FOOD CONSUMPTION PATTERNS, PHYSICAL ACTIVITY AND OVERWEIGHT AND OBESITY AMONG SECONDARY SCHOOL STUDENTS IN KWARA STATE, NIGERIA

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MARCH 2016
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or any other award.

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This thesis is dedicated to the almighty Allah- the creator of heavens and earth, Alhaja Fatima Ashabi, Muinat, Ruth and all the Owolabis' and Federal Republic of Nigeria
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<th>Full Form</th>
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<tbody>
<tr>
<td>BFHI</td>
<td>Baby Friendly Hospital Initiative</td>
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<td>BMI</td>
<td>Body Mass Index</td>
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<td>CFS</td>
<td>Child Friendly Schools</td>
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<tr>
<td>CVDs</td>
<td>Cardiovascular Diseases</td>
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<td>CVI</td>
<td>Content Validity Index</td>
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<td>DHHS</td>
<td>Department of Health and Human Services</td>
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<td>EMR</td>
<td>Eastern Mediterranean Region</td>
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<td>EP</td>
<td>Essential Package</td>
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<td>EST</td>
<td>Ecological System Theory</td>
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<td>FAO</td>
<td>Food and Agricultural Organization</td>
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<td>FCP</td>
<td>Food Consumption Pattern</td>
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<td>FI</td>
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<td>FND</td>
<td>Food, Nutrition and Dietetics</td>
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<td>Global Physical Activity Questionnaire</td>
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<td>Health Promoting Schools</td>
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<td>Higher Socioeconomic Status</td>
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<td>International Obesity Taskforce</td>
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<td>IPAQ</td>
<td>International Physical Activity Questionnaire</td>
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<td>JSS</td>
<td>Junior Secondary School</td>
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<td>KSTSC</td>
<td>Kwara State Teaching Service Commission</td>
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<td>KSUBLEB</td>
<td>Kwara State Universal Basic Education Board</td>
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<td>KU</td>
<td>Kenyatta University</td>
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<td>LSES</td>
<td>Lower Socioeconomic Status</td>
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<td>Acronym</td>
<td>Description</td>
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<td>METs</td>
<td>Metabolic equivalents Score</td>
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<td>MVPA</td>
<td>Moderate-Vigorous Intensity Physical Activity</td>
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<td>NCDs</td>
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<td>Statistical Package for Social Science</td>
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<td>SSS</td>
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<td>TETFUND</td>
<td>Tertiary Education Trust Fund</td>
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<td>UNICEF</td>
<td>United Nations International Children Emergency Fund</td>
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<td>VS</td>
<td>Versus</td>
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<td>USA</td>
<td>United States of America</td>
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<tr>
<td>WFP</td>
<td>World Food Programme</td>
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<td>World Health Organization</td>
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OPERATIONAL DEFINITION OF TERMS

Adolescent: Any child between the ages of 10 and 19 years.

Food Consumption Pattern: The number of times (frequency), participants consume certain food items in a week.


Physical Activity: Any human activity that involves energy expenditure and can be categorized as low, moderate or high.
ABSTRACT
Adolescent overweight and obesity have been observed as one of serious public health challenges of the 21st century by the World Health Organization (WHO). Over the past few decades adolescent food consumption has undergone a great deal of transition from the starchy carbohydrates from roots and tubers to the highly refined cereals and sugary beverages. The highly refined cereals consumption contributes in no small measure to body adiposity. Physical inactivity further aggravates the calorie-imbalances that will later develop into overweight and obesity. This study determined the food consumption pattern and physical activity and overweight and obesity among the secondary school students in Kwara state, Nigeria. Cross-sectional analytical design was used in this study. A total of 515 adolescent students were randomly selected using multistage and stratified sampling techniques from 8 public secondary schools in two zonal inspectorate divisions. The instruments of data collection used were a modified food frequency questionnaire and Physical Activity Questionnaire for Adolescents (PAQ-A). Digital bathroom scale and stadiometer were used to measure the weight and height of the students respectively and observation checklist was used to assess the functionality of school facilities. Data was analyzed using statistical package for social sciences (SPSS, Version 20) and WHO anthropus package. Food consumption pattern of participants indicated that 77% consumed breakfast and 4.5% added more than 5 teaspoonful of sugar to their beverages daily. The participants mostly consumed refined carbohydrates was doughnut and biscuits (2.36±0.99) times per week, while mostly consumed fat and oil was vegetable oil in soup (2.54±0.96) times per week. Furthermore, the fatty protein mostly consumed was fish pies and fish rolls (2.71±0.87) times per week and mostly consumed fruit was pawpaw (2.56±0.89) times per week. Participants’ hours of sleep indicated that 50.3% had 7-8 hours of sleep daily. Physical activity level indicated that 48.7% were moderately active and 39.4% were highly active per week. Observation checklist results indicated that all the schools had functional sporting facilities (100%). Body mass index (BMI) for age of participants showed that 29.1% were underweight, 4.7% were overweight while less than 1% were obese. The Pearson correlation between BMI for age and food consumption pattern (FCP) was (r=0.012, p =0.785), BMI for age and physical activity level (r=-0.105, p= 0.017). ANOVA of BMI for age and food consumption pattern showed significance (p= 0.001). There was no significant difference between BMI for age and the metabolic equivalent scores (METs) of the participants (p=0.725). Despite the relatively low prevalence of overweight and obesity observed, of concern was high underweight and low BMI for age in this study. Result findings indicated low frequency of food consumption and moderate physical activity levels. The parents and guardians should improve on the frequency of consumption of nutritious food for the adolescent students in public secondary schools and their physical activity level should be sustained.
CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Adolescents as a vulnerable group require special attention and nutritional care because of the negative nutritional consequences that may occur among them as a result of inadequate consumption of healthy foods and physical inactivity. Overweight and obesity in childhood and in adolescents are emerging as one of the major public health of concern in the last few decades. Overweight and obesity conditions develop when there is an imbalance between calories consumed and calories expended mostly due to inadequate consumption of healthy foods and physical inactivity that cut-across all age groupings. It is known to be associated with substantial loss of quality of life and social stigmatisation that may trigger depression, anxiety, low self-esteem, feelings of guilt and chronic diseases development in the crop of individuals that may constitute a higher percentage of the world labour force in few years to come (Onyiriuka, Umoru, & Ibeawuchi, 2013). Globally, the increasing prevalence of overweight and obesity among adolescent began to draw the world attention as early as 1991 in the United States of America (USA) when there was a decline in the proportion of students in grade 9 to 12 years participation in daily physical education from 42% in 1991 to 29% in 1999 (Boyle & Holben, 2006). In 1997, a World Health Organization (WHO) Consultative group formally recognized that the obesity epidemic occurs worldwide and that the prevalence is increasing faster in developing countries than in developed countries (Hafiz, Ibrahim, & Atiku, 2012; WHO, 2008). The healthy people 2010 initiative of the US department of health and human services (DHHS) progress review indicated that the proportion of children and adolescent age six to nine years who were
overweight had increased from 11% in late 1980s to 16% in 2002. The initiative’s objectives on the consumption of fruits, vegetable and grain had not been met as at that time, therefore another goal was set for 2020 (Boyle & Holben, 2006).

According to Ferrara (2009), more than 17% of children in the United State of America (USA) were overweight or obese and about 35% of college students in USA were overweight or obese. The prevalence of overweight and obesity among school children in Eastern Mediterranean Region (EMR) was between 7% and 45% (Abdurrahman, 2011).

Okoth (2013) reported overweight prevalence of 18.7% for female adolescent and 10.3% for male adolescent while the obesity prevalence for both male and female adolescents were 0% and 2.1% respectively among adolescents in Kenya. Adamu, Adjei and Kubuga (2012) put adolescents’ overweight and obesity prevalence in Ghana between 4% and 7%. In Nigeria the prevalence of overweight and obesity among adolescent varies according to the regions and between urban and rural, as well as between private and public school students. For instance in the Southern Nigeria, the prevalence of overweight was between 13.2% and 24.2% and the prevalence of obesity was between 1% and 2.5% (Onyiriuka et al., 2013). In the Northern Nigeria, recent study indicated a high prevalence of underweight (29.6%) in the adolescent (Hafiz, et al., 2012).

Physical activity is the bodily movement produced by skeletal muscles that requires energy expenditure. Physical inactivity has been identified as the fourth leading risk factor of global mortality. It accounted for 6% of death globally and has been estimated to be the main cause of the following disease conditions 27% diabetes, 21-25% of breast and colon cancer and about 30% ischemic heart disease burden in the
world (WHO, 2014). The recent studies conducted around the world indicated that the nutrition education interventions on school children have significantly improved their healthy eating habit and informed food choice practices.

However, these interventions are limited in some countries especially in the Northern Nigeria where there is a great diversity in the cultural practices that influence adolescent dietary behaviour. According to Olubanji Ojofeitimi, Ojofeitimi, Olugbenga-Bello, Adekanle, & Adeomi, 2011) the dietary practices of adolescent girls in private secondary schools studied indicated that majority (60.2%) were unhealthy. Similarly, overweight and obesity were significantly higher in adolescent girls who lived sedentary lifestyles in Nigeria as was reported in (Olubanji Ojofeitimi et al, 2011). Furthermore, the study indicated the difference in the prevalence of overweight and obesity among adolescents from private schools and public schools. The difference was concluded to be due to poor healthy dietary practices and sedentary lifestyles of the adolescents in private schools. Therefore this study on the food consumption patterns and physical activity and overweight and obesity will be very useful among adolescent students in public secondary schools in the North Central Nigeria where Kwara state is situated. This is important so that appropriate school based intervention can be put in place for the students.

1.2 Problem Statement
Nutrition-related health problems such as overweight and obesity in adolescents are increasingly significant causes of disability and premature death both in developed and developing countries including Nigeria (Boyle & Holben, 2006). The epidemic of obesity alongside continuing problems of under-nutrition has plagued African
countries. According to Karl and Pengpid (2011) whose study was on the assessment of overweight and obesity and associated factors in school-going adolescents in low-income African countries (Ghana and Uganda), adolescents consumed fruits or vegetables in less than one times in a day, while more than three quarters of them were physically inactive.

Studies on adolescents overweight and obesity among secondary schools students in Nigeria had shown progressive increase in the prevalence of overweight and obesity especially in the private secondary schools (Eberechukwu, Eyam, &Nsan, 2013; Ene-Obong, Ibeanu, Onuoha & Ejekwu, 2012; Olubanjiojofitimi et al, 2011). Little information on overweight and obesity is available on the public secondary schools students particularly in Kwara state. Childhood and adolescents obesity are strong predictors of adult obesity which has now become the public health challenges of the 21st century according to World Health Organization (Fadupin & Olayiwola, 2011; Monyeki, vanLenthe, & Steyn, 1999; Popkin, Adair, & Ng, 2012). Many co-morbid conditions like metabolic, cardiovascular, psychological, orthopaedic, neurological, hepatic, pulmonary and renal disorders are seen in association with childhood obesity (Raj & Kumar, 2010). Therefore, there was need to determine overweight and obesity prevalence among the public secondary schools in Kwara state, Nigeria. This study on the food consumption patterns and physical activity and overweight and obesity among adolescent in public secondary schools in Kwara state determined the weight status of the public schools students in the North Central geo-political region which Kwara state is situated.
1.3 Purpose of the Study

The purpose of the study was to determine the food consumption patterns, physical activity levels and their association with overweight and obesity among adolescent students in public secondary schools in Kwara State, Nigeria.

1.4 Objectives of the Study

The specific objectives of the study were to;

1. Determine the demographic characteristics of adolescent students in public secondary schools in Kwara State.
2. Determine the food consumption patterns of adolescent students in public secondary school in Kwara state.
3. Determine the physical activity level of adolescent students in public secondary schools in Kwara State.
4. Establish prevalence of overweight and obesity among adolescent students in public secondary schools in Kwara State.
5. Establish the relationship between food consumption patterns, physical activity and overweight and obesity of adolescent students in public secondary schools in Kwara State.

1.5 Hypotheses of the Study

H01: There is no relationship between the food consumption patterns and overweight and obesity among adolescent students in public secondary schools in Kwara State.

H02: There is no relationship between the physical activity level and overweight and obesity among adolescent students in public secondary schools in Kwara State.
1.6 Significance of the Study

The study findings would enable the ministry of education and schools’ administrators to develop policy framework on student’s food consumption pattern and physical activity practices at the public secondary school level especially in Kwara state in Nigeria.

1.7 Delimitations of the Study

The study was conducted in public secondary schools located in the southern senatorial districts of Kwara State among day students.

1.8 Limitation of the Study

This study was carried out in the school setting which may have influenced the food consumption pattern and physical activity level of the participants. Also data on food consumption was collected on recall basis from students and actual weighing of foods consumed was not made.

1.9 Conceptual Framework

The study was based on the UNICEF (2013) conceptual framework on causes of malnutrition (overweight, obesity and underweight) in developing countries (Figure 1.1). The main causes of malnutrition in Africa include immediate, underlying and basic causes. The modified conceptual framework used for this study only concerned itself with immediate and underlying causes of malnutrition. The study’s conceptual framework explains the link between food consumption pattern, physical activity level and overweight and obesity of the adolescent students. Overweight and obesity are the manifestations of adolescent student food consumption pattern and their physical activity level.
The education level and occupation of the adolescent parents and guardians which form part of their demographic characteristics influence the adolescent student food consumption patterns which could manifest in overweight and obesity of the student. Furthermore, sporting facilities in school influence adolescent student physical activity practice and this could also manifest in overweight and obesity of the students. All these variables are interrelated and their manifestations are the level of malnutrition of the students in form of overweight and obesity (Figure 1.1).

**Figure 1.1.** Causes of overweight and obesity

Source: Modified from the UNICEF conceptual framework on malnutrition in developing countries UNICEF (2013)
2.1 Socioeconomic Status and Emerging Overweight and Obesity Epidemic among Adolescents

African countries in the last few decades have experienced rapid growth and development in both social and economic sectors that resulted in improved lifestyle of the populace. This rapid economic development manifested in the accumulation of different assets which further widen the socioeconomic strata among the people and had equally changed the cause of death from infectious to chronic non-communicable disease (NCDs) (Wrotniak et al., 2012). Socioeconomic status (SES) of adolescents’ parents has been found to be a factor associated with overweight and obesity in adolescence (Muthuri et al., 2014). However, higher socioeconomic status (HSES) could be found among students who attend private schools than those in public schools. The school location, amount of school fees paid and level of assets acquired by the students’ parents could also indicate HSES. Only few studies assessed the association between SES of adolescents and emerging overweight and obesity epidemic among adolescents in semi-urban and rural areas public secondary school especially in Nigeria.

Recent studies try to avoid asking students in public school about the level of income, educational background and occupation of their parents in order not to embarrass them. Certain facilities at home such as television, computer, refrigerator and other electronic gadget of which their presence have been associated with adolescents overweight and obesity could serve as a useful strategy to determine the adolescents level of SES in lower SES (Gewa, 2010; Sharif Ishak, Shohaimi, &
The study carried out in Botswana indicated that private school students whose parents have more assets had higher prevalence of overweight and obesity than public school students whose parents have fewer assets but the study did not indicate the level of overweight and obesity within the low socioeconomic status (Wrotniak et al., 2012). The socioeconomic status of the public secondary students in Irepodun local government of Kwara state has not been reported by any published literature.

2.2 Adolescents Food Consumption Patterns and Risk of Overweight and Obesity

Adolescents' food requirement and consumption are determined by their physiological and emotional conditions that are influenced by the hormonal secretions and parental influence (Anzman, Rollins, & Birch, 2010; Dapi, 2010; Huffman, Kanikireddy, & Patel, 2010; Lioret et al., 2009). Children and adolescents' food choice is one of the determinants of their food intakes which will then result in their nutritional status (Gewa, 2010; Sharif Ishak et al., 2013). Maruapula et al., (2011) reported that as at the year 2000, approximately 10% of youth aged 5-17 years were overweight (OW) and 2-3% were obese (OB) in Botswana this was due to their food consumption patterns which was characterised by snacks and sugary beverages. This trend has increased tremendously among the low and medium income countries to which most African countries belong. Previous cross-sectional studies reported adolescents' food consumption pattern as being low in fibre, fruits and vegetables, high in calories and sugary beverages and dairy products (Krølner et al., 2011). Many studies agreed that overweight and obesity in adolescents and children are caused by unhealthy eating habits characterized by the
consumption of fast foods, drinking of sugar sweetened beverages, low fruits and vegetable intakes and consumption of empty calories from soda, fruit drinks and dairy desserts

The risk of being overweight and obese in adolescence begins with what a child is fed on during childhood. The foods children are fed on have been attributed to the nature and the risk of diseases in adult life which could manifest in different diseases conditions such as coronary heart diseases, type 2 diabetes, stroke, certain forms of cancer, hypertension and mental disorders (Wang et al., 2010). Snacking and fast food consumption have being identified as a contributory factor to the development of childhood overweight and obesity in Nigeria (Olumakaiye, Ogbimi, Ogunba, & Soyebo, 2010).

The study conducted by Wang et al., (2010) on the dietary pattern of low income urban African American indicated high energy intakes and several unhealthy eating patterns, this was in agreement with what Sharif Ishak et al., (2013) observed among Malaysian children. However parental education has greatly been observed to influence what adolescents eat and their frequency of consumption of certain snacks and sugary beverages. According to Krølner et al., (2011), larger proportion of children failed to meet the WHO recommended amount(400gms) of fruits and vegetables consumption per day. He further observed that the determinants of fruits and vegetables consumption among children include the time, cost, lack of taste and access to unhealthy food among others. Vik et al., (2013) reported there has been consistent association between meals skipping and increased obesity risk in children as most adolescents woke up late to school due to frequent and unrestricted television and phone usage. These practices encourage the consumption of high
energy dense meals away from home thereby predisposing them to overweight and obesity. In Irepodun local governments area of Kwara state, the food consumption patterns of the students in public secondary schools have not been researched on to establish the foods consumption pattern that may predispose them to overweight and obesity.

2.3 Adolescents Physical Activity, Sedentary Lifestyle and Its Relationship with Adolescent Overweight and Obesity

Physical activity (PA) has been defined as any bodily movement produced by skeletal muscles that requires energy expenditure (WHO, 2014). Physical inactivity is the 4th leading factor of global mortality and increasing physical inactivity has been seen worldwide with 1 in 3 adult not being so active which prompted the WHO member states in 2013 to agree to reduce physical inactivity by 10% by 2025. Physical activity reduces the risk of hypertension, CVDs, strokes, diabetes, depression and certain forms of colon cancers (Berge, Wall, Bauer, & Neumark-Sztainer, 2010). Sedentary lifestyle that is characterized by physical inactivity has been associated with adiposity and increased weight gain.

Childhood is a crucial time to learn basic life skills on sufficient levels of physical activity in order to attain healthy body weight considering high prevalence of physical inactivity among the school aged adolescent (Agazzi, Armstrong, & Bradley-Klug, 2010; Muthuri, Wachira, Onywera, & Tremblay, 2014). According to Mushtaq, Gull, Mustaq, Shahid, Shad, and Akram (2011). Association of physical activity and sedentary lifestyle with childhood obesity have been extensively explored among school aged children globally. However most studies were
conducted in the developed countries and literature in this regard is scarce in developing countries on South Asian and African children including Nigeria.

Exercise is a form of physical activity that if well-structured and purposeful will balance the energy input with energy output. Certain activities such as dances, household chores, regular trekking, biking and host of other energy sapping activities mostly performed by children and adolescents brings health benefits across age-group. Pizarro, Ribeiro, Marques, Mota, and Santos (2013) reported that there was association between walking to school and waist circumference after controlling moderate to vigorous intensity physical activity (MVPA). Most of the literature he reviewed indicated that children who actively commute to school have healthier waist adiposity, body weight, cholesterol sub –fractions, lower blood lipid and odds of being overweight or obese was found to be lower in children who bicycled to school. Studies conducted in Kenya and Florida by Agazzi et al., (2010), Wachira, Muthuri, Tremblay, & Onywera., (2014) indicated that majority of Kenyan and Florida children and youth did not meet the WHO recommended 60 minutes of moderate to vigorous activity (MVPA) per day.

Furthermore the result of the study conducted in Osun state, Nigeria between the private and public students by (OlubanjiOjofeitimi et al., 2011) indicated that 64.2% of the girls from private schools lived sedentary lifestyles which were in contrast to the girls from public school who lived active lifestyle. Factors such as socioeconomic status, gender, sedentary behaviour, place of residence (urban vs. rural) insufficient sleep, television watching contribute to physical inactivity of individual especially children and adolescents (Muthuri et al., 2014; Ortega et al., 2010; Vik et al., 2013). Most of the studies carried out on physical activity practice
of the secondary schools students in Nigeria did not use the international standard to determine the physical activity level of the students. This puts some limitations in their findings and it also makes comparison of the students’ physical activity level very difficult particularly with the other African countries.

2.4 Predictors of Overweight and Obesity Status among Adolescent’s Students

Certain factors have been identified as predictive factors for overweight and obesity in adolescents and infants. The factors include personal, behavioural and socio-environmental predictive factors (Quick, Wall, Larson, Haines, & Neumark-Sztainer, 2013). These predictive factors could be modified through public health interventions. Other predictive factors such as genetic factors are innate and may not be easily modified but could also be used to predict overweight and obesity in adolescents and infants. In a study conducted by Flores and Lin (2013) on factors predicting overweight in US kindergartners, maternal physiological state was a predictive factor for overweight of their infants. For instance, the mothers mean pregnancy weight gain and maternal hypertension during pregnancy were found to predict overweight in the infants. In addition, mothers who were overweight before pregnancy and neonate birth weight also predict overweight status of the infants.

Several longitudinal studies on overweight and obesity confirmed that infant and adolescent overweight could lead to overweight in later in life. Socio-environmental features that facilitate the consumption of unhealthy foods and promote physical inactivity (poor housing and schools environments) are established factors for predicting overweight and obesity in adolescents. For example, schools with limited facilities for students to play, and policies both at family and national levels that encourage distribution and accessibility of materials that are the drivers of
overweight and obesity among adolescents (Giskes, Van Lenthe, Avendano-Pabon, & Brug, 2011). According to Galvez, Pearl & Yen, (2010) who highlighted the ecological system theory (EST), he stated that certain factors in the family, schools and community at large promote childhood obesity. Guedes, Rocha, Silva, Carvalhal & Coelho, (2011) reported that available literature have shown complex association between social and environmental determinants and obesity among the adolescents, although these studies were conducted in highly industrialized regions of world and those findings may not be applicable to developing countries like Brazil and most African countries like Nigeria. However, it was observed in his findings that apart from age-group and ethnicity that showed no significant association with the prevalence of overweight and obesity among the Brazilian parents and children, other determinants such as gender, number of siblings, SES, parents educational level, paid work, food consumption at schools, transport to school and city population size were significantly predictive of overweight and obesity among the school children in Brazil. This finding was in agreement with the study conducted among the Kenyan women by (Steyn, Nel, Parker, Ayah, & Mbithe, 2011). Berge, Wall, Bauer & Neumark-Sztainer, (2010), Dawson-McClure et al., (2014), Kimani-Murage, Pettifor, Tollman, Klipstein-Grobusch & Norris, (2011), Stevenson, (2010) in their studies on parenting style and association with weight status indicated that parenting style as an in-built environment factor on social determinant is associated with high adolescent weight status and authoritarian parenting style common among higher socioeconomic status while (Dulin-Keita, Thind, Affuso, & Baskin, 2013), Senbanjo & Oshikoya, (2010) stated that physical activity is largely determined by neighbourhood physical environment, social, economic and cultural factors and that perceived neighbourhood disorders was significantly and positively related to
obesity. All the studies reviewed agreed that the environment may play an important role in overweight and obesity development but the dietary behaviours contribution to obesity development remain unclear and physical activity plays a crucial role in weight gain, overweight and obesity. The predicting factors for overweight and obesity among students in public secondary schools in Kwara state have not been established. Therefore, the need to establish those factors that could predict overweight in students in public schools is very necessary for policymakers to use in addressing the students overweight status.

2.5 Relationships between Adolescent Food Consumption Pattern, Physical Activity Level and Overweight and Obesity

Prevalence of overweight and obesity has increased worldwide (Farhat, Iannotti, & Simons-Morton, 2010; Kotian, Kumar, & Kotian, 2010; Peltzer & Pengpid, 2011) and this trend is becoming rampant among the low income earner (Dawson-McClure et al., 2014). There are an estimated 1.2 billion adolescents aged 10-19 years in the world and instituting comprehensive health intervention programs will help preventing the estimated 1.4 million deaths that occurred globally every year in this population especially those deaths that related to nutritional deficiencies and the occurrence of no communicable diseases like overweight and obesity (Chandra-Mouli et al., 2013). Childhood and adolescent obesity are strong predictors of adult obesity (Fadupin & Olayiwola, 2011; Monyeki et al., 1999; Muthuri, Francis, et al., 2014; Popkin et al., 2012). According to (Raj & Kumar, 2010) many co-morbid condition like metabolic syndrome, cardiovascular, physiological, orthopaedic, neurological, hepatic, pulmonary and renal disorders are seen in association with childhood and adolescents obesity.
This statement supports the finding of (Farhat et al., 2010; Renzaho, Bilal, & Marks, 2014). Many studies agreed that obesity in adolescents and children are caused by unhealthy eating habits characterized by the consumption of fast foods, drinking of sugar sweetened beverages, low fruits and vegetable intakes and consumption of empty calories from soda, fruit drinks and dairy desserts. Also physical inactivity is noted as one of the drivers of obesity among the youth especially in urban areas that are rapidly springing up in African (Beck, Tschann, Butte, Penilla, & Greenspan, 2014).

However, certain intervention programs were developed by WHO to reduce the prevalence of overweight and obesity among the adolescents in secondary schools. Nutrition-Friendly Schools Initiative (NFSI) was developed as follow-up to the WHO Expert Meeting on Childhood Obesity June 2005. The main aim of the NFSI is to provide a framework for ensuring integrated school-based programs which addresses the double-burden of nutrition-related ill health, building on and inter-connecting the on-going work of various agencies and partners. These include the FRESH Initiative, Essential Package by (UNICEF/WFP), Child-Friendly Schools (UNICEF), Health Promoting Schools (WHO), School Food and Nutrition Education programs (FAO) to mention just a few (WHO, 2014).

NFSI applies the concept and principles of the Baby-friendly Hospital Initiative (BFHI), where schools that meet a set of essential criteria will be accredited as "Nutrition Friendly Schools". These WHO initiatives are to step down the prevalence of childhood and adolescent overweight and obesity because if the prevalence of overweight and obesity continues unchecked, the result will be a population of children and adolescents with a lot of health problems which will lead
to high mortality rates. This will reduce the global lifespan of the people and Africa being one of continents experiencing the double burden of malnutrition will be mostly affected (Halpern, Mancini, Magalhaes, Fisberg, Radominoski, and Bertolami, 2010).

2.6 Summary of Literature Review

The following gaps were observed in the literature reviewed on the research topic-food consumption pattern and physical activity in relation to overweight and obesity among adolescents in secondary schools in Kwara state, Nigeria. There were very scanty studies on the food consumption pattern of secondary schools in Africa especially in public schools in northern Nigeria. Only few studies associated socio-economic status with overweight and obesity in the public schools in the rural areas. Most studies reviewed on childhood overweight and obesity was carried out in urban private schools and their results were only compared within the urban setting. There were few published studies on the regional overweight and obesity among adolescents in public secondary school in Nigeria and none was from the north central in which the Kwara state is located thereby making this study unique. Also the predicting factors of overweight and obesity among students in public secondary schools in Kwara state were not available for review. Furthermore, published research work on physical activity practice in developing countries is very scanty especially in Nigeria where motorized equipment usage is on the increase. The intervention programs initiated were selectively applied to countries with enough data on the contributing factors to overweight and obesity in their area. Therefore it is very crucial to determine the food consumption patterns and the physical activity practice of the students in public secondary schools in order to evaluate their overweight and obesity status and establish a database in the state.
CHAPTER THREE: METHODOLOGY

3.1 Research Design
Cross-sectional analytical design was used in this study because it was ideal for rapid data collection in which a large sample size was involved (Oso & Onen, 2011; Tolmie et al., 2011). According to Mugenda & Mugenda (2003), a cross-sectional design is applied in collecting data from numbers of a population in order to determine the current status of that population with respect to one or more variables.

3.2 Measurement of Variables
The dependent variables were overweight and obesity. These variables were determined using the BMI for age (WHO, 2007) standard cut-offs for overweight and obesity. The independent variables were demographic characteristics, food consumption patterns and physical activity of the adolescents. The food consumption patterns variable was measured using food consumption frequency questionnaire and physical activity was measured with physical activity questionnaire for adolescent (PAQ-A)

3.3 Study Area
This study was carried out in the Southern Senatorial district of Kwara State, Nigeria. The Kwara State capital is Ilorin which is about 700 km from Abuja (Federal Capital Territory) and 350 km from Lagos. The main ethnic group in Kwara State is Yoruba with significant number of minority tribes which include the Nupe, Bariba and Fulani. The State borders Niger State in the North, Oyo, Osun and Ekiti States in the South, Kogi State in the East and the Republic of Benin in the West. Because of its unique geographical position the State is referred to as a “gateway” State between the Northern and Southern Nigeria. Agriculture is the main
occupation of the people of the State and solid mineral deposits are also being
explored in Kwara State (Appendices F and G).

3.4 Target Population

Students in public secondary school aged 10-19 years were the target population,
with 2014 estimated population of 330,035 students (Adeyemi, 2009).

3.5 Exclusion and Inclusion Criteria

3.5.1 Inclusion Criteria

Students in the public day schools in Kwara state within the ages of (10-19) were
selected.

3.5.2 Exclusion Criteria

Students with chronic diseases, those with pregnancy and those on transfers from
other states three months before the commencement of this study were excluded.

3.6 Sampling Techniques

The sampling techniques used in this study were both stratified sampling and
multistage simple random sampling which was carried out in four stages. In this
study, one local government was randomly selected from the seven local
government areas in the Southern Senatorial districts of Kwara State. Ajase-ipo and
Omu-aran zonal inspectorates of education were randomly selected from eight zonal
inspectorates in the local government and also eight public secondary schools was
selected from thirty-two public secondary schools. Finally, students were allowed to
pick from the container containing scrapped piece of papers in which numbers 1 or 2
were written in order to qualify to participate in the study. All the students that
picked number 1 were selected for the study. The selection was based on the gender
ratio of 2: 1 (NDHS, 2008) using stratified sampling technique. A total of five hundred and fifteen students (343 girls and 172 boys) were randomly selected from the eight public secondary schools.

Figure 3.1. Multistage sampling procedure
3.7 Sample Size Determination

The sample size for this study was calculated using Cochran (1963) formula for determining sample size in a research.

\[ n_0 = \frac{Z^2 pq}{e^2} \times 2 \]

Where; \( n_0 \) = Sample size for the study

\( Z = \) desired confidence interval (95% CI)

\( P = \) Prevalence = 19% or 0.19

\( e = \) desired level of precision 5% or 0.05

\( q = 1 - p \)

\( 2 = \) is a constant (design effect for research that has not been conducted on the target population in sampled area)

Therefore, \( n = \frac{1.922 \times 0.19(1-0.19)}{(0.05)^2} \times 2 \)

\( n = \frac{3.8416 \times 0.19 \times (0.81)}{0.0025} \times 2 \)

\( n = 473 \) Students

\( F (\text{finite}) = \frac{473}{1 + 0.0095} \)

Finite sample = \( \frac{473}{1.01} = 468.57 \)

Sample size + 10% for non-response = 468.57 + 46.86

Total sample size = 515

Using sex ratio of 2:1 (NDHS, 2008) - the sample comprised of 343 girls and 172 boys.
3.8 Research Instruments

A modified Food Frequency Consumption Questionnaire produced by Harvard University on adolescent food consumption pattern (Lee & Nieman, 2010), was used to collect data on students’ food consumption pattern. A modified Physical Activity Questionnaire for adolescent (PAQ-A) was constructed from Global Physical Activity Questionnaire (GPA-Q) to collect data on physical activity. Digital bathroom scale was used to measure students’ weight to the nearest 0.1 kilogram and Stadiometer was used to measure the students’ height to the nearest 0.1 meters and observation checklist was used to assess the school physical facilities and usage.

3.9 Pre-testing

The research instruments were pre-tested in one public secondary school in the research area, this school was randomly selected and it was not part of the schools selected for the main study. Fifty two students were randomly selected for the pre-test. All the data collection tools such as the digital bathroom weighing Scale, Stadiometer and food consumption pattern and physical activity questionnaire were administered on the selected students. The pre-testing exercise was carried out in order to minimize problems that students might encounter in answering the questions and also to reduce error in data recording. Pre-testing allowed for some assessment of the validity and reliability of the data that were collected during the main study. Research instruments were standardized before the actual study was carried out to minimize error.

3.10 Validity and Reliability of the Research Instrument

In order to control the quality of the research findings in this study, the research instruments were pretested in a school which was not included in the sample schools
for this study. Two nutrition experts and the researcher’s supervisors in the department of Food, Nutrition and Dietetics (FND) evaluated the relevance of each item in the research instruments in relation to the stated objectives and rated each item accordingly. The content validity was calculated using appropriate statistical formula for determining the content validity. The content validity index (CVI) was the summation of the items rated 3 or 4 by all the nutrition experts divided by the number of items in the questionnaire. The calculated content index for the pretesting was 0.89 or 89% which was deemed to be appropriate for this study Kathuri and Pals, (1993) cited Oso and Onen (2011) reported that items with validity or reliability of a minimum of 70% or 0.70 are considered acceptable as being valid and reliable in research.

3.11 Data Collection Procedure

Anthropometric data of the adolescent secondary students was collected by the researcher and two research assistants with diploma certificate in Human nutrition using stadiometer and digital weighing scales. Each student’s weight was measured twice and average weight determined for every student. Students were weighed one after the other when wearing light clothing; their feet placed side by side and were pointing straight with their hands by their sides with no heavy object on them. Each student height was measured twice and average height determined. Students’ heights were measured when the students stood erect with heels, shoulder, back and head all resting on the wall. Food consumption and physical activity questionnaires were administered to the students individually when they were comfortably seated in the classroom and schools facilities were observed and ticked accordingly on the
observation checklist. The optional responses on the questionnaires were ticked accordingly in response to the corresponding question on the questionnaire.

3.12 Data Analysis and Presentation

The measurements obtained from the height and weight were entered into the Anthroplus software to determine the BMI of the student using WHO (2007) BMI for age and sex cut-offs. The information on physical activity, food consumption pattern scores was entered into the Statistical Package for Social Science (SPSS) version 20 to generate data on the scores. The BMI for age were categorized into underweight (<15th percentile), normal weight (15th to <85th percentile), overweight (85th to <97th percentile), and obese (≥ 97th percentile) and each category of the BMI for age was expressed as percentages to determine the prevalence of overweight and obesity (Appendix G and H). Food consumption patterns were expressed in mean consumption per week. Food consumption patterns (FCP) was calculated as a composite score of 20 food items selected. A score of 80 means that all 20 foods were consumed 5 or more times in a week. A score of 20 is the minimum, meaning the student never consumed any of the 20 foods. Physical activity was categorized according to international physical activity questionnaire (IPAQ) guidelines. IPAQ based physical activity intensity on metabolic equivalent score per minutes per week (METs-minutes/week). The categories are, low physical activity intensity (<600METs), moderate physical activity intensity (600-3000METs), and high physical activity intensity (>3000 METs) for individuals. Overweight and obesity status of participants were determined according to WHO (2007) BMI for age classifications. The Pearson correlation (r) and ANOVA were used to determine the relationship and significant differences of the composite
means between dependent (overweight and obesity) and independent variables (food consumption pattern and physical activity level) at p< 0.05 for significant differences respectively.

3.13 Logistical and Ethical Consideration

Kenyatta University Graduate School granted approval for data collection. The ethical clearance was obtained from the Ethical Review Committee of the Kwara state Universal Basic Education Board (KSUBEB). The research permit was obtained from the Kwara State Teaching Service Commission (KSTSC) and the authority to conduct the research was obtained from the school administrators of the selected schools. Written letters of informed consent were endorsed by the principals of the selected schools on behalf of the sampled students’ parents who were below 18 years while the students who were above 18 years appended their signatures on the consent forms individually after the students had been duly informed of the purpose of the study. Assurance of the students’ privacy and confidentiality was given to the students by explaining to the students that the information given will not be used for any other purposes apart from the academics publications.
CHAPTER FOUR: RESULTS

4.1. The Demographic Characteristics of Participants

The study population comprised of eight secondary schools in Irepodun local government area of Kwara state in Nigeria. A total of 515 adolescents participated in the study, 33.4% were boys and 66.6% were girls. The participants in this study were adolescents whose ages were between (10-19) years and 54% were (16-18) years. This indicates that majority of participants may have an established food consumption pattern. The sampled schools were 12.5% boys only, 12.5% girls only and 75% mixed (Table 4.1).

Table 4.1. Demographic characteristics of participants

<table>
<thead>
<tr>
<th>Participants characteristics (n=515)</th>
<th>No. of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>172</td>
<td>33.4</td>
</tr>
<tr>
<td>Female</td>
<td>343</td>
<td>66.6</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>515</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Age distribution (years/months)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.6-12.5</td>
<td>26</td>
<td>5.0</td>
</tr>
<tr>
<td>12.6-15.5</td>
<td>162</td>
<td>31.5</td>
</tr>
<tr>
<td>15.6-18.5</td>
<td>278</td>
<td>54.0</td>
</tr>
<tr>
<td>18.6-19.5</td>
<td>49</td>
<td>9.5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>515</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Type of school</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Girls</td>
<td>1</td>
<td>12.5</td>
</tr>
<tr>
<td>Mixed</td>
<td>6</td>
<td>75.0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>8</td>
<td>100%</td>
</tr>
</tbody>
</table>

The participants used different means of transport to get to schools daily of which 61.7% walked to school and 10.1% used their parent or guardian cars as means of
transport to school. The study findings showed that 50.3% of the participants lived with their parents, only 25.8% the participants lived alone (Table 4.1).

Table 4.2. Demographic characteristics of participants

<table>
<thead>
<tr>
<th>Participants characteristic</th>
<th>No. of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants means of transportation to school</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcycles</td>
<td>119</td>
<td>23.1</td>
</tr>
<tr>
<td>Public transport</td>
<td>26</td>
<td>5.1</td>
</tr>
<tr>
<td>Walked</td>
<td>318</td>
<td>61.7</td>
</tr>
<tr>
<td>Parents/guardians or cars</td>
<td>52</td>
<td>10.1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>515</td>
<td>100%</td>
</tr>
<tr>
<td>Participants by whom they lived with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parents</td>
<td>259</td>
<td>50.3</td>
</tr>
<tr>
<td>Guardians</td>
<td>123</td>
<td>23.9</td>
</tr>
<tr>
<td>Alone</td>
<td>133</td>
<td>25.8</td>
</tr>
<tr>
<td>TOTAL</td>
<td>515</td>
<td>100%</td>
</tr>
</tbody>
</table>

The educational background of the participants’ parent or guardian in the study showed that, 1.2% had not attained any formal education, 62.1% completed primary school level of education and only 11.5% completed university level of education.

The participant’s parent and guardian engaged in different occupations of which 13.3% were civil servants while 68.1% were farmers (Table 4.3).
Table 4.3. *Demographic characteristics of participants’ parents or guardians*

<table>
<thead>
<tr>
<th>Participants characteristic</th>
<th>No. of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational background of participant’s parents/guardians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>6</td>
<td>1.2</td>
</tr>
<tr>
<td>Primary</td>
<td>320</td>
<td>62.1</td>
</tr>
<tr>
<td>Secondary</td>
<td>105</td>
<td>20.4</td>
</tr>
<tr>
<td>University</td>
<td>59</td>
<td>11.5</td>
</tr>
<tr>
<td>Others</td>
<td>25</td>
<td>4.9</td>
</tr>
<tr>
<td>TOTAL</td>
<td>515</td>
<td>100%</td>
</tr>
<tr>
<td>Occupation of participant’s parents/guardians</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil servants</td>
<td>17</td>
<td>3.3</td>
</tr>
<tr>
<td>Artisan</td>
<td>36</td>
<td>7.0</td>
</tr>
<tr>
<td>Farmers</td>
<td>351</td>
<td>68.1</td>
</tr>
<tr>
<td>Business activities</td>
<td>111</td>
<td>21.5</td>
</tr>
<tr>
<td>TOTAL</td>
<td>515</td>
<td>100%</td>
</tr>
</tbody>
</table>

**4.2 Food Consumption Patterns of the Participants**

The food consumption patterns questionnaire was used to obtain information on the breakfast meal. Also, types and frequency of consumption of certain foods and drinks listed in the questionnaire from the respondents.

**4.2.1 Breakfast Consumption by the Participants**

The participants’ breakfast meal consumption showed that, 77% usually ate breakfast before going to school daily while 23% skipped breakfast (Figure 4.1)
4.2.2 Daily Sugar Intake by the Participants

The results of daily sugar intake of the participants indicated that 52% added 1-2 teaspoons of sugar to their beverages daily and 4.5% added 5 or more teaspoons of sugar (Figure 4.2)
4.2.3 Average Numbers of Times per Week Carbohydrates Foods consumed by the Participants

The average numbers of times per week that carbohydrates foods were consumed by the participants showed that boiled Irish potatoes was consumed in 1.78±0.81 times per week and doughnut and biscuits were consumed in 2.36±0.99 times per week but potatoes chips was consumed in 2.14±0.94 times per week as well as spaghetti and noodles in 2.14±0.85 times per week. However, doughnuts and biscuits had the highest average number of times of consumption per week by the participants (Table 4.4)

Table 4.4. Average numbers of times per week carbohydrates foods consumed by the participants

<table>
<thead>
<tr>
<th>Starchy roots, tubers and refined cereals consumption (n=515)</th>
<th>Food items consumed</th>
<th>Never</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5 or more times</th>
<th>% total</th>
<th>Average number of times per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Boiled yam/cassava</td>
<td>21.9</td>
<td>52.0</td>
<td>14.8</td>
<td>11.3</td>
<td>100</td>
<td>2.15±0.89</td>
</tr>
<tr>
<td></td>
<td>Boiled Irish potatoes</td>
<td>42.9</td>
<td>40.0</td>
<td>13.6</td>
<td>3.5</td>
<td>100</td>
<td>1.78±0.81</td>
</tr>
<tr>
<td></td>
<td>Boiled sweet potatoes</td>
<td>26.0</td>
<td>40.4</td>
<td>22.3</td>
<td>11.3</td>
<td>100</td>
<td>2.19±0.95</td>
</tr>
<tr>
<td></td>
<td>Boiled bran rice</td>
<td>16.9</td>
<td>45.8</td>
<td>22.3</td>
<td>15.0</td>
<td>100</td>
<td>2.35±0.93</td>
</tr>
<tr>
<td></td>
<td>Maize boiled/roasted</td>
<td>38.4</td>
<td>32.8</td>
<td>24.1</td>
<td>4.7</td>
<td>100</td>
<td>1.95±0.90</td>
</tr>
<tr>
<td></td>
<td>Oat bran meal</td>
<td>22.1</td>
<td>51.7</td>
<td>20.4</td>
<td>5.8</td>
<td>100</td>
<td>2.09±0.81</td>
</tr>
<tr>
<td></td>
<td>Doughnuts &amp; biscuits</td>
<td>23.3</td>
<td>28.2</td>
<td>40.0</td>
<td>8.5</td>
<td>100</td>
<td>2.36±0.99</td>
</tr>
<tr>
<td></td>
<td>Potatoes chips</td>
<td>26.6</td>
<td>34.8</td>
<td>35.9</td>
<td>2.7</td>
<td>100</td>
<td>2.14±0.84</td>
</tr>
<tr>
<td></td>
<td>Spaghetti &amp; noodles</td>
<td>24.3</td>
<td>43.3</td>
<td>26.4</td>
<td>6.0</td>
<td>100</td>
<td>2.14±0.85</td>
</tr>
</tbody>
</table>
4.2.4 Average Numbers of Times per Week Fat and Oil Foods Consumed by the Participants
The average numbers of times per week that fat and oil foods were consumed by the participants showed that peanut butter was consumed in 2.34±1.15 times per week, vegetable oil (soup) was consumed in 2.54±0.96 times per week and butter/margarine was consumed in 2.0±0.83 times per week. However, vegetable oil had the highest average number of times of consumption per week by the participants (Table 4.5)

Table 4.5. Average numbers of times per week fat and oil foods consumed by the participants

<table>
<thead>
<tr>
<th>Food items consumed</th>
<th>Never</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5 or more times</th>
<th>% total</th>
<th>Average number of times per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peanut butter</td>
<td>28.7</td>
<td>34.0</td>
<td>11.5</td>
<td>25.8</td>
<td>100</td>
<td>2.34±1.15</td>
</tr>
<tr>
<td>Vegetable oil (soup)</td>
<td>15.7</td>
<td>31.8</td>
<td>34.4</td>
<td>18.1</td>
<td>100</td>
<td>2.54±0.96</td>
</tr>
<tr>
<td>Butter/margarine</td>
<td>29.5</td>
<td>45.0</td>
<td>20.6</td>
<td>4.9</td>
<td>100</td>
<td>2.0±0.83</td>
</tr>
<tr>
<td>Salad dressing/mayonnaise</td>
<td>33.8</td>
<td>42.7</td>
<td>18.6</td>
<td>4.9</td>
<td>100</td>
<td>1.94±0.85</td>
</tr>
<tr>
<td>Boiled/roasted peanut</td>
<td>42.3</td>
<td>21.9</td>
<td>24.5</td>
<td>11.3</td>
<td>100</td>
<td>2.04±1.06</td>
</tr>
<tr>
<td>Soybeans cheese</td>
<td>29.9</td>
<td>31.8</td>
<td>22.1</td>
<td>16.1</td>
<td>100</td>
<td>2.24±1.05</td>
</tr>
</tbody>
</table>

4.2.5 Average Numbers of Times per Week Fatty Protein Foods Consumed by Participants
The average number of times per week fatty protein foods were consumed by the participants indicated that pork/bacon was consumed in 1.86±0.98 times per week and pies/fish rolls was consumed in 2.71±0.87 times per week while fried
eggs/boiled eggs were consumed in 2.15±0.69 times per week. However, pies/ fish rolls had the highest average number of times of consumption per week by the participants (Table 4.6).

Table 4.6. Average numbers of times per week fatty protein foods consumed by participants

<table>
<thead>
<tr>
<th>Food items</th>
<th>Never</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5 or more times</th>
<th>% total</th>
<th>Average number of times per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fried fish /roasted meat</td>
<td>40.2</td>
<td>39.6</td>
<td>10.3</td>
<td>9.9</td>
<td>100</td>
<td>1.89±0.94</td>
</tr>
<tr>
<td>Whole milk/ milk shakes</td>
<td>18.6</td>
<td>57.9</td>
<td>20.8</td>
<td>2.7</td>
<td>100</td>
<td>2.08±0.71</td>
</tr>
<tr>
<td>Burgers/hot dogs</td>
<td>41.0</td>
<td>25.6</td>
<td>18.6</td>
<td>14.8</td>
<td>100</td>
<td>2.07±1.09</td>
</tr>
<tr>
<td>Pork/bacon</td>
<td>48.5</td>
<td>22.5</td>
<td>22.5</td>
<td>6.4</td>
<td>100</td>
<td>1.86±0.98</td>
</tr>
<tr>
<td>Ice-cream/ frozen yogurt</td>
<td>13.8</td>
<td>68.9</td>
<td>10.1</td>
<td>7.2</td>
<td>100</td>
<td>2.10±0.72</td>
</tr>
<tr>
<td>Pies/fish roll</td>
<td>5.8</td>
<td>38.3</td>
<td>34.6</td>
<td>21.4</td>
<td>100</td>
<td>2.71±0.87</td>
</tr>
<tr>
<td>Fried eggs/boiled eggs</td>
<td>11.8</td>
<td>65.4</td>
<td>17.7</td>
<td>5.0</td>
<td>100</td>
<td>2.15±0.69</td>
</tr>
</tbody>
</table>

4.2.6 Average Numbers of Times per Week Sugary Beverages, Fruit Juices and Whole Fruits Consumed by Participants

The average number of times per week that sugary beverages, fruits juices and whole fruits consumed by the participants indicated that soda/soft drinks were consumed in 2.14±1.05 times per week and malted drinks were consumed in 1.83±0.77 times per week, pawpaw was consumed in 2.56±0.89 times per week while other fruits were consumed in 2.23±0.99 times per week. However pawpaw
had the highest average number of times of consumption per week by the participants (Table 4.7).

Table 4.7. Average number of times per week sugary beverages, fruit juices and whole fruits consumed by participants

<table>
<thead>
<tr>
<th>Food items consumed</th>
<th>Never</th>
<th>1-2 times</th>
<th>3-4 times</th>
<th>5 or more times</th>
<th>% total</th>
<th>Average number of times per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soda drinks/soft drinks</td>
<td>32.4</td>
<td>36.9</td>
<td>14.2</td>
<td>16.5</td>
<td>100</td>
<td>2.14±1.05</td>
</tr>
<tr>
<td>Chocolate drinks</td>
<td>28.7</td>
<td>48.9</td>
<td>22.4</td>
<td>0.00</td>
<td>100</td>
<td>1.93±0.71</td>
</tr>
<tr>
<td>Malted drinks</td>
<td>36.3</td>
<td>46.8</td>
<td>14.2</td>
<td>2.7</td>
<td>100</td>
<td>1.83±0.77</td>
</tr>
<tr>
<td>banana</td>
<td>8.2</td>
<td>56.5</td>
<td>29.7</td>
<td>5.6</td>
<td>100</td>
<td>2.32±0.71</td>
</tr>
<tr>
<td>mangoes</td>
<td>13.6</td>
<td>41.0</td>
<td>41.0</td>
<td>4.5</td>
<td>100</td>
<td>2.36±0.77</td>
</tr>
<tr>
<td>Pawpaw</td>
<td>8.9</td>
<td>43.5</td>
<td>29.3</td>
<td>18.3</td>
<td>100</td>
<td>2.56±0.89</td>
</tr>
<tr>
<td>Other fruits</td>
<td>21.2</td>
<td>48.8</td>
<td>13.7</td>
<td>16.3</td>
<td>100</td>
<td>2.23±0.99</td>
</tr>
</tbody>
</table>

### 4.3 Physical Activity Level of the Participants

Physical activity questionnaire for adolescents (PAQ-A) was used to obtain information on the physical activity practices by the public secondary schools students in Irepodun local government area of Kwara state in Nigeria. The (PAQ-A) was used to analyse the number of times a respondent participated in the physical activities in schools and at home and also for how long the respondent engaged in physical activities in a week. The physical activities included in this study were skipping, walking for exercise, bicycling, jogging/running, football playing,
basketball playing, volleyball playing, swimming, dancing, and other forms of energy sapping activities at home or in school. The (PAQ-A) was also used to assess the hours of sleep among the participants. The observation checklist was used to obtain information on the sporting facilities, duration for physical activity practices of the respondents and students participation in the physical activity. The checklist was also used to obtain information on availability of a functional field for physical activity and other energy consuming activities that the schools engaged the participants in.

4.3.1 The Daily Hours of Sleep by the Participants

The daily hours of sleep by the students in public secondary schools in Irepodun local government area of Kwara state in Nigeria indicated that 10.3% slept for between (3-4) hours and 50.3% slept between (7-8) hours daily (Figure 4.3).

*Figure 4.3. Daily hours of sleep by the participants*
4.3.2 Types, Frequency and Duration of Involvement in Physical Activities by the Participants Daily

The results of types of physical activities involved in by the participants indicated that 32.8% involved in (running/jogging) and 2.1% in skipping. However, 27.8% were rarely involved in physical activity daily while 27.8 engaged in a little physical activity. Furthermore, 41.9% were involved in physical activity for between (30-40) minutes daily while 7% engaged in physical activity for only 10 minutes (Table 4.8).

Table 4.8. Types, duration and frequency of daily physical activities by the participants

<table>
<thead>
<tr>
<th>Items</th>
<th>n = 515</th>
<th>No. of participants</th>
<th>% of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of daily physical activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycling</td>
<td>155</td>
<td>30.1</td>
<td></td>
</tr>
<tr>
<td>Jogging/ running</td>
<td>169</td>
<td>32.8</td>
<td></td>
</tr>
<tr>
<td>Skipping</td>
<td>11</td>
<td>2.1</td>
<td></td>
</tr>
<tr>
<td>Walking</td>
<td>150</td>
<td>29.1</td>
<td></td>
</tr>
<tr>
<td>Other forms of physical activities</td>
<td>30</td>
<td>5.8</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>515</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Frequency of engaging in daily physical activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A little</td>
<td>143</td>
<td>27.8</td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>143</td>
<td>27.8</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>115</td>
<td>22.3</td>
<td></td>
</tr>
<tr>
<td>Regularly</td>
<td>114</td>
<td>22.1</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>515</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Duration for daily physical activity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 minutes</td>
<td>36</td>
<td>7.0</td>
<td></td>
</tr>
<tr>
<td>20- 30 minutes</td>
<td>68</td>
<td>13.2</td>
<td></td>
</tr>
<tr>
<td>30- 40 minutes</td>
<td>216</td>
<td>41.9</td>
<td></td>
</tr>
<tr>
<td>50- 60 minutes</td>
<td>135</td>
<td>26.2</td>
<td></td>
</tr>
<tr>
<td>1 hour</td>
<td>60</td>
<td>11.7</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>515</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>
The distribution of the respondents’ physical activities in the last 7 days of the week indicated that 60% of the participants sometimes participated in physical education class. Also, 41% of the participants ran and played hard after lunch in the previous week. Furthermore, 36.3% of the participants engaged in games at least 1 time in the previous week (Table 4.9).

Table 4.9. *Distribution of the participant’s physical activities in last 7 days*

<table>
<thead>
<tr>
<th>Physical Activities in last 7 days</th>
<th>Number Participants (%</th>
<th>Average number of days in the last 7 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Participation in Physical education class</strong></td>
<td>n=515</td>
<td></td>
</tr>
<tr>
<td>Hardly Ever</td>
<td>116(22.5)</td>
<td>2.82±1.25</td>
</tr>
<tr>
<td>Sometimes</td>
<td>309(60.0)</td>
<td></td>
</tr>
<tr>
<td>Quite often</td>
<td>42(8.2)</td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>48(9.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>515(100)</td>
<td></td>
</tr>
<tr>
<td><strong>Activities engaged-in after lunch</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxed and slept</td>
<td>36(7.0)</td>
<td>3.06±1.18</td>
</tr>
<tr>
<td>Ran and played a little</td>
<td>133(25.8)</td>
<td></td>
</tr>
<tr>
<td>Ran and played hard</td>
<td>211(41.0)</td>
<td></td>
</tr>
<tr>
<td>Sat down</td>
<td>32(6.2)</td>
<td></td>
</tr>
<tr>
<td>Walked around</td>
<td>103(20.0)</td>
<td>3.06±1.18</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>515(100)</td>
<td></td>
</tr>
<tr>
<td><strong>Number of days engaged-in games and were very active</strong></td>
<td></td>
<td>3.09±1.33</td>
</tr>
<tr>
<td>None</td>
<td>47(9.1)</td>
<td></td>
</tr>
<tr>
<td>1 time last week</td>
<td>187(36.3)</td>
<td></td>
</tr>
<tr>
<td>2/3 times last week</td>
<td>63(12.2)</td>
<td></td>
</tr>
<tr>
<td>4 times last week</td>
<td>109(21.2)</td>
<td></td>
</tr>
<tr>
<td>5 times last week</td>
<td>109(21.2)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>515(100)</td>
<td></td>
</tr>
</tbody>
</table>
4.3.3 The Metabolic Equivalent Scores (Mets) Per Week by the Participants

The metabolic equivalent scores (METs) per week by the respondents showed that 11.8% of the respondents had (<600 METs) which indicated low physical activities intensity, 48.7% had between (600-3000 METs) which indicated moderate physical activities intensity and 39.4% had above (3000 METs) which indicated high physical activity intensity (Table 4.10).

Table 4.10. Metabolic equivalent scores (METS) per week of the participants

<table>
<thead>
<tr>
<th>IPAQ METs Categories per week</th>
<th>Number of participants</th>
<th>% of participants</th>
<th>Physical activities intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;600</td>
<td>61</td>
<td>11.8</td>
<td>low</td>
</tr>
<tr>
<td>600-3000</td>
<td>251</td>
<td>48.7</td>
<td>medium</td>
</tr>
<tr>
<td>&gt;3000</td>
<td>203</td>
<td>39.4</td>
<td>high</td>
</tr>
</tbody>
</table>

4.3.4 Participants’ Belief in the Efficacy of Physical Activity

The participants’ beliefs in the statement that “physical activity practice as an ideal means of maintaining ideal weight and for the prevention of certain body ailments” indicated that 2.1% of the participants strongly disagreed with the statement, 12.1% of the participants disagreed with the statement, 55.5% of the participants were undecided with the statements, 16.7% of the participants agreed with the statement and 13.6% of the participants strongly agreed with the statement (Figure 4.4).
4.3.5 Observation Checklist of the Schools Facilities of the Participants

The observation checklist used to assess the schools facilities, students participation in physical activities and trainers’ involvement in the physical activity practice. Results showed that all the schools in this study had functional physical activities facilities (sporting and functional fields). The result also indicated that physical activity participation in their schools was compulsory as entrenched in the school’s timetable. The schools physical activity trainers were involved in physical activity practice during the schools games.

4.4 Distribution of the BMI for Age of the Participants

The body mass index (BMI) for age of the respondents as classified by (WHO, 2007) showed that 29.1% were underweight, 66.0% were of normal weight, 24.7% were overweight and 0.2% obese. Furthermore, based on the sex of the participants,
47.7% of the male participants were underweight, 0.6% was overweight and 0% was obese. Also, 19.8% of the female participants were underweight, 6.7% was overweight and 0.3% was obese (Table 4.11).

Table 4.11. Summary of participants body mass index for age (BMI for age) as classified by (WHO, 2007)

<table>
<thead>
<tr>
<th>BMI for age</th>
<th>Categories of weight status</th>
<th>Male participants n=172</th>
<th>Female participants n=343</th>
<th>Total participants n=515</th>
<th>Mean (BMI) for age of all the participants (kg/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15th percentile</td>
<td>Underweight</td>
<td>82</td>
<td>47.7%</td>
<td>68</td>
<td>19.8%</td>
</tr>
<tr>
<td>15th -84.5th percentile</td>
<td>Normal weight</td>
<td>89</td>
<td>51.7%</td>
<td>251</td>
<td>73.2%</td>
</tr>
<tr>
<td>85th -97th percentile</td>
<td>Overweight</td>
<td>1</td>
<td>0.6%</td>
<td>23</td>
<td>6.7%</td>
</tr>
<tr>
<td>&gt;97th percentile</td>
<td>Obese</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>172</td>
<td>100%</td>
<td>343</td>
<td>100%</td>
</tr>
</tbody>
</table>

Footnote.- * BMI for age in (kg/m²) was calculated to give the mean BMI for age of all the participants.
Figure 4.5. Participants (BMI) for age by sex compared with WHO (2007) Standard

Figure 4.6. All participants (BMI) for age compared with WHO (2007) Standard
4.5 Factors Associated with Overweight and Obesity.

The relationship between overweight and obesity, food consumption pattern and physical activity of the adolescents’ students in public secondary schools in Kwara state of Nigeria was investigated based on the Body Mass Index (BMI) for age.

4.5.1 Relationship between Food Consumption Pattern, Physical Activity and the Body Mass Index for Age

Pearson’s correlation was used to determine the relationship between the dependent variable (overweight and obesity) based on BMI for age (WHO, 2007) and independent variables (food consumption pattern and physical activity level). The relationships were determined at p< 0.05 level of significance. ANOVA was used to test the hypothesis on the variance between food consumption pattern score of the respondents and the BMI for age categories as well the variance between the metabolic equivalent scores (METs scores) of physical activity of the respondents and Body Mass Index for age categories at p< 0.05 level of significance.

4.5.2 Relationship between BMI for Age, FC P and PA for the Participants

Bivariate correlation analysis was done using SPSS version 20. The BMI for age, FCP and PA correlated using correlation coefficient. The BMI for age has weak relationship with FCP (r=0.012, p=0.785). The BMI for age has negative relationship with PA(r= -0.105, p = 0.017) (Table, 4.12).
Table 4.12. Relationships between BMI for age, FCP and PA for the participants

<table>
<thead>
<tr>
<th>Variables</th>
<th>P value</th>
<th>Coefficient of correlation(r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI and food consumption pattern (FCP)</td>
<td>P=0.785</td>
<td>0.012</td>
</tr>
<tr>
<td>BMI and physical activity level (PA)</td>
<td>P=0.017</td>
<td>-0.105</td>
</tr>
</tbody>
</table>

4.5.3 ANOVA Test of FCP and PA in Mets Based On (BMI) for Age of the Participants

Mean composite score for food consumption pattern was calculated as a composite score of the 20 foods selected from the questionnaire. In group 1 (carbohydrates) foods selected were (potatoes chips, spaghetti, doughnut, and yams). Group 2 (fats and oils), foods selected were (roasted peanut, margarine, salad dressing and peanut butter). Group 3 (fatty proteins), foods selected were (milk shakes, pork, burger and ice-cream). Group 4 (sugary beverages and fruits drinks and whole fruits), food selected were (soda, chocolate, fruits drinks and fruits). A score of 80 means participants ate all the 20 selected foods in 5 or more times in a week. A score of 20 is the minimum, meaning participants never eat any of the 20 selected foods. The result indicated that food consumption pattern mean scores were 61.36±11.44 for underweight, 65.84±11.64 for normal weight and 70.24±9.58 for overweight. The respondents food consumption pattern based on their BMI for age categories varied significantly p<0.01(Table, 4.13). Furthermore, the mean METS scores were 2235.72±1670.86 METs for underweight, 2263.81±1534.69 METs for normal weight and 2506.56±1376.69 METs for overweight. The mean METs score based on the BMI for age categories did not vary significantly (p=0.725) (Table, 4.13).
Table 4.13. ANOVA test of FCP and PA based on BMI for age categories of the participants

<table>
<thead>
<tr>
<th>Body mass index (BMI) For age categories</th>
<th>Number of participants n=515</th>
<th>Mean composite scores for (FCP)</th>
<th>Physical activity (METs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>150</td>
<td>$61.36\pm11.44^a$</td>
<td>$2235.72\pm1670.86^c$</td>
</tr>
<tr>
<td>Normal weight</td>
<td>340</td>
<td>$65.84\pm11.64^b$</td>
<td>$2263.81\pm1534.69^a$</td>
</tr>
<tr>
<td>Overweight</td>
<td>25</td>
<td>$70.24\pm9.58^c$</td>
<td>$2506.56\pm1376.69^e$</td>
</tr>
<tr>
<td>P-value (ANOVA)</td>
<td>515</td>
<td>p=0.001</td>
<td>p=0.725</td>
</tr>
</tbody>
</table>

Foot note- scores with different letters varied significantly with BMI for age categories while scores with same letters did not vary significantly with the BMI for age categories.
CHAPTER FIVE: DISCUSSION

5.1 Demographic Characteristics of the Adolescent Students

The demography of the participants in this study indicates that 54% of the participants were between (16-18) years old, 50.3% of them lived with parents and about 61.7% of the participants walked to school. The demography further indicates that about 62.1% of the parents and guardians of participants attained primary level of education and 68.1% of the parents and guardians engaged in farming as their occupation. This result was similar to the findings reported by (Olubanji-Ojofeitimi et al., 2011) among public and private students in secondary schools in Osun State, Nigeria. Olubanj-Ojofeitimii et al findings reported that 60.8% of the participants in his study were between (15-19) years old, and about 50.3% of them lived with their parents. Furthermore, about 74.8% of participants’ parents and guardians engaged in unskilled occupation, meaning that they engaged in any form of work to earn a living. This study demography result clearly illustrates that majority of the participants come from the lower socioeconomic background where facilities such as motor cars and motorcycles are rarely used. In addition to that, the parents and guardians of participants’ low educational level limit their ability to engage in professional occupations which could fetch them more income thereby improving their standard of living. Conversely, participants’ ability to engage in walking to school may influence their physical activity level. The demographic characteristics of the participants in this study might have contributed to the low prevalence of overweight and obesity among the adolescents.

Studies from related literature confirmed that the level of education attained by children’s parents and type of occupation engaged- in were among the
socioeconomic factors that encouraged high prevalence of overweight and obesity among the adolescents especially in the cities and urban areas (Hafiz et al., 2012).

The result of this study also agreed with Ene-Obong et al., (2012) findings where it was found that overweight prevalence among adolescents in Nigeria was affected by location. The demography characteristics of participants in this study is in contrast with most studies of similar nature that were mostly carried out among the private schools students especially in urban areas. This has put the students in public schools at a disadvantage because there is a fewer data on the prevalence of overweight in adolescent in the rural areas (Gupta, Goel, Shah, & Misra, 2012; Steyn, Nel, Parker, Ayah, & Mbithe, 2011; Viner et al., 2012; Wrotniak et al., 2012).

5.2 Breakfast Consumption Pattern of the Participants

Breakfast is one such meal that most people usually skip particularly by the adolescent and this could lead to over consumption. Excess food consumption influences adolescent weight gain and results in overweight and obesity (Agostoni et al., 2011; Arora et al., 2012; Basch, 2011; Fulkerson et al., 2011; Hallström et al., 2013). Breakfast consumption pattern in this study indicates that about 77% of the participants eat breakfast meal before going to school. However, this finding was in contrast to the finding reported by (Doku et al., 2013) in Ghana in which only 31% of the adolescents take breakfast. Skipping breakfast may lead to low blood sugar level thereby causing dizziness and inactivity especially among adolescents who are rapidly going through emotional, physical, and intellectual developmental stages (Arora et al., 2012; Izuora et al., 2013; Sawyer et al., 2012). Breakfast consumption pattern of the participants in this study might have influenced their low food
consumption and this could reduce the prevalence of overweight and obesity among the participants.

5.2.1 Carbohydrates Consumption Pattern of the Participants

Carbohydrates in form of snacks were mostly consumed by the participants in this study. About 40% of the participants consume snacks (doughnut and biscuits) between 3-4 times per week. The finding of similar study carried out by (Wang et al. 2010) in Chicago among African- American adolescents was in contrast with the finding in this study because about 75% of the adolescent in Chicago study consume snacks in three or more times per day. However, the finding of this study was similar to the finding in a study carried out among 401 adolescents in secondary schools in Osun state, Nigeria by (Olumakaiye et al., 2010). Olumakaiye et al. reported that about 33% of the adolescents consume 2-3 times per week. The finding in this study clearly illustrates that snacks consumption among adolescents is gradually on the increase. Although, snacks consumption might be relatively lower among adolescents in African countries compared to their counterpart in more developed countries such as United State of America.

Studies on adolescents’ dietary consumption pattern both in Africa and among African emigrants in USA and Europe revealed that Africans irrespective of their age were consuming more refine foods than their traditional starchy roots and tubers which are very rich in fibre and some B Vitamins (Salvo, Frediani, Ziegler, & Cole, 2012; Smpokus et al., 2013; Vernarelli, Mitchell, Hartman, & Rolls, 2011). This study’ finding on carbohydrates consumption pattern of the adolescents also agreed with the study carried out by (El-Gilany & Elkhawaga, 2012) in Egypt where about 34% adolescents of both sexes eat snacks daily. Snacking is becoming a norm
among adolescents and adults alike because of the increasing outlet for fast foods, food marketing and advertisements. This trend has contributed immensely to high prevalence of non-communicable diseases that are being experienced in Africa and other developing world (Chiang et al., 2011; Kearney, 2010; Morrell, Lofgren, Burke, & Reilly, 2012; Orsi, Hale, & Lynch, 2011; Pollock et al., 2012). Comparatively, low frequency of snacks consumption may be a factor in reducing overweight and obesity among the participants in this study.

5.2.2 Fats and Oil Consumption Pattern of the Participants

The mostly consumed fats and oil rich foods were peanut butter, vegetable oil and Groundnut and soybeans cheese. These are energy dense foods that contain fat soluble vitamins such as Vitamins A, D, E, and K. They also facilitate absorption of these vitamins from other source. The mean consumption of fat and oil by the respondents was low and this was in contrast with the study conducted by (Sedodo, Akinlotan, Akinlua, Abosede, & Isaac, 2014) on dietary diversity scores among undergraduate students in western Nigeria, the fat and oil consumption was high compared to the recommended allowance. However, intervention studies on dietary consumption pattern and nutritional status of adolescents have shown that dietary consumption which comprises of between 10-15 % of fat has positive relationship in maintaining ideal weight among the adolescents (Hamilton-Ekeke, 2013).

5.2.3 Proteins Consumption Pattern of the Participants

Fatty protein consumption in form of dairy products (ice-cream and yogurt) is consumed by the majority of participants in this study. The finding in this study shows that 68.9% of participants consume dairy products between 1-2 times in a week. A similar study by (Palenzuela et al., 2014) revealed that about 66.7% of
adolescents in his study consume dairy products daily. However, the finding of this study disagrees with the finding of a similar study conducted in Ghana among children between (9-12) years old by (Abibat et al., 2013). Abibat et al., reported that animal protein consumption (dairy products) was low, and about 73% of the participants did not consume eggs and fish and meat were consume occasionally. Similarly, a study on food intake and meal pattern of adolescents in schools that was conducted in Ila-Orangun, south-west, Nigeria by (Ogunkunle and Oludele, 2013) indicated that 42% of the adolescents had low protein intake and 51% of the adolescents also had low fat and oil intakes. Protein is one of the macronutrients that are very essential for tissues production, development, body fluids synthesis, and its deficiency can result in retarded growth and wasting. The mean protein consumption of the respondents was two times per week; this was far below the expected consumption requirement for adolescents that are still going through another stage of rapid growth. The findings of this study was supported by the similar study conducted by Dapi et al., (2011) among adolescents in secondary schools in urban Cameroon in which more than 50% of the adolescents’ boys and girls consumed proteins below the recommendations.

However the findings of this study was in contrast with a study conducted by Adebusoye et al., (2014) in which most of the adolescents assessed consumed proteins adequately. Generally African consumed more carbohydrates than other macronutrients; this could be as a result of poverty, food insecurity and poor livestock managements as was observed by various studies on animal protein consumption among African (Salvo et al., 2012; Smith et al., 2013; Vorster, Kruger, & Margetts, 2011). Low frequency of fatty protein consumption observed in this
study makes the participants food consumption inadequate and unhealthy, and this can lead to both low weight gain and deficiencies in some essential amino-acids. The low frequency of protein consumption can also contribute to participants’ low prevalence of overweight and obesity.

5.2.4 Sugary Beverages, Whole Fruits and Fruits Juices Consumption of the Participants

Fruits and vegetables consumption are very essential for the supply of micronutrients such as vitamins, minerals, edible fibres’ and simple sugars that are required in some amounts for physiological processes of individuals. The finding of this study shows that about 56.5%, 41.0%, 43.5% of participants consumed one form of fruits or the other and 48.9% consume chocolate drinks between (1-2) times in a week. The result of this study was in agreement with (Onyiriuka et al., 2013) in which only 15% of the adolescents consumed fruits and vegetables. Other studies have also reported low fruits and vegetables consumption by the adolescents but they were equally associated the paradigm to low level of familial meals, meal skipping and accessibility to sugary fruit drinks (Ding et al., 2012; Goldfield et al., 2011; Grimes, Riddell, Campbell, & Nowson, 2013; Hu & Malik, 2010; Pollock et al., 2012).

However high sugary beverages and fruit drinks as well as low vegetables consumption have significantly been attributed to increase prevalence of overweight and obesity, colon cancer, diabetes and other manifestation of non-communicable diseases that are becoming rampant among the children and adolescents all over the world (Juonala et al., 2011). Excessive consumption of these beverages is associated with weight gain and obesity. Intake of more than one to two drinks per day is also
linked to the metabolic syndrome (MS), insulin resistance, type 2 diabetes, cardiovascular diseases, hypertension, gout and non-alcoholic fatty liver disease (Brand-Miller, Atkinson, & Rowan, 2013; Caballero, 2015; Grimes, Riddell, Campbell, & Nowson, 2013; Irabor & others, 2014). While sugar sweetened beverages (SSBs) contributed significantly to the daily caloric intake, the reports on the food consumption of people around the world indicated that millions of people consume as much as 20% of their caloric intake from the SSBs and healthy individuals can fulfil their daily energy needs without having to consume caloric fluids in form of added sugar and sugar sweetened beverages (Caballero, 2015). The low frequency of fruits and vegetables observe in this study may influence the prevalence of overweight and obesity among participants because the energy content of most fruits and vegetables are very minimal compared to other nutrients.

5.3 Physical Activity Practice of the Participants

Physical activity involvement has been confirmed to be beneficial to human physiology because it improves oxygen retention capacity of the lungs and blood circulation (Brambilla, Pozzobon, & Pietrobelli, 2011). The World Health Organization (WHO) has recommended moderate to vigorous physical activity practice for children and adolescents daily in order to reduce sedentary lifestyles. The physical activity also reduces symptoms of anxiety and depression, build self-confidence and develop neuromuscular awareness (coordination and movement control) of adolescents and maintain healthy body weight among them. Globally, 81% of adolescents aged 11-17 years were insufficiently physically active in 2010 according to WHO’s report and adolescent girls were less active than adolescent boys, with 84% vs. 78% not meeting WHO recommendations (WHO, 2014).
5.3.1 Hours of Sleep by the Participants

The hours of sleep by the participants indicated that more than 50% of them slept for between seven to eight hours in a day. The total duration for both afternoon and night sleep met the recommendations by the physical education experts (Garaulet et al., 2011). The finding of this study agrees with the study conducted by Garaulet et al., among 3311 adolescents from 10 European cities in Austria where it was found that average sleep of the adolescent was eight hours of sleep in a day. Adolescents who slept less than 8 hours per day were more sedentary and they have higher values of BMI, body fat, waist and hip circumferences and fat mass. Studies have associated short sleep duration with weight gain in people and adolescents short sleeps were attributed to the use of electronics particularly television and social media use. These phenomena contribute to adolescent frequent snacks consumption and poor active life (Gubbels, Assema, &Kremers, 2013; Lipsky & Iannotti, 2012; Peltzer, 2010).

Furthermore, adequate sleep will be very beneficial to children and adolescents if it is complemented with physical activity because accumulation of energy without the means of its expenditure could lead to high prevalence of non-communicable diseases among adolescents especially female adolescents who are highly prone to weight gain and obesity. The higher proportion of the participants in this study who had the recommended duration of sleep in a day may be one of the contributing factors to their low overweight and obesity of the participants.

5.3.2 Physical Activity Pattern of the Participants

Certain physical activities have been classified as moderate to vigorous intensity by the sports experts and physical education specialists. These activities promote
energy expenditure and the level of the energy that may be expended depended on the type of activity and length of involvement in such physical activity daily or in a week. The physical activity pattern of the participants indicates that only about 32% of them involved in jogging/running daily and about 40% of the participants spend between (30-40) minutes in a day on one form of physical activity or the other. The participants’ physical activity intensities per week based on IPAQ guidelines indicates that more than forty five per cent of the participants is moderately active in a week. The finding of this study supports the study conducted by (Eberechukwu et al., 2013) in Nigeria among the rural and urban adolescents. The results showed that rural adolescents were proportionately active than their urban counterparts but their physical actively practice was still low because only about 14% per cent of the rural adolescents performed sporting activities daily. Walking from home to school could be attributed to some participants’ ability to meet the moderately recommended physical activity intensity as a lot of the participants’ energy might have been expended. This finding clearly illustrates certain physical activity practice of participants may reduce overweight and obesity among the participants in this study. Majority of the participants were undecided in their attitude towards physical activity practice as a means of preventing certain ailments and maintaining ideal weight. Most studies report low physical activities practice among adolescents in schools which is attributed to schools and neighbourhood environments that are not conducive. This phenomenon contributes immensely to the high prevalence of overweight and obesity among the adolescents in the developing countries (Berge, Arikian, Doherty, & Neumark-Sztainer, 2012; Mugwang’a, 2014; Vilchis-Gil, Galván-Portillo, Klünder-Klünder, Cruz, & Flores-Huerta, 2015).
5.3.3 Physical Activity Facilities in Schools

One of the factors that can discourage children and adolescents to actively participate in sporting activity in the schools as a form of physical activity is the lack of sport and recreation facilities in schools or at home, lack of parks, sidewalks, air pollution and dirty environment, high density traffic, fear of violence and crime in outdoor areas (Chatterton, Younger, Fischer, Khunti, & others, 2012; Dobbins, Husson, DeCorby, & LaRocca, 2013; Tremblay, Boudreau-Larivière, & Cimon-Lambert, 2012). However the schools in this study, participants’ schools (100%) were well equipped with sporting facilities. The facilities available in the participants’ schools include the functional field, games materials (i.e. balls, table tennis, hockey sticks).

Furthermore, finding on schools facilities shows that all the schools made physical activity compulsory and certain period allocated for its practice daily in their schools’ time-table. Other factors that encourage physical activity practice and participation among the participants include the involvement of the school trainers in the physical activity and also the engagement of the participants in other energy reduction activity in the schools. Available physical activity facilities may contribute to low prevalence of overweight and obesity among participants in this study because those facilities could encourage participants’ participation in physical activity. According to WHO (2014), In 2013, WHO Member States agreed to a target of reducing insufficient physical activity by 10% by 2025 and included strategies to achieve their target in "Global Action Plan for the Prevention and Control of Non-communicable Diseases 2013-2020". The strategies to be adopted to achieve this lofty goal include the provision of safe spaces and facilities for
students to spend their free time actively; quality physical education supports, inculcating in children attitude of developing behaviour patterns that will keep them physically active throughout their lives and making sports and recreation facilities available for everyone to do sports. Other strategies include making walking, cycling and other forms of active transportation accessible and safe for all and establishing labour and workplace policies to encourage physical activity.

5.4 Body Mass Index (BMI) for Age of the Participants

Adolescence is the foundation of the future health of the nations (Sawyer et al., 2012). Healthful eating habits and active lifestyle through improved physical activity practice will help adolescents to maintain appropriate weight and reduce pandemic of obesity especially in developing countries like Nigeria. Finding in this study on body mass index (BMI) for age indicate that overweight prevalence based on sex of participants is 0.6% in male and 6.7% in female. In addition to that, obesity prevalence based on sex is 0% in male participants and 0.3% in female participants. Furthermore, overweight prevalence for all participants is 4.7% and obesity is 0.2%. Equally worthy of mentioning here is the underweight and normal weights of participants which are 29.1% and 66.0% respectively.

The finding of this study agrees with finding from similar study conducted by (Olubanji-Ojofeitimi et al., 2011) among adolescents in private and public schools in Osun state, Nigeria. Olubanji-Ojofeitimi et al., reported that 4.0% of adolescents girls in private schools were overweight and 1.2% of them were obese, while 2.3% of adolescent girls in public schools were overweight and none was obese. However, the finding in this study is in contrast with another similar study conducted by (Ene-Obong et al., 2012) on prevalence of overweight, obesity and thinness among urban
school aged children and adolescents in southern, Nigeria. Ene-Obong et al., (2012) reported that overweight prevalence in his finding was 11.4% while obesity prevalence was 2.8%, and that overweight was higher (13%) among adolescents 10 to 18 years than among children 5 to 9 years which was (9.4%). The finding was similar to many of the results obtained by African researchers on adolescents’ body mass index where it was discovered that many of the adolescents studied were underweight, while overweight and obesity among them were less than 10% especially in the rural areas of Africa (Izuora et al., 2013; Manyanga, El-Sayed, Doku, & Randall, 2014; C. Napier & Oldewage-Theron, 2015; Nti, Pecku, & Opare-Obisaw, 2015; Oladunni & Sanusi, 2014).

However the finding was in contrast with the results obtained by most western and European researchers where the prevalence of overweight and obesity were proportionally higher than Africans but underweight prevalence was much lower than what was found in Africa (Gupta, et al., 2012; C. E. Napier & Hlambelo, 2014; C. Napier & Oldewage-Theron, 2015; Wells, Marphatia, Cole, & McCoy, 2012). This should be expected as most African families are still experiencing the double burden of malnutrition and underweight, stunting and wasting are very common among African children. These situations are closely attributed to food insecurity, poor sanitation, inadequate maternal and child care and endemic tropical diseases (Maher, et al., 2010; Popkin, et al., 2012; Seligman, et al., 2010; Thompson, et al., 2010).

Low overweight and obesity prevalence observe among the participants in this study shows clearly that overweight and obesity is still lower in rural setting than in urban adolescents. This further illustrates that overweight and obesity is comparatively
fewer in public schools among adolescents than their counterpart in private schools especially in Kwara state, Nigeria.

5.5 The Relationship between Food Consumption Pattern, Physical Activity Level and Overweight and Obesity of the Participants

The finding on relationship between food consumption pattern and BMI for age of participants in this study indicates that a relationship ($r=0.012$) exits between the two variables but the relationship is not significant ($p=0.785$). Furthermore, finding on relationship between physical activity level and BMI for age of participants shows that a negative relationship ($r=-0.105$) exits between the two variables and the relationship is significant ($p=0.017$). The finding of this study varies with finding of similar study conducted by (Bruenning et al., 2012) on the relationship between adolescent and eating behaviour. Bruenning et al., (2012) reported that relationship exists on the eating behaviour of adolescent and the relationship was significant ($p=0.038$). However, the finding agrees with the finding of similar study carried out by (Alkahtari et al., 2015) on relationship between self-reported dietary intakes and measured physical activity among male students in Saudi Arabia. Alkahatari et al., (2015) reported that relationship exist between physical activity level and BMI of the students, and the relationship was significant ($p=0.048$). The findings on relationships between food consumption and physical activity and BMI for age of participants in this study clearly illustrates that food consumption pattern and physical activity have influence on the participants overweight and obesity status. Overweight and obesity status of participants will increase as they consume more foods, meaning that this study fails to reject the null hypothesis that states that there is no significant relationship between food consumption pattern and overweight and
obesity of the students. On the hand, overweight and obesity status of the participants will reduce as they engage in more physical activity. Therefore, this study failed to accept the Null hypothesis which stated that there was no significant relation between the respondents’ physical activity level and BMI for age. Other findings in this study show that participants eat according to the BMI for age categories as the result shows, mean composite scores for underweight is (61.36±11.44), normal weight is (65.84±11.64) and overweight mean composite scores is (70.24±9.58). This clearly illustrates that food consumption pattern (FCP) is proportional to the weight categories of the participants, meaning that overweight participants consume more than those who are within normal weight and so on. This finding of this study agrees and confirms several studies conclusion that overweight and obesity is strongly associated with the food consumption and frequency of its consumption (Aounallah-Skhiri et al., 2012; Cutler, Flood, Hannan, Slavin, &Neumark-Sztainer, 2012; Dubois, Farmer, Girard, Burnier, &Porcherie, 2011; Franks et al., 2010; Fulkerson et al., 2011).

Several literature have attributed the high prevalence over weight and obesity among people to the rising level of other non-communicable disease condition such as diabetes, hypertension, certain form of cancer, arthritis, kidney problems and metabolic syndrome in general. This shows that the lower the BMI of the people the less the risk of the non-communicable diseases and the healthier the people will be especially the adolescents who are the future leaders of tomorrow.
CHAPTER SIX: SUMMARY, CONCLUSION AND RECOMMENDATIONS

6.1 Summary of the Findings

The demographic characteristics of the students indicated that adolescent student girls were twice adolescent student boys. Majority of the adolescent parents and guardians only had primary school education and farming was their main occupation. Higher proportion of the adolescents lived with their parents and guardians while others lived alone.

The majority of the adolescents consumed breakfast before going to school and about a quarter of them skipped their breakfast. More than a half of them added two teaspoonful of sugar to their beverages daily while a third of them added up to four teaspoonful of sugar to their beverages during consumption daily. The adolescent’s consumption of refined carbohydrates was about three times in a week and starchy roots and tubers were consumed once in a week. The fatty protein foods and fat and oil rich foods were consumed two times in a week while fruits, sugary beverages and whole fruits were consumed three times in a week.

More than 50% of the adolescents slept for more than seven hours daily while only about 10% slept for about four hours. Adolescents students mainly walked to schools from their homes and a proportion of them went to school on motorcycle. The physical activity level of the adolescents based on the metabolic equivalents scores (METS) were between moderate and high intensity. The schools had functional facilities to promote sporting activities in form of physical activities. Schools made sport compulsory for all students to participate fully in the games and recreations. The weekly physical activity practice of the adolescents was three times
in a week and majority of them did not believed that regular physical activity can prevent certain body ailments and as well as help to maintain an ideal weight.

A significant proportion of the adolescents was underweight and only 4% were overweight with less 1% of the adolescent classified as obese. The finding was an indication of low frequency of food consumption, moderate to high physical activity intensities of the adolescents and low socio economic status of most of their parents. There was a weak positive relationship between food consumption pattern and BMI for age of the participants. Furthermore, there was a weak negative relationship between physical activity level and BMI for age of participants

6.2 Conclusion of the Findings

The participants’ demographics might have influenced their low food consumption pattern. Walking to school could have improved their physical activity level. The prevalence of overweight and obesity of the participants was low and this was in line with several similar studies. The low body mass index (BMI) for age and the high underweight observed could be attributed to the rural area they lived, their frequency of food consumption and energy reducing activity they engaged in within their domain. The schools as the agents of behavioural change can curtail any weight abnormalities that may develop among the adolescents because of the structured system that were put in place in form of games and available functional sporting facilities. The participants’ food consumption pattern and physical activity level greatly relate to participants overweight and obesity.
6.3 Recommendations

6.3.1 Recommendation for Practice

The low BMI for age within the normal range and the high underweight observed in the study points to a need for the adolescent parents and guardians to ensure that frequency of food consumption of their children are improved. This can be achieved by increase frequency meals of the participants and also prepare lunch from home should be given to them to take to school daily. This will help to improve their food consumption. In addition, the schools authorities should establish appropriate food cafeteria in their schools where nutritious meals will be served for those students who may not come with their lunch.

6.3.2 Recommendations for Policy

The high underweight and low BMI observed could be attributed to the adolescent’s demography which indicated that majority of their parents had low level of education and engaged in farming as their main occupation. Empowering the adolescent parents by ensuring an improvement in the resources allocation to the rural communities in form of improved social amenities to stimulate economic development will enhance the majority of the parents and guardians standard of living.

6.3.3 Suggestion for Further Research

This study could be extended to other local governments’ areas in the state so as to obtain adequate information on the food consumption pattern, physical activity level and the overweight and obesity prevalence of the adolescents in public schools in the state.
Further research can also be conducted on the factors that determine the physical activity practice among the adolescents in public and private schools and how those factors contribute to the prevalence of overweight and obesity of the adolescents. Intervention studies can be carried out on the socio-economic status and food consumption pattern of the families in the rural area and its effect on overweight and obesity prevalence of adolescents and children.

Studies on the food consumption and physical activity of boarding and day students in Kwara state can also be research into so as to compare the level of activity and food consumption of the two groups.
REFERENCES


APPENDICES

Appendix A

LETTER OF INTRODUCTION

I am Mr. Lateef O. Jimoh a postgraduate student from the department of foods, nutrition and dietetics of Kenyatta University Nairobi in Kenya. I am in your school to carry out a research on the Food consumption patterns and physical activity in relation to overweight and obesity among secondary school students in Kwara State. The benefits of this study include the opportunity for you to measure your weight and height. It will also help you to know your food consumption pattern and how physically active you have been. This study will not harm you in any way but rather make you to be conscious of the food you eat and the physical activity you engage- in. You will be required to fill a food frequency table and physical activity questionnaire. Also your body weight and height will equally be measured. Therefore if you are interested and willing to participate in the research, you should signify by writing your name in the space provided below and append your signature or thumb print.

LETTER OF CONSENT

I..............................................., as the parent of.............................................have been duly informed about this study and I have directed my child to participate in the study willingly. I therefore append my signature/thumb print on this letter of consent and confidentiality.

Signature.............................................. Date......................................................
Appendix B:

QUESTIONNAIRE

SECTION A: DEMOGRAPHIC CHARACTERISTICS

1). Student Questionnaire Number ..............................................................

2). Sex: Male  [ ] Female [ ]

3). Date of Birth: ……………………….. Age (years)  ……………………………

4). School: …………………………… Year of Admission: ……………………….

5). Residence: ………………………… City: ………………………………………

6). Who do you live with? ……………………………………………………………

7). The highest education level that your parents have attained (Father/Mother)
   (a) None (b) primary (c) secondary  (d) university (e) others .....................

8). What is the occupation of your parents ……………….. (Father/Mother)

9). What mode of transport do you use to come to school (a) bicycle (b) motorcycle
    (c) public transport  ( d) trekking  ( e) parent’s car

SECTION B - WEIGHT AND HEIGHT MEASUREMENT (to the nearest meters)

10). Weight Measurement (Kg) 1st Reading ……… 2nd Reading ………

   Average ………

11). Height Measurement (M) 1st Reading ……… 2nd Reading ………

   Average ………
SECTION C: FOOD CONSUMPTION FREQUENCY TABLE

1). Do you normally eat breakfast every morning?
   (a) Yes     (b) No

2). Where do you usually eat breakfast? 1. Where do you usually eat breakfast?
   □ At home       □ at school       □ don’t eat breakfast       □ others,
   Specify........................................................................................................

3). How many times each week (including weekdays and weekends) do you usually eat breakfast prepared away from home?
   □ Never or almost never
   □ 1 – 2 times per week
   □ 3 – 4 times per week
   □ 5 or more teaspoon per day

4). How many teaspoons of sugar do you ADD to your beverages (tea, porridge, coffee, etc) or food each day?
   □ None/less than 1 teaspoon per day
   □ 1-2 teaspoon per day
   □ 3–5 teaspoons per day
   □ More than 6 teaspoons
5). How often do you eat any of these foods items at home or school in a week? (Weekend inclusive)

<table>
<thead>
<tr>
<th>S/N</th>
<th>FOOD ITEMS</th>
<th>Never per week</th>
<th>1-2 times Per week</th>
<th>3-4 times Per week</th>
<th>5 or more times per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Starchy roots ,tubers &amp; refined cereals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Yam/cassava(boiled/roasted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Boiled Irish potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Boiled sweet potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Boiled whole bran rice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Maize (boiled/roasted)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>Oat bran meal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Doughnuts &amp; biscuits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Potatoes chips&amp; fried potatoes</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>9</td>
<td>Spaghettis, noodles &amp; Popcorn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Fat &amp; oil rich foods</strong></td>
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</tr>
<tr>
<td>10</td>
<td>Peanut butter</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Vegetable oil in soup/stew</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Butter/margarine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Salad dressing/mayonnaise</td>
<td></td>
<td></td>
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<tr>
<td>14</td>
<td>Groundnut (boiled/roasted)</td>
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<tr>
<td>15</td>
<td>Soybeans cheese</td>
<td></td>
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<tr>
<td></td>
<td><strong>Fatty proteins foods</strong></td>
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<tr>
<td>16</td>
<td>Fried fish &amp; roasted meat</td>
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<tr>
<td>17</td>
<td>Whole milk&amp; milk shakes</td>
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<tr>
<td>18</td>
<td>Burgers/hot dogs</td>
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<tr>
<td>19</td>
<td>Pork/bacon</td>
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<tr>
<td>20</td>
<td>Ice-cream &amp; frozen yogurt</td>
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<tr>
<td>21</td>
<td>Meat pies &amp; fish rolls,</td>
<td></td>
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</tr>
</tbody>
</table>
SECTION D: PHYSICAL ACTIVITY QUESTIONNAIRE

Instruction: tick appropriately

1). For how long do you normally sleep at night?

☐ 3-4 hours ☐ 5-6 hours ☐ 7-8 hours ☐ More than 8 hours

2). How often do you exercise your body daily?

☐ A little ☐ Rarely ☐ Sometimes ☐ None ☐ Regularly

3). What physical activity do you usually do in a day?

☐ Skipping ☐ Walking ☐ Bicycling ☐ Jogging/running

☐ Others, Specify

........................................................................................................................................

4). For how long do you engage in any physical activity daily?

☐ 10 mins ☐ 20-30 mins ☐ 30-40 mins ☐ 50-60 mins ☐ > 1 hour

5). In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, play football and volleyball)

☐ Hardly ever ☐ Sometimes ☐ Quite often ☐ Always
6). In the last 7 days, what did you normally do after (besides eating lunch?)

☐ Relax and sleep-off  ☐ Ran/played a little  ☐ Ran/played hard most of the time
☐ Sat down (talking, reading, doing schoolwork)  ☐ Stood/walked round

7). In the last 7 days, how many days right after school did you do sport, dance or play games in which you were very active?

☐ None  ☐ 1 time last week  ☐ 2 or 3 times last week
☐ 4 times last week  ☐ 5 times last week

8). How much time do you spend doing moderate – intensity activities at work on a typical day?

   Hours ........................................... Minutes ........................................

9). On the last weekend, how many times did you do sport, dance or play games that caused small increase in breathing or heart beat such as brisk walking, carrying light load for at least 10 Minutes continuously?

☐ None  ☐ 1 time  ☐ 2-3 times  ☐ 4 times  ☐ 5 times

10). Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places

   ☐ Yes  ☐ No

11). Mark how often you do physical activity (like playing, sport, games and dance) or any other physical activity for each day last week.

<table>
<thead>
<tr>
<th>Days</th>
<th>None</th>
<th>Little bit</th>
<th>Medium</th>
<th>Often</th>
<th>Very often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
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<tr>
<td>Tuesday</td>
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<tr>
<td>Sunday</td>
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</tbody>
</table>
12). Which of the following statements describe your best for the last 7 days?

☐ All or most of my free time was spent doing things that involve little physical effort
☐ I sometimes (1-2 times last week) did physical things in my free time (e.g. played sport, went running, swimming, bike riding, aerobics)
☐ I often (3-4 times last week) did physical things in my free time.
☐ I quite often (5-6 times last week) did physical things in my free time.
☐ I very often (7 or more times last week) did physical things in my free time.

13). Were you sick last week or did anything prevent you from doing your normal physical activities? Yes ☐ No ☐

14). If yes, what prevented you? Specify.................................................................

15). Do you agree that engaging oneself in physical activity regularly can prevent certain ailment and helps you to maintain ideal weight?

Strongly disagree ☐ Disagree ☐ Undecided ☐ Agree ☐ Strongly Agree ☐
## Appendix C:

### OBSERVATION CHECKLIST

<table>
<thead>
<tr>
<th>S/N</th>
<th>During research data collection process, does the school has/done any of the following</th>
<th>1-Yes</th>
<th>2-No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Are there available field/play grounds for physical activity practice in the school?</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>Does the school have physical activity trainers/games masters?</td>
<td></td>
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<tr>
<td>3</td>
<td>Is physical activity practice part of the daily school 'time table'?</td>
<td></td>
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<tr>
<td>4</td>
<td>Are the students observed while engaging in physical activity practice?</td>
<td></td>
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<tr>
<td>5</td>
<td>For how long does the students engage in physical activity practice daily &lt;30mins, &gt;30mins.</td>
<td></td>
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<tr>
<td>6</td>
<td>Do the students participate fully in the school physical activity practice?</td>
<td></td>
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<tr>
<td>7</td>
<td>Is the school playing ground functional? (overgrown grass, well-cut out lawn and dilapidated wood wall)</td>
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<tr>
<td>8</td>
<td>Are there physical activity facility items such as football, basketball, table tennis, etc in the school?</td>
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<tr>
<td>9</td>
<td>Does the school make physical activity compulsory for the students?</td>
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<tr>
<td>10</td>
<td>Does the physical activity trainer usually brief the students at the beginning of the practice?</td>
<td></td>
<td></td>
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<tr>
<td>11</td>
<td>Are there other energy consuming activities that the students engaged-in?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Are the trainers involved in the physical activity practice in order to encourage students’ participation?</td>
<td></td>
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</tr>
</tbody>
</table>
Appendix D:

THE MAP OF NIGERIA

A map of Nigeria - 36 states and federal capital territory (FCT) Abuja

Source: http://realfilmcareer.com/photowqdb/maps-of-nigerian-states
Appendix E:

THE MAP OF KWARA STATE

Source: Regional Challenges to HIV/AIDS Prevention in a Rural Community in Kwara State, Nigeria: Nutritional and Educational Strategies (Olasehinde et al., 2009)

NB: Kwara state is safe and had not experienced any civil or political crisis in the recent past
Appendix F:

WHO BMI FOR AGE FOR BOYS GRAPH
Appendix G:

WHO BMI FOR AGE FOR GIRLS
Appendix H:

KENYATTA UNIVERSITY APPROVAL FOR RESEARCH DATA COLLECTION

KENYATTA UNIVERSITY
GRADUATE SCHOOL

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 57530

FROM: Dean, Graduate School
DATE: 15th March, 2015

TO: Mr. Lateef Owolabi Jimoh
C/o Food, Nutrition & Dietetics Dept.
KENYATTA UNIVERSITY

REF: HGF/24362/11

SUBJECT: APPROVAL OF RESEARCH PROPOSAL

This is to inform you that the Graduate School Board at its meeting of 11th March, 2015 approved your M.Sc. Research Proposal entitled “Dietary Consumption Patterns and Physical Activity in Relation to Overweight and Obesity among Secondary School Students in Kwara State Nigeria”.

You may now proceed with your data collection, subject to clearance with the Principal Secretary, Higher Education, Science and Technology.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed supervision tracking forms per semester. The form has been developed to replace the progress report forms. The Supervision tracking forms are available at the University's Website under Graduate School webpage downloads.

Thank you.

ANNABEL MWANIKI
FOR DEAN, GRADUATE SCHOOL

c.c. Chairman, Food, Nutrition & Dietetics Dept.

Supervisors:

1. Dr. Enice Ng'gou
C/o Food, Nutrition & Dietetics Department
KENYATTA UNIVERSITY

2. Dr. Festus Kiplamai
C/o Sport Science Department
KENYATTA UNIVERSITY

AM/nn
Appendix I:

KWARA STATE TEACHING SERVICE COMMISSION (KSTSC) PERMIT FOR RESEARCH EXERCISE
Appendix J:

KWARA STATE UNIVERSAL BASIC EDUCATION BOARD (KSUBEB) ETHICAL REVIEW COMMITTEE APPROVAL TO CONDUCT RESEARCH.
Appendix K:

PERMISSION OBTAINED FROM THE SELECTED SCHOOLS FOR THE RESEARCH STUDY

EIGHT PUBLIC SECONDARY SCHOOLS WERE RANDOMLY SELECTED IN IREPUDUN LOCAL GOVERNMENT AREA OF KWARA STATE FOR THE STUDY

Eight (8) public Secondary Schools were randomly selected in Irepuden Local Government Area, In Which the Research on "Dietary Consumption Pattern, Physical Activity in Relation to Overweight and Obesity among the Public Secondary School Students in Kwara State", would be Carried Out. The schools selected were as follows;

1. Okeya High School, Okeya-Ipo.
2. Buni Comprehensive High School, Buni.
7. Oyo Grammar School, Oyo.