ondo	5.0 (2.2-11.0) ***

N=384

1.00[b]: reference variable

*$p < .05$ **$p < .01$ ***$p < .0001$

Child's Participation in Physical Activity and Childhood Obesity

RQ2: Is there an association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o2: There is no association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children age 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a2: There is a significant association between participation in physical exercise, as measured by the number of days the children were physically active and number of hours of inactivity (watching TV), and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

Children's participation in physical activity was measured as the number of days the child was physically active for a total of at least 60 minutes per day 7 days prior to the data collection. Nearly 60% of the parents reported that their children were physically active for at least 60 minutes every day of the week (59.4%) while 13.8% were active for at least 60 minutes for 6 days during the week. The respondents also reported the number of hours the children spent watching TV on an average day. Slightly above one-third (35.8%) reported that their children watched TV for 5 or more hours per day, followed by those who watched for 4 hours (19.8%) and 3 hours (13.3%) on an average day respectively (see Table 9).

Table 9

*Child Participation in Physical Activity in the Past 7 Days (*N = *384)*

Child participation in physical activity	*n* (%)	95 % CI
Physical activity participation		
<5 days per week	43 (11.2)	9.3-16.7
5-6 days per week	83 (21.6)	18.9-28.5
7 days	228 (59.4)	57.9-68.4
I don't know / I'm not sure	30 (7.8)	5.6-8.6
Number of hours of TV watched		
Less than 3 hours per day	76 (19.8)	16.1-25.4
3-4 hours per day	131 (34.1)	33.4-44.0
5 or more hours per day	136 (35.4)	35.3-46.1

Bivariate Analysis

The hypothesis test if physical exercise has an impact on childhood obesity. The dependent variable child obesity was regressed on predicting variable physical activity to test the hypothesis H_{02}. Physical activity did not significantly predict childhood obesity, which indicates that the physical activity does not play a significant role in shaping childhood obesity among the respondents ($\beta=1.4$, $p>0.05$). Table 10 shows the summary of the findings (see Table 10).

Table 10

Bivariate Regression Analysis for Physical Exercise with Weight Status

Characteristic	Overweight v. healthy weight
	Unadjusted OR (95% CI)

Physical exercise	
Physically active	1.00[b]
Not physically active	1.4 (0.8-2.5)

N = 384
1.00[b]: reference variable
**p* < .05 ***p* < .01 ****p* < .0001

Multivariate Analysis

In order to answer the research question, further analysis was carried out to adjust for potential confounders by conducting a binomial logistic regression using physical exercise and the demographic characteristics as covariates. There was not a statistically significant association between physical exercise and weight status after adjusting for potential cofounders. We therefore fail to reject the null hypotheses (H_{02}) (see Table 11).

Table 11

*Multivariate Analysis for Physical Exercise With Weight Status Adjusting for Confounders (*N = *384)*

Characteristic	Overweight v. healthy weight
	Adjusted OR (95% CI)
Physical exercise	
Physically active	0.7 (0.4-1.3)
Not physically active	1.00[b]
Child sex	
Female	0.7 (0.4-1.3)
Male	1.00[b]
Marital status	
Married	2.1 (0.7-6.1)
Others	1.00[b]
Child age	
6-8 years	1.00[b]
9-10 years	3.5 (1.5-8.1)**
11-12 years	5.3 (2.3-12.2)***
State of residence	
Oyo	1.00[b]
Lagos	2.9 (1.4-6.7)**
Ondo	3.4 (1.5-7.6)**

1.00[b]: reference variable

*$p < .05$ **$p < .01$ ***$p < .0001$

Child Nutrition Behaviors and Childhood Obesity

RQ3: Is there an association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_o3: There is no association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

H_a3: There is a significant association between nutrition behavior, as measured by the intake of breakfast, fruits, vegetables, potatoes, soda drinks, and eating from restaurants, and childhood obesity in children aged 6–12 years in the Southwest geopolitical zone of Nigeria, adjusting for potential confounders.

The nutritional behavior of the respondents is presented in table 12. The scores were used to compute the nutritional behavior of the child. Total scores were then grouped as poor or good (See practice scale for more details). From the results, the majority of the children ate breakfast all through the previous week (70.8%). Half (50.0%) reportedly ate fruit 1 to 3 times within the past week, 20.8% ate fruit 4 to 6 times while 13.3% did not eat any fruit 7 days prior to the study.

It was also found that more than half (57.8%) of the children reportedly ate vegetables 1 to 3 times followed by about a quarter (23.7%) who ate vegetables for 4 to 6 times and 13% who did not eat vegetables at all within the past 7 days. The frequency of

potatoes intake by the children a week prior to the study reported that 36.2% of them ate potatoes 1 to 3 times, 36.5% ate it 4 to 6 times while 13.5% of the parents did keep a track of their children's intake of potatoes.

The intake of soda drinks by the children showed that slightly above half (52.6%) of them drank soda drinks 1 to 3 times the past week, 21.1% drank soda drinks 4 to 6 times while 15.1% did not take soda drinks a week before the study. The frequency at which the children ate from a restaurant 7 days before the research revealed that more than half (59.9%) of the parents reported that their wards did not eat from the restaurant while 26.8% of the children ate at restaurants 1 to 3 in the previous week (see Table 12).

Table 12

Children's Nutrition Behavior Within the Past 7 Days

Characteristic	*N* (%)	95 % CI
Breakfast intake in the past 7 days		
< 4 days per week	22 (5.6)	4.8-10.6
4-6 days per week	89 (23.1)	19.5-28.3
7 days per week	272 (70.8)	63.1-73.7
I don't know / I'm not sure	1 (0.3)	0.0-0.8
Fruit intake in the past 7 days		
Child didn't eat fruits	51 (13.3)	10.4-17.0
1 to 3 servings per week	192 (50.0)	43.4-53.6
4 to 6 servings per week	80 (20.8)	17.6-25.8
One or more servings daily	38 (7.3)	12.4-20.1
I don't know / I'm not sure	23 (6.0)	3.4-8.6
Vegetable intake in the past 7 days		
Child didn't eat vegetables	50 (13.0)	8.8-15.7
1 to 3 servings per week	222 (57.8)	53.6-63.5
4 to 6 servings per week	91 (23.7)	20.9-29.4
One or more servings daily	12 (2.8)	2.5-6.6
I don't know / I'm not sure	10 (2.6)	1.0-4.2
Potato intake in the past 7 days		
Child didn't eat potatoes	140 (36.5)	33.0-42.9
1 to 3 servings per week	139 (36.2)	32.4-42.3
> 3 servings a week	53 (14.0)	20.1-29.1
I don't know / I'm not sure	52 (13.5)	10.4-17.2
Soda consumption in the past 7 days		
Child didn't take soda drink	58 (15.1)	12.1-19.8
1 to 3 servings per week	202 (52.6)	46.7-56.6

4 to 6 servings per week	81 (21.1)	17.6-25.8
One or more servings daily	17 (4.5)	7.7-13.7
I don't know / I'm not sure	26 (6.8)	4.2-9.4
Number of times child ate at a restaurant		
Child didn't eat at a restaurant	230 (59.9)	58.5-67.9
1 to 3 times	103 (26.8)	23.6-33.0
More than 4 times	31 (8.1)	5.5-11.5
I don't know / I'm not sure	20 (5.22)	3.1-7.6

*$\bar{x}$ = 15.57 ± 2.74

Figure 5

Child Nutritional Behavior in the Past Week

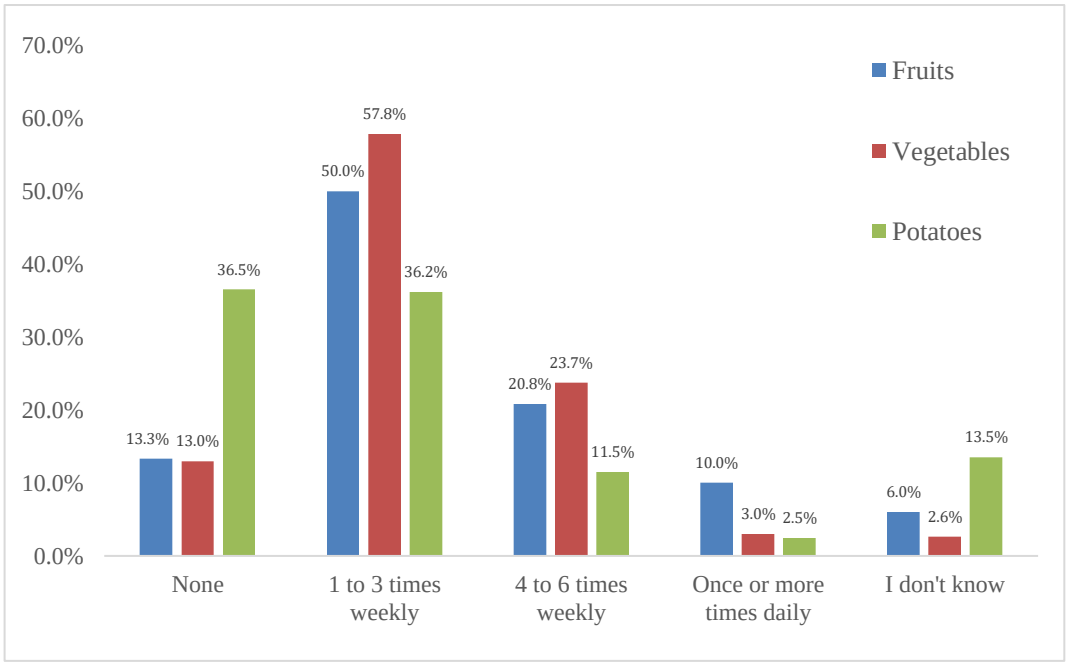
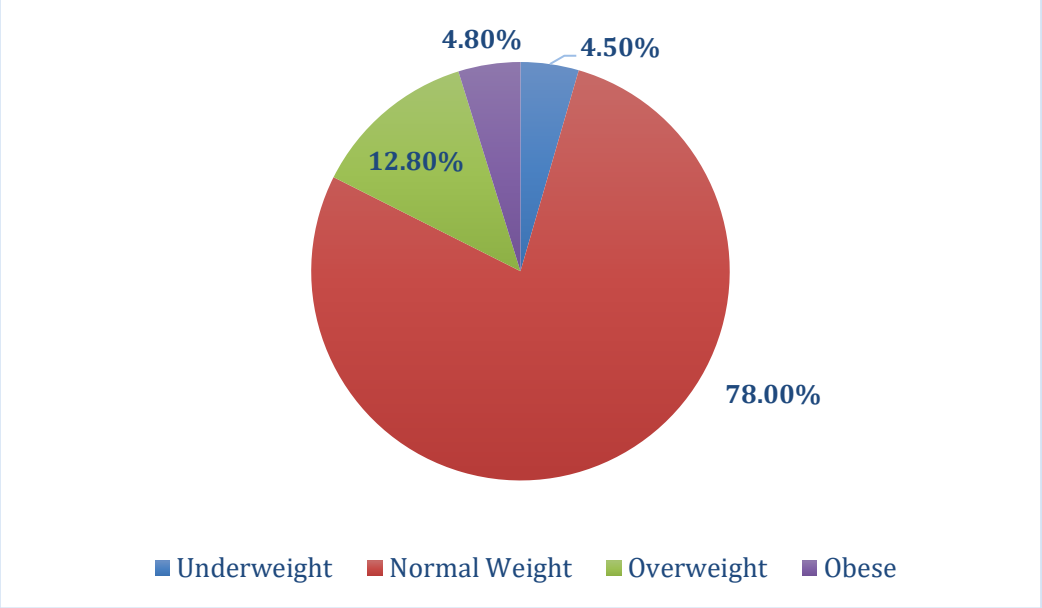


Figure 6

BMI Categories of Children in the Study



Bivariate Analysis

A bivariate analysis was conducted to determine if nutritional behavior had an impact on childhood obesity. As a result, there was not a significant association between nutrition behavior and weight status (β=1.4, p>0.05). Table 13 shows the summary of the findings.

Table 13

Bivariate Regression Analysis for Nutritional Behavior with Weight Status

Characteristic	Overweight v. healthy weight
	Unadjusted OR (95% CI)
Nutritional behavior	
Poor nutritional behavior	1.00[b]
Good nutritional behavior	1.4 (0.8-2.7)

N = 384
1.00[b]: reference variable
*$p < .05$ **$p < .01$ ***$p < .0001$

Multivariate Analysis

In order to answer the research question, further analysis was conducted to test the hypothesis using the overall nutritional behavior of the children with added covariates to the model to adjust for potential confounders. The variables child age and state of residence were found to be statically significant factors at a standard p-value, p<0.05. However, there was no statistically significant association between nutritional behavior and childhood obesity after adjusting for potential cofounders. We therefore fail to reject the null hypotheses (H_{03}) (see Table 14).

Table 14

*Multivariate Analysis for Nutritional Behavior with Weight Status Adjusting for Confounders (*N = *384)*

Characteristic	Overweight v. healthy weight
	Adjusted OR (95% CI)
Nutritional behavior	
Poor nutritional behavior	1.00[b]
Good nutritional behavior	1.3 (0.6-2.6)
Child sex	
Female	1.00[b]
Male	2.3 (1.1-4.7)
Marital status	
Married	3.9 (1.0-15.3)
Others	1.00[b]
Child age	
6-8 years	1.00[b]
9-10 years	5.4 (2.1-13.5) ***
11-12 years	8.1 (3.2-20.9) ***
State of residence	
Oyo	1.00[b]
Lagos	4.7 (1.9-11.6) **
Ondo	5.4 (2.3-12.9) ***

N = 384
1.00[b]: reference variable
*$p < .05$ **$p < .01$ ***$p < .0001$

Summary

Chapter 4 was a presentation of the data analysis and the results of the research study. The majority (78%) of the primary school were within the normal percentile of BMI range. children aged 6 to 12. In the data collected and analyzed, the results of the variable frequencies in relation to the parent's socio-economic status, child's physical activity and nutritional behavior were presented.

The analysis and results of this chapter provided valuable information in answering the research questions. After evaluating the analyses of the three hypotheses, there were no significant associations between physical exercise and childhood obesity; and nutritional behavior and childhood obesity after potential confounders were adjusted for. The binomial logistic regression however showed child age, child sex, breakfast intake and parent's socioeconomic status were significant factors relating to childhood obesity.

Chapter 5 is a presentation of the interpretation of the findings, limitations, and strengths of the study. In addition, the chapter also includes conclusions and recommendations for further study. An explanation of implications of the findings and study's potential impact on positive social change is also provided.

Chapter 5: Discussion, Conclusions, and Recommendations

The research was a cross-sectional study carried out to assess the association between the socioeconomic status of parents and obesity among children aged 6–12 years. Statistical analyses were used to investigate whether gender, age, nutrition, physical activity, and other related sociodemographic characteristics were predictors of obesity outcomes among the respondents. Several factors including parental characteristics and demographics interact to influence childhood obesity risk. The participants included a sample of parents of children aged 6–12 years in Southwest geopolitical zone of Nigeria. Results indicated a significant association between parents' socioeconomic status and childhood obesity. However, there was no significant association between weight status in relation to the child's participation in physical activity and nutritional behavior. A significant association was found between childhood obesity and some social characteristics such as child's sex, child's age, child's breakfast intake, and parents' socioeconomic status from the bivariate analyses. Results of multiple logistic regression indicated that age was significantly associated with childhood obesity after adjusting for potential confounders. There was no significant association between physical activity or nutritional behavior and childhood obesity after adjusting for potential confounders.

Interpretation of the Findings

Various factors including parental behavioral characteristics and demographics may interact to influence the risk of childhood obesity (Adetunji et al., 2019; Bognon et al., 2018). Some of the significant associations observed between social characteristics

and childhood obesity in the current study were similar to previous research findings. However, there were also some differences regarding nutritional behavior and physical activity compared to other studies.

Childhood Obesity Prevalence

A higher prevalence of overweight among children has been found in developing countries. In the current study, 13.0% of the respondents were overweight and 4.9% were obese. This prevalence was slightly higher than that of previous research carried out among similar populations. A recent study carried out in Lagos, Southwest Nigeria indicated a prevalence of 8.9% obesity and 6.6% overweight among children aged 6–13 years (Adeniyi et al., 2019). The prevalence of overweight and obesity was 7.3% and 3.1% respectively among children aged 6–12 years in Ilorin, North-Central Nigeria (Bello, 2018). Previous research, however, indicated a lower level of overweight. A narrative review article on the prevalence of child obesity in Nigeria from 1983 to 2013 indicated an average prevalence of 0.0%–5.8% and 5%–12% of overweight and obesity, respectively (Ejike, 2014). The trend of recent results showed an increase in obesity and overweight among children in Nigeria although a higher prevalence was found among children in Lagos.

The occurrence of childhood obesity was not attributed to only Nigeria; other West African countries like Benin have reported it in recent studies. Research among primary school children in Porto-Novo/Benin indicated a prevalence of 8.6% overweight and 2.1% for obesity (Bognon et al., 2018). Also, in a study carried out among primary students in midwestern Nigeria, Adetunji et al. (2019) found that 4.9% of the respondents

had overweight and obesity. Although I engaged a similar population from the same region, the results showed a higher prevalence of overweight and obesity. This could have been the result of the global increase in the prevalence of childhood obesity, which has been influenced by nutrition and physical activity.

Factors Associated with Childhood Obesity

There are various factors associated with excess weight and obesity in children. In the current study, overweight and obesity were significantly associated in the bivariate analysis with males who were 1.2 times more likely to be overweight or obese compared to females. This result varied from that of a previous study among a similar population, which indicated that females were 2.42 times more likely to be overweight or obese (Adetunji et al., 2019).

From the results of multivariate logistic regression in a previous study, gender, school type, and family socioeconomic status were associated with child overweight and obesity (Bello, 2018). In a study carried out among primary school pupils in semiurban areas of midwestern Nigeria, overweight and obesity were found to be significantly associated with females, attendance at private schools, and higher socioeconomic status families (Adetunji et al., 2019). Bognon et al. (2018) reported parents' high socioeconomic status, children's daily snacking of sweet cakes, and children's high number of hours spent watching television or video games as significant factors. In the current study, the results indicated age as a factor significantly associated with childhood obesity.

Association Between Parent Socioeconomic Status and Childhood Obesity

From the bivariate analysis in the current study, children from middle and high socioeconomic status were roughly 2 times more likely to be obese than those in the low socioeconomic status. Comparable results were reported in a study among a similar population in western Nigeria. Those who went to private school were 3.3 times more likely to be obese compared to those who went to other types of school (Adetunji et al., 2019). Those from higher socioeconomic status families were 2.3 times more likely to be obese compared to those from lower socioeconomic families, while those who had television in their bedrooms were 2.2 times more likely to be obese compared to those who did not (Adetunji et al., 2019).

In a study carried out among children in Gombe in Nigeria, Alkali et al. (2015) found that overweight and obesity were more prevalent in children whose parents belonged to the middle and upper socioeconomic class. These children had televisions and computers in their rooms and were driven to school (Alkali et al., 2015). This is the opposite of research results from developed nations in which overweight and obesity were more prevalent in children of the lower socioeconomic class. The higher prevalence of obesity can be linked with some sedentary behaviors associated with a high socioeconomic level in developing countries, such as access to personal television, phones, computers, and other electronics that increase a sedentary lifestyle among the children (Alkali et al., 2015). Also, children tend to attend private schools, which often have school buses and therefore reduce walk time for children (Adetunji et al., 2019).

From the unadjusted odds ratio of the current study, children from middle- and high-income homes were about 2 times more likely to be obese than those from low-income homes. However, there was no significance after adjusting for cofounders. This indicates that there are other factors influencing childhood obesity among this study population.

Association Between Physical Activity and Childhood Obesity

Physical activity level in the current study was determined by the reported frequency of participation in physical exercise and the number of hours of TV watching during an average day. Physical activity was measured this way because today's children spend many hours participating in sedentary activities (Adetunji et al., 2019). More than half of the respondents in this study (59.4%) were reported to be physically active every day of the week. The numbers of hours of TV watching on average varied, with 35.4% of the sample watching more than 5 hours per day. From the results of the binomial logistic regression, the variables were not statistically significant. This is a nonconventional result when it comes to the association between physical activity and childhood obesity. Previous research had shown that participation in physical activity lowers the risk of obesity (Hong et al., 2016; Li et al., 2020).

Association Between Nutrition Behavior and Childhood Obesity

Many developing countries, including Nigeria, are in a state of nutritional transition from prevalent undernutrition to the emergent problem of overweight and obesity (Senbanjo & Oshikoya, 2012). In the bivariate analysis in the current study, those who did not eat breakfast were 2.6 times more likely to be overweight or obese compared

to those who ate breakfast. Skipping breakfast increases the probability of children eating junk food such as snacks and drinks high in sugar, which are directly linked to obesity (Keller & Bucher Della Torre, 2015). However, the overall nutrition behavior of respondents in the current study was not associated with their weight despite the report of several studies on the dependence of childhood obesity on nutrition.

Limitations of the Study

Accurate measurement of variables can limit a research outcome. The obesity measurements used in the current study were self-reported by the parents or guardians of the children. Generally, there is not one measurement tool that perfectly captures physical activity and sedentary behaviors of children (Loprinzi & Cardinal, 2011). Self-reported measures of physical activity are commonly used in epidemiological research because they are relatively simple to administer, inexpensive, and have the ability to provide information on the type and context of physical activity in a large sample of individuals (Loprinzi & Cardinal, 2011).

Self-report measurements generally give a low validity coefficient when measuring children's physical activity (Prince et al., 2020). The data collected were based on responses recalled and provided by the respondents, and analysis was based on these reported data. These data were susceptible to recall bias. This was observed in some responses in which parents could not recall their children's food intake 7 days prior to the data collection. Getting accurate data such as weight, height, nutrition pattern, and level of physical activity from minors can be challenging, and this was a study limitation.

Recommendations

Some of the limitations encountered during this study could be addressed when future research is being carried out. These limitations include the use of a device for more accurate documentation of the physical activity level of the children, expansion of the variables used in the instrument for the exploration of the research questions, and alternative data collection techniques. The use of accelerometers to measure children's activity level could be done instead of reports from parents/guardians. This would enable the collection of real-time data from the children, which would be more comprehensive and reliable compared to recall of activity level by their parents or guardians.

Researchers can include additional variables in the instrument used to establish parents' socioeconomic status. There are other factors that can influence the socioeconomic status of individuals besides their monthly income, which was used in the current study. These factors can include ownership of other material resources that have a direct or indirect impact on the physical activity level and nutrition of their children or wards. For example, questions could address ownership of cars or household appliances, children's access to electronics, use of a school bus, distance from home to school, source of water, and other living conditions. This could help in identifying other factors influencing childhood obesity as well as in the accurate measurement of physical activity.

Regarding the data collection technique, further research can be done to investigate the nutritional behavior and physical activity of children on a 24-hour basis instead of the 7-day recall methods used in the current study. Some of the respondents had difficulty recalling their child's feeding pattern 7 days before the study, especially

regarding the intake of fruits, potatoes, and soda drinks. The 24-hour method would reduce recall bias if the data were collected from the parents/guardians. To make the data collection on the 24-hour basis feasible, the data collection could be done in schools where parents/guardians come daily. Further research could be carried out to investigate the reasons for the association between age and weight status in children. The research questions could focus on behavioral changes associated with differences in weight status by age.

Implications

The social change implications of the findings from this study include suggestions for altering cultural values, behaviors, and norms of parents and caregivers as well as school authorities' requirements relating to physical activity and other healthy living practices. This study identified age as one of the factors significantly associated with childhood obesity. Implications for positive social change may originate from an increased understanding of the potential influence of age on childhood obesity outcomes among children in Southwest Nigeria. The increased knowledge of risk factors may lead to opportunities for parents, guardians, school authorities, and other child health experts to enhance childhood obesity prevention efforts with the development of policies, programming, or education. These added prevention efforts may include education to increase parents' awareness of childhood obesity risk factors and promote healthy behaviors at the individual family level.

Policies may direct efforts toward reducing childhood obesity prevalence within the larger community, or programming in schools or through child community

organizations that target risk factors associated with child obesity. The use of communication to promote changes in knowledge, attitudes, norms, beliefs, and behaviors could be targeted at parents of high socioeconomic class whose children are more likely to be overweight or obese. To promote positive behaviors, public health interventions such as communication strategies and messages that are appropriate to this setting could be implemented. This is rarely done in this region, and continuous provision of relevant information could lead to behavioral change. The findings from this study could also be used to inform age-related interventions on the importance of childhood obesity. This could lead to an improved childhood obesity prevention effort and a reduction in the prevalence of childhood obesity.

Conclusion

Obesity among children has become a concern because the long-term risks are immense. Excess calorie intake, the constant intake of low-quality foods, decreased physical activity, and poor adherence to healthy behaviors are risk factors associated with obesity (Abduelkarem et al., 2020; Danquah et al., 2020). Findings from the current study provided insight into the factors influencing childhood obesity among children aged 6–12 years in Southwest Nigeria. Initial bivariate analyses showed significant association between sex, child's age, parents' socioeconomic status, and childhood obesity. However, results from multivariate analyses revealed that several of the previously observed significant associations disappeared.

In the final model, children's age was a significant factor associated with childhood obesity. Nutrition, parent's socioeconomic status, and physical activity were

not found to be significantly associated with childhood obesity among the respondents in this study. These findings differed from previous literature. Further studies can be carried out to understand the association between age and childhood obesity. Research can also be carried out to address the study's limitations. Results from this study could guide the development of age-specific obesity prevention programming that could lead to positive childhood obesity outcomes for this population.

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Appendix A: Questionnaire

Association Between Parental Socioeconomic Status and Childhood Obesity in the Southwest **Geopolitical Zone of Nigeria**

The purpose of this questionnaire is to further understand how socioeconomic status, physical activity behavior, and nutrition knowledge are connected to childhood obesity in the Southwest geopolitical Zone of Nigeria.

The questions asked below are to be answered by the parents of children aged 6-12 years old in this region. Please answer questions accurately and to the best of your knowledge.

A. Parent Socio-Demographic Information

1. What is your sex:

a. Male ( )

b. Female ( )

2. What is your age: _____

3. What is your current marital status:

a. Single
b. Married ( )
c. Divorced ( )
d. Separated ( )
e. Widowed ( )

4. What is your annual household income?

a. less than #30,000 ( )
b. #30,000 - #50,000 ( )
c. #50,000 - #100,000 ( )
d. #100,000 - #200,000 ( )
e. #200,000 - #300,000 ( )
f. #300,000 - #500,000 ( )
g. Over #500,000 ( )

 # Stands for Naira, the unit of Nigerian currency.

B. Child's Demographic Information

5. Gender of ward:

a. Male ( )

b. Female ( )

6. Age of ward: _____

7. Weight (in kg) of ward: _____

8. Height (in meters) of ward: _____

C. Child Participation in Physical Activities

9. During the past 7 days, on how many days was your child physically active for a total of at least 60 minutes per day?

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days
I. I don't know / I'm not sure

10. On an average day, how many hours of TV does your child watch?

A. My child does not watch TV on an average day
B. Less than 1 hour per day
C. 1 hour per day
D. 2 hours per day
E. 3 hours per day
F. 4 hours per day
G. 5 or more hours per day
H. I don't know / I'm not sure

E. Child Nutrition Behavior

11. During the past 7 days, how many mornings did your child eat breakfast?

A. 0 days
B. 1 day
C. 2 days
D. 3 days
E. 4 days
F. 5 days
G. 6 days
H. 7 days
I. I don't know / I'm not sure

12. During the past 7 days, how many times did your child eat fruit? (Do not count fruit juice.)
A. My child did not eat fruit during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day
H. I don't know / I'm not sure

13. During the past 7 days, how many times did your child eat vegetables? (raw or cooked)
A. My child did not eat vegetables during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day
H. I don't know / I'm not sure

14. During the past 7 days, how many times did your child eat potatoes? (Do not count French fries, fried potatoes, or potato chips.)

A. My child did not eat potatoes during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day

F. 3 times per day
G. 4 or more times per day
H. I don't know / I'm not sure

15. During the past 7 days, how many times did your child drink a can, bottle, or glass of soda, such as Coke, Pepsi, or Sprite? (Do not count diet soda)
A. My child did not drink soda during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. 1 time per day
E. 2 times per day
F. 3 times per day
G. 4 or more times per day
H. I don't know / I'm not sure

16. During the past 7 days, how many times did your child eat at a restaurant?
A. My child did not eat at a restaurant during the past 7 days
B. 1 to 3 times during the past 7 days
C. 4 to 6 times during the past 7 days
D. More than 6 times during the past 7 days
E. I don't know / I'm not sure

Appendix B: Practice Scale

S/N	Child Participation in Physical Activity	Score
1	**Number of days child was physically active for at least 60 minutes per day**	
	0 days	0
	1 day	1
	2 days	2
	3 days	3
	4 days	4
	5 days	5
	6 days	6
	7 days	7
	I don't know / I'm not sure	0
2	**Number of hours child watches TV on an average day**	
	None	6
	Less than 1 hour	5
	1 hour per day	4
	2 hours per day	3
	3 hours per day	2
	4 hours per day	1
	5 hours per day	0
	I don't know / I'm not sure	0
	Maximum Score	**13**

POINTS	EVALUATION	CODE
< 8	Inactive	1
≥ 8	Active	2

S/N	Child Nutritional Behavior	Score
1	**Eating of Breakfast within the past week**	
	0 days	0
	1 day	1
	2 days	2
	3 days	3
	4 days	4
	5 days	5
	6 days	6
	7 days	7
	I don't know / I'm not sure	99
2	**Eating of Fruits within the past week**	
	My child did not eat fruit during the past 7 days	0
	1 to 3 times during the past 7 days	1
	4 to 6 times during the past 7 days	2
	1 time per day	3
	2 times per day	4
	3 times per day	5
	4 or more times per day	6
	I don't know / I'm not sure	99
3	**Eating of Vegetables within the past week**	
	My child did not eat vegetables during the past 7 days	0
	1 to 3 times during the past 7 days	1
	4 to 6 times during the past 7 days	2
	1 time per day	3
	2 times per day	4
	3 times per day	5
	4 or more times per day	6
	I don't know / I'm not sure	99
4	**Eating of Potatoes within the past week**	
	My child did not eat potatoes during the past 7 days	0
	1 to 3 times during the past 7 days	1
	4 to 6 times during the past 7 days	2
	1 time per day	3

	2 times per day	4
	3 times per day	5
	4 or more times per day	6
	I don't know / I'm not sure	99
5	**Taking Soda drinks within the past week**	
	My child did not eat potatoes during the past 7 days	0
	1 to 3 times during the past 7 days	1
	4 to 6 times during the past 7 days	2
	1 time per day	3
	2 times per day	4
	3 times per day	5
	4 or more times per day	6
	I don't know / I'm not sure	99
6	**Eating from Restaurants**	
	My child did not eat at a restaurant during the past 7 days	0
	1 to 3 times during the past 7 days	1
	4 to 6 times during the past 7 days	2
	More than 6 times during the past 7 days	3
	I don't know / I'm not sure	99
	Total Maximum Score	**37**

POINTS	EVALUATION	CODE
< 20	Poor	1
> 20	Good	2

Categorization of Socio-economic Level

Annual Household Income	Category
less than #30,000	Low Income
#30,000 - #50,000	Low Income
#50,000 - #100,000	Low Income
#100,000 - #200,000	Middle Income
#200,000 - #300,000	Middle Income
#300,000 - #500,000	High Income
Over #500,000	High Income