

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCE
UNIVERSITY OF GHANA**



**FACTORS ASSOCIATED WITH CHILDHOOD OVERWEIGHT AND OBESITY
IN SCHOOL CHILDREN IN SEKONDI- TAKORADI METROPOLIS**

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**THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA,
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DECLARATION

I, **Akua Boadiwaa Amoh-Yeboah**, declare that except for other people's research which have been duly acknowledged, this thesis proposal is the result of my original work undertaken under supervision and that it has neither in whole nor in part been presented for another degree in this university or elsewhere.

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DEDICATION

I dedicate this work to the Almighty God for His grace and strength, to my dear mum Arabella Conduah and siblings Kwame Amoh-Yeboah and Akosua Gyankomah Amoh-Yeboah for the support and assistance.



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DEFINITION OF TERMS

Overweight: body mass index for age greater than one standard deviation above WHO growth reference median

Obesity: body mass index greater than two standard deviations above WHO growth reference median

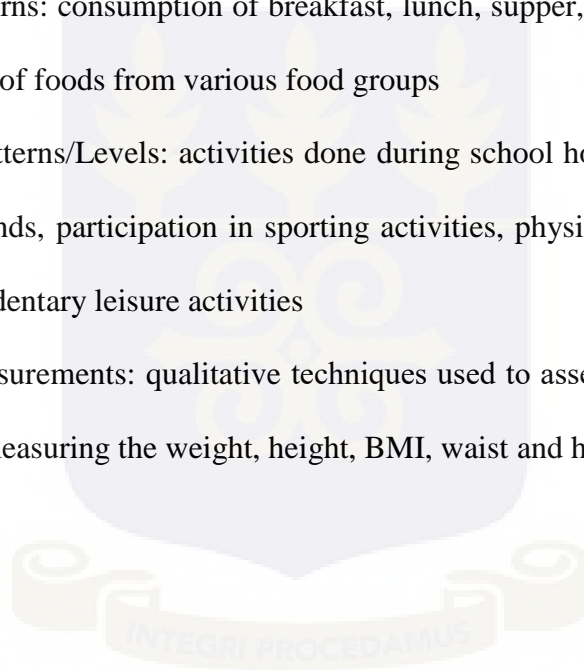
Underweight: body mass index less than 2 standard deviations below the WHO growth reference median

Body Mass Index: is weight in kilograms divided by square of height in meters

Dietary Habits/ Patterns: consumption of breakfast, lunch, supper, snacks, meal frequency and amount, choices of foods from various food groups

Physical Activity Patterns/Levels: activities done during school hours, after school hours, evenings and weekends, participation in sporting activities, physical education in school, and time spent on sedentary leisure activities

Anthropometric measurements: qualitative techniques used to assess an individual's body fat composition by measuring the weight, height, BMI, waist and hip circumference.



ABSTRACT

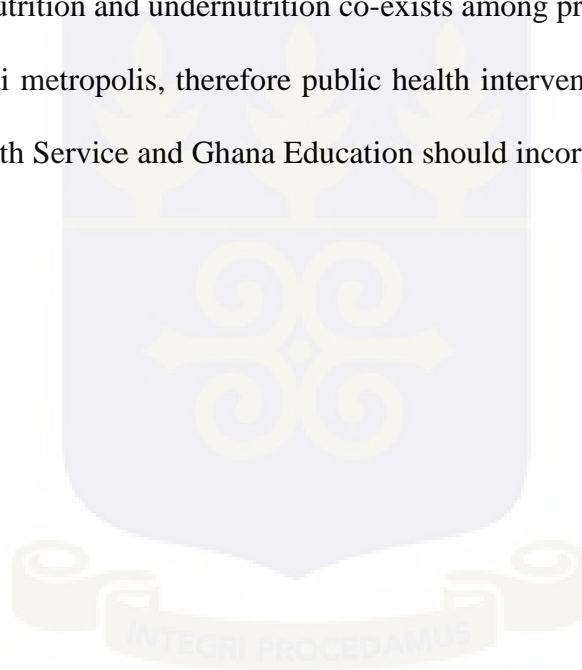
Background: Childhood overweight and obesity is being noted as a serious public health concern and contributes to 2.6 million deaths globally. Overweight and obesity once established in infancy persist through childhood and adulthood leading to an increase in the risk of Non-communicable diseases. The study was conducted to determine and compare the prevalence and factors associated with overweight and obesity among private and public primary school children in the Sekondi-Takoradi Metropolis.

Methods: A cross-sectional study was conducted from April-July 2017 in the Sekondi-Takoradi metropolis of Ghana. Using a multi-stage random sampling, 497 school children between the ages 8-16 years were recruited from 8 primary schools (4 private, 4 public). Data collection involved interviews using a structured questionnaire, including the Food Frequency Questionnaire (FFQ), Physical activity questionnaire for children and Anthropometric measurements (weight, height and BMI). Data obtained from structured questionnaires and FFQ were analyzed using STATA version 13 to generate frequencies and percentage distributions. Anthropometric measurements, i.e. weight (kg) and height (cm) with other required variables were exported into the WHO AnthroPlus software where BMI for age was calculated and used to classify the age and sex-specific nutritional status of the pupils. Associations between demographic and socio-economic characteristics, dietary-related factors, physical activity levels and overweight/obesity were tested using bivariate and multiple logistic regressions respectively at < 0.05 significant level.

Results: Combined prevalence of overweight and obesity among primary school children in Sekondi-Takoradi metropolis was 29.4%. The study revealed an overall overweight prevalence of 13.7%, obesity prevalence of 15.7% and underweight prevalence of 16.5%.

Combined overweight and obesity prevalence was higher in private schools compared to public schools (44.5% vs. 13.9%, $p < 0.001$). Overweight was found significantly higher in children less than 12 years of age. School type (being in the private school), pupils with mothers with formal education, mothers with tertiary level of education, being in the middle socio-economic status and having lunch from the school feeding programme were significantly associated with the BMI after controlling for age, sex, physical activity levels, area of residence and other dietary-related factors.

Conclusions: Overnutrition and undernutrition co-exists among primary school children in the Sekondi-Takoradi metropolis, therefore public health interventions with collaboration from the Ghana Health Service and Ghana Education should incorporate measures to avert the burden of both.



LIST OF ABBREVIATIONS

AC – Air Conditioner

BMI – Body Mass Index

CDC – Centers for Disease Control and Prevention

CVD – Cerebro Vascular Diseases

EU – European Union

FFQ – Food Frequency Questionnaire

PAQ-C – Physical Activity Questionnaire for children

SES – Socio-economic Status

UNICEF – United Nations Children’s Fund

WHO – World Health Organization



CHAPTER ONE

INTRODUCTION

1.1 Background

Childhood overweight and obesity are being noted as a serious public health issue worldwide. The prevalence of overweight and obesity are rising globally at a disturbing rate in both developed and developing countries during the past decades. (Aduama, 2004, Hijian-Tilaki et al., 2013. In 2010, WHO estimated that about 1.5 billion people above the age of 20 years and over 42 million children under 5 years worldwide were overweight and almost 35 million of these were in developing countries (Amidu et al., 2013, Alangea, 2015). It has also been estimated that 25% of children in the United States are overweight and 11% obese with the prevalence rate of childhood obesity in developing countries less compared to that of developed countries. Despite these facts, the percentage of obese children is increasing in both cases and currently almost all the developed and developing countries are experiencing an epidemic of obesity with differences between and within countries. (Amidu et al., 2013). Rural areas of developing countries have been generally highlighted with regards to nutrition intervention, because under nutrition is more prevalent than in urban areas. However, there has been a change and children in the urban areas are at risk of both over-nutrition and under nutrition. In the past 30 years, childhood obesity has more than tripled. Obesity prevalence among children aged 6 to 11 years has increased from 6.5% in 1980 to 19.6% in 2008. Obesity prevalence among 12- 19 years adolescents has increased from 5.0% to 18.1%. (Jacob, 2008).

According to Opuni-Frimpong (2015), nationally representative surveys conducted in developing countries have documented a high prevalence of overweight in basic school pupils. Countries like Mexico, India, Argentina and Brazil reported prevalence rates greater than 15% between 2008 and 2011. As at 2010, the estimated prevalence in Africa was 8.5%,

and is expected to increase to as high as 12.7% by 2020.

A study by Abachinga (2001) reported a prevalence of 19.3% of school aged children in Legon and Achimota in Ghana.

Another study conducted in basic schools in Accra by Mohammed and Vuvor (2012) documented obesity prevalence rate of 10.9% among children in the University of Ghana Primary School. The same study indicated a combined prevalence of overweight and obesity of 26.7% (Opuni-Frimpong, 2015). All these findings confirm the existence of overweight and obesity in Ghanaian school children and thus the need to monitor the prevalence and identify associated factors to target interventions.

Overweight and obesity in children is of public health importance because once it is established in infancy, it persists through childhood and adulthood (Alangea, 2015, Mohammed et al., 2012, Peltzer et al., 2011, Amidu et al., 2013). According to Aduama, (2004) about one- third of obese pre-school children become obese in adulthood, and one-half of obese school-age children become obese adults.

Childhood overweight and obesity is a major determinant for several non-communicable diseases which affects physical health and well-being conferring both short and long-term health consequences. Notable among these are impaired glucose tolerance, insulin resistance and diabetes (type 2) and the metabolic syndrome (Alangea, 2015, Steiner-Aseidu et al., 2012); increasing the risk of orthopedic problems, sleep disorders, respiratory disease, depression, anxiety, cancers and many cardiovascular diseases (such as high cholesterol, hypertension, dyslipidemia) (Amidu et al., 2013, Gupta et al., 2012). Being obese in childhood and adolescence contributes to premature mortality and long term increase in morbidity in adulthood and is associated with impaired health during childhood itself. (Peltzer and Pengpid, 2011, Alangea, 2015).

WHO defined overweight and obesity as abnormal or excessive fat accumulation that may impair health. Obesity, which is the Body Mass Index (BMI) greater than or equal to 30 kg/m^2 and overweight, which is BMI greater than or equal to 25 kg/m^2 of an individual, is a major risk factor for several non-communicable diseases. (World Health Organization, 2015).

WHO report also indicates that primary cause of this problem is an energy imbalance between calories consumed and calories expended. Risk factors associated with childhood overweight and obesity such as parents' obesity status, prenatal over-nutrition, inappropriate dietary choices (increase intake of energy-dense foods high in fats and simple sugars), decreased level of physical activity, sedentary lifestyles, changing modes of transportation and increasing urbanization account for this energy balance. Energy balance is influenced by genetic, physiologic and environmental factors. (World Health Organization Report 2015).

In order to emphasize the extent to which obesity has become a problem, the American Medical Association classified it as a disease to get physicians and all stakeholders to pay more attention to this condition (American Heart Association, 2010).

Due to the growing problem of obesity among children and adolescents in developed countries, prevention strategies and interventions have been adopted. A few of such interventions are the body mass index (BMI) measurement programs in schools in the United States for surveillance and screening purposes by the Centers for Disease Control and Prevention (CDC) in 2007 and the "Let's Move" childhood obesity campaign launched by the First Lady of the United States in 2010 with the aim to solve "the childhood obesity problem within a generation". However, there is limited information on such interventions in developing countries, particularly Ghana. So this study is an attempt to provide data on

the prevalence and factors associated with childhood overweight and obesity among school age children, and to identify appropriate interventions to inform policy in prevention and management. More so, most studies on childhood obesity in Ghana are concentrated in urban areas and since Sekondi- Takoradi has experience a surge of urbanization and socio-economic changes due to the oil activities in Western region resulting in the influx of foreign and domestic workers, this development has been accompanied by a change in lifestyle of the inhabitants therefore it will be of much interest and importance to identify the situation in the Metropolis.

1.2 Problem Statement

Childhood overweight and obesity are increasing globally at an alarming rate in both developed and developing countries. About 10% of the world's school age children are estimated to be overweight and about 2-3% of them obese, with an increased risk for chronic diseases. (WHO, 2015). Childhood obesity was considered a problem of affluent countries, but until recent times, this problem is appearing in developing countries including Ghana, especially in affluent urban areas. In a typical Ghanaian society, a child who is fat is thought of as a healthy child from an affluent home, however research has proven this may not be so. Childhood obesity has been linked to several contributing factors such as social and economic (place of residence, parents cultural background, socio-economic status and family income), lower physical activity levels, high sedentary behavior (playing video/computer games and television viewing times) and dietary behavior such as eating foods away from home (Amidu et al., 2013). Several studies have shown that children in private schools have higher prevalence of obesity in Ghana compared to those in public schools (Amidu et al.,2013). This was due to reasons such as children from affluent homes were usually enrolled in private schools and had relatively inactive lifestyles and always transported to school compared to public school children who usually walk to and from

school. Also children from affluent homes in private schools had access to daily pocket money and could afford snacks and lunch with high calories. Childhood obesity is a major risk for several non-communicable diseases which may persist through childhood and adulthood. It has adverse consequences on premature mortality, psychological disorders and long term increase in physical morbidity in adulthood. Several studies conducted in urban areas of Ghana confirms the existence of overweight and obesity in school children (Opuni-Frimpong, 2015). In Ghana, overweight and obesity have caused an increase in non-communicable diseases which have contributed significantly to the nation's disease burden accounting for over 82,000 deaths. (Globocan, 2012). However, there is paucity of information available on the actual prevalence of overweight and obesity among school children in both private and public schools in Ghana, and appropriate interventions to help address this issue.

1.3 Justification

Due to difficulty in treatment of childhood obesity and the long-term health consequences associated with it, it has become crucial to take measures to prevent or address the development of obesity at its onset rather than allowing children to develop and be put on lifelong treatment. In order to identify strategies in preventing childhood obesity with its associated problems, there's the need to carry out comprehensive studies of its prevalence and determinants. Also preventive strategies and interventions is very difficult to implement in developing countries especially Ghana as data available on its prevalence and determinants is insufficient. To the best of my knowledge and literature available there's limited data on childhood overweight and obesity in the Sekondi-Takoradi Metropolis, thus necessitating this study. The results of this study therefore intends to add to existing knowledge on the actual prevalence of childhood obesity, the dietary habits and physical activity in school going children. Findings of this study would be vital and useful to key

stakeholders (schools, health workers and policy makers) in adapting effective strategies and interventions for obesity control and prevention in schools. This study will also enlighten school authorities and parents on their roles and responsibilities in the prevention and management of overweight and obesity among school aged children.

1.4 Research Questions

- ✓ What is the prevalence of overweight/obesity among the primary school children in Sekondi-Takoradi Metropolis?
- ✓ Is there a difference in prevalence among private and public school children in the Sekondi-Takoradi Metropolis?
- ✓ What are the socio-economic factors associated with overweight/obesity among these pupils in Sekondi-Takoradi Metropolis?
- ✓ What are the dietary habits and patterns among the school children in the Sekondi-Takoradi Metropolis?
- ✓ What are the levels of physical activity among the children in the Sekondi-Takoradi Metropolis?
- ✓ Is childhood overweight/obesity associated with socio-economic status of parents in the Sekondi-Takoradi Metropolis?

1.5 Objectives of the Study

1.5.1 General: To determine factors associated with childhood overweight/obesity in school children in Sekondi- Takoradi Metropolis

1.5.2 Specific

- ✓ To determine prevalence of overweight/obesity in children in private and public schools in Sekondi-Takoradi
- ✓ To determine socio-economic factors associated with childhood overweight/obesity among the school children
- ✓ To identify dietary habits associated with childhood overweight/obesity
- ✓ To determine the levels of physical activity of the school children

1.6 Hypotheses

- ✓ There is no statistically significant difference between the prevalence of overweight and obesity in school children 8-17 years in private and public schools in Sekondi-Takoradi
- ✓ There is no statistically significant difference between the levels of physical activity of the school children (in private and public schools)
- ✓ There is no statistically significant difference between the dietary habits and eating patterns of the school children (in private and public schools)
- ✓ There is no statistically significant difference between the prevalence of overweight and obesity and socio-economic status of private school children
- ✓ There is no statistically significant difference between the prevalence of overweight and obesity and socio-economic status of public school children

1.7 Conceptual Framework

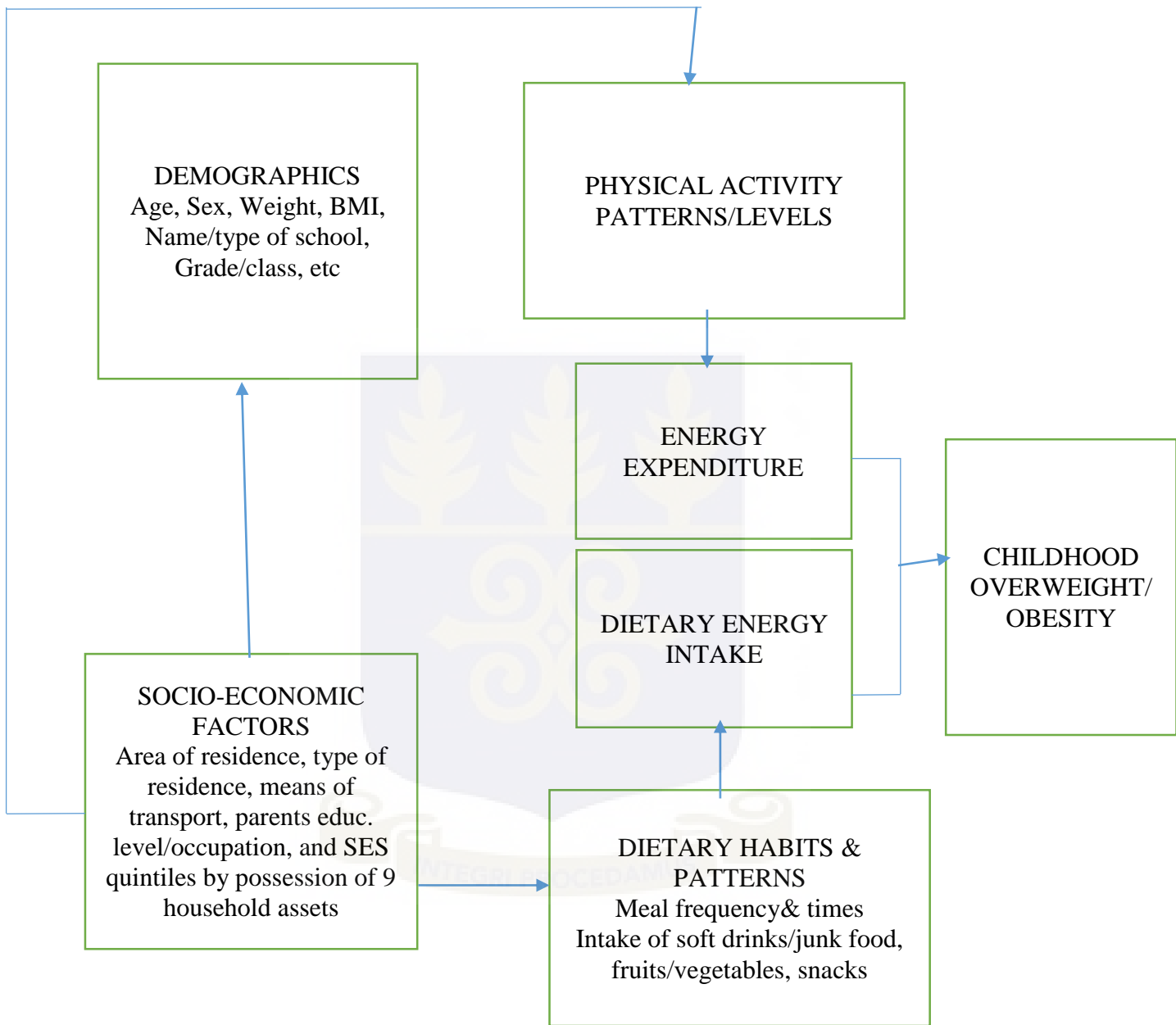
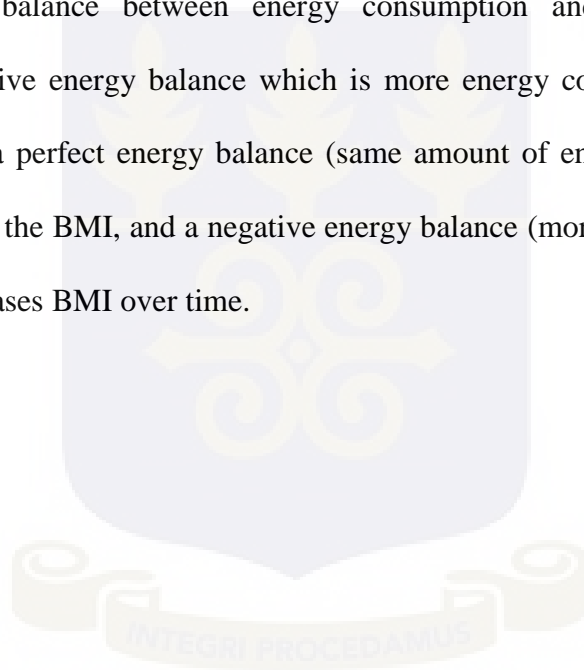


Figure 1: Conceptual Framework of factors associated with childhood overweight and obesity

1.7.1 Conceptual Framework Narrative

Socio-economic factors have direct influence on certain demographics such as the type of school, weight and BMI of school children but not sex. The socio-economic factors directly influence the physical activity patterns/levels and dietary habits of the pupils both at home and the school environment. Physical activity patterns translate into physical activity levels or status which impacts the total energy expenditure of school children. Dietary habits and patterns also reflect in the actual intake of foods which contribute to the total dietary energy intake of the children. The resulting nutritional status (BMI) of the school children will be dependent on the balance between energy consumption and expenditure through metabolism. A positive energy balance which is more energy consumed than expended increases the BMI, a perfect energy balance (same amount of energy intake and energy expended) maintains the BMI, and a negative energy balance (more energy expended than energy intake) decreases BMI over time.



CHAPTER TWO

LITERATURE REVIEW

This chapter presents the pertinent literature in relation to the study objectives. It covers the following thematic areas:

- Concept of overweight and obesity
- Burden of childhood overweight and obesity
- Causes of childhood overweight and obesity
- Obesity and socio-economic factors
- Assessment of child weight status
- Dietary assessment in children
- Physical activity assessment in children
- Prevention and control of childhood overweight and obesity

2.1 Concept of Overweight and Obesity

Childhood overweight and obesity is defined as an excessive accumulation of fat or adipose tissue to an extent that impairs health (WHO, 2015). Largely, obesity is likely to develop when there is energy imbalance between calories consumed and calories expended over a long period of time. The cause of childhood overweight and obesity is linked to several contributing factors and not just ascribed to excessive caloric consumption and low expenditure (Alangea, 2015). “Causes of childhood obesity have been attributed to changes in dietary patterns characterized by a low intake of vegetables and fruits, frequent snacking and high intakes of energy dense foods combined with increased sedentary activities among children.” (Reilly et al., 2003, Adair and Popkin, 2005). Childhood overweight and obesity is extremely important because it is likely to track into adulthood’ (Wardle et al., 2006).

Irrespective of the increasing number of children portrayed to be overweight or obese, there is a deficiency of an in-depth scientific meaning of these terminologies and lack of lucidity

about how they must be surveyed (Livieri et al. 2003). Notwithstanding, there are guidelines that can be employed to help health care professionals figure out if a child is overweight or obese.

According to Ruxton (2004), “obesity is an excess of body fat, with overweight being viewed as a less severe excess of body fat than obesity.” Although overweight might simply refer to body weight, weight alone is not a correct measure of whether the problem exists. There are several strategies that can be employed to evaluate the volume of body fat with considerable accuracy.

Body mass index (BMI) mostly used for adults, is usually used to determine whether an individual is considered obese or overweight. BMI greater than $25\text{kg}/\text{m}^2$ is defined as overweight and a BMI greater than $30\text{kg}/\text{m}^2$ is defined as obese. For children, there is no general agreement (Ruxton 2004). BMI calculated from height and weight should be used and inferred using percentiles (Kaur et al. 2003). Cole et al. (2000) used the adult body mass index cut-off point of $25\text{kg}/\text{m}^2$ and $30\text{kg}/\text{m}^2$ to indicate overweight and obesity respectively. Percentile scores out of these was calculated to estimate overweight or obesity in children. Cole et al.’s (2000) tool is thought to be the most precise measurement of overweight and obesity in children age 2-6 years (Rolland-Cachera 2004), in spite of the fact that Ruxton (2004) proposes 4 years as the minimum age for diagnosing this problem.

2.2 Burden of Childhood Overweight and Obesity

Kimm (2003) stated that obesity and overweight in children is an ‘emerging pandemic of the new millennium’. According to Wilson (2003) there has been a continuous rise in the occurrence of childhood obesity within the past 20 years in the UK, with Caroli and Lagravinese (2002) submitting that the prevalence of childhood obesity has doubled with a rise of about 50%. Balaban and Silva (2004) stated that obesity has been projected to affect

about 20-25% of children in the United States of America. Obesity has therefore become an issue of concern worldwide (Kaur et al. 2003) among nations with the United Kingdom (Wilson 2003), Italy (Gasparrini et al. 2003), New Zealand (Turnbull et al. 2004), South America (Guigliano and Carneiro 2004) Japan (Yoshinaga et al. 2004) and India (Ramachandran et al. 2002) where the demand for interventions and strategies have been identified.

Overweight and obesity in children is currently viewed as a serious issue of public concern globally (Knehans, 2002). The surge in obesity prevalence in children has health implications expected to negatively affect the lives of a high proportion of the population both in childhood through adulthood. This will be a major negative effect on health care resources if action is not taken to reverse the trend and help children and young people who are overweight or obese adopt healthy lifestyles to improve their health (Ehtisham and Barrett 2004).

The overall prevalence of youth obesity and overweight increased from 4.2% to 6.7% somewhere around 1990 and 2010. Per these happenings, the aggregate number of children anticipated that would be overweight and obese by 2026 is evaluated to be around 60 million as indicated by Malik et al, (2013). The WHO (2015) likewise affirms a quick overall increment of the rate of adolescence corpulence with the quantity of overweight and fat youngster under age 5 anticipated to ascend from more than 42 million in 2013 to 70 million by 2025 meaning an expansion in pervasiveness of around 67%.

In the developed countries, childhood obesity and overweight is a subject of regular discussion and mounting open concern. The European Union (EU) in its Action Plan on Childhood Obesity crossing 2014-2020 uncovered that out of each three children chosen from an EU nation in 2010 between the ages 6-9 years, one is overweight or large. In

Canada, utilizing the WHO cut off focuses, near 33% (31.5%) of 5 to 17year olds, an expected 1.6 million, were delegated overweight (19.8%) or corpulent (11.7%) in 2009 to 2011. The rate that was overweight was comparative crosswise over age bunches. In the United States, around 16.9% of kids matured somewhere around 2 and 19 were heavy in 2011 to 2012, and 31.8% were either overweight or obese. Europe is one of the landmasses hardest hit by the ascent in commonness rates of adolescence weight. Nations, for example, The United Kingdom, Finland and Germany have obesity rates more than 20% (Stamatakis et al., 2010).

In Africa, however there is little to report with respect to reviews on children obesity and overweight, the accessible information focuses to an expansion in this age section. South Africa recorded 1% of school children somewhere around 8 and 11 years to be obese in 1994. This figure had ascended to around 17% by 2006 (Snell et al., 2007). Blössner et al. (2010), likewise introduced youth overweight and obesity prevalence rate in Africa as at 2010 as 8.5% and anticipated an ascent up to 12.7% in 2020 if current patterns proceed.

In Asia, studies in India and Kuwait among school children recorded prevalence rates of 14% and 45% separately (Chusilp, 2003). Oceania additionally has commonness rate in twofold digits (Olds et al., 2010).

Information on early childhood overweight and obesity in Ghana have been gathered by the demographic and health survey which reported overweight commonness increments from 0.7% in 1987 to 5% in 2008 (GSS et al., 2009). Among school age children, pilot studies concentrated in Accra reported overweight and obesity predominance of over 12% and 5% individually among school children (Goh, 2006, Aduama, 2004). Additionally, a later overview of school-going children tested from schools in the two biggest urban areas of Ghana (Accra and Kumasi) assessed an aggregate overweight and obesity of 15% (Ghana

School Survey, 2012). Outside Accra, another study in Tamale indicated overweight and obesity prevalence of 9.8% and 7.5% respectively (Amidu et al., 2013). From the Central region, Kwaw et al. (2013) also documented a combined prevalence of almost 50% with prevalence of obesity 23.9% amongst the school children.

2.3 Causes of Childhood Overweight and Obesity

The cause of overweight and obesity in children is thought to be a multifaceted dynamic of the balance between energy intake and expenditure in the context of an individual's environment, behaviour and genes (Balaban and Silva 2004). The links between genetics and environmental factors in obesity in children are particularly difficult to disentangle from one another because children usually have similar eating habits/patterns and approaches to physical activity as their parents (Nguyen et al. 1996).

2.3.1 Diet- related behaviours

In Ghana, children belong to all family members. It is a normal thing to see relatives buying gifts for children during festive seasons and even ordinary days when they return from journeys. However, these gifts often come in the form of foods such as chocolate, ice cream, toffees, drinks which are typically high in sugar and occasionally fat. Regrettably, these components of food are some of the major culprits of childhood obesity (Steele-Dadzie and Dogbe, 2014). Furthermore, food is used as rewards for children in most instances. Gradually these make children eventually develop the appetite for these foods and in most cases prefer more of these fat and sugary foods more than well-balanced meals served at home.

2.3.2 Energy Balance

High intake of energy and low expenditure of energy have been recognized as the main cause of overweight in humans. However, Atkin and Davies (2000) showed that there is no

difference in the consumption of energy dense foods between obese and non-obese persons. Though there is a likelihood that self-reports of dietary consumption confound these results (Balaban and Silva 2004 and Strauss (1999) state that people who are obese, especially grown-ups normally under estimate and report the amount of food consumed. Another study by Fox (2004) indicated that self-reports in children are mostly undependable especially concerning recall of foods taken including snack consumption.

In the prevention and treatment of overweight and obesity, it is important to know whether the resting basal metabolic rate of people likely to be obese are lower than that of lean people. Strauss (1999) documented that there is no significant difference in the metabolic rates of obese adults but on the contrary, overweight adults have their metabolic rates higher than that of adults who are lean. These outcomes are pertinent to overweight or obesity in children in the sense that, it debunks the speculation which states the common cause of overweight is having a low basal metabolic rate.

The function of fats in an individual being obese relative to total energy consumption has been an issue of discussion. A study by Chen et al. (2002) revealed that consumption of diets high in fat is a determinant of obesity in children. This mirrors the results of three systematic reviews of randomized controlled trials in adults which revealed that a decrease in the fat consumption leads to a substantial decrease in body weight (Astrup 2002). Nonetheless, a study by Willet (2002) revealed that, irrespective of a decrease in dietary fat intake of children and adults in the United States, there is still a rise in the occurrence of obesity. They proposed that other factors, such as low physical activity levels, may be responsible for the high incidence of overweight and obesity. Aihaud and Guesnet (2004) suggest that 'while the absolute fat content of diets may be unchanged, or may even be reduced, an increase in polyunsaturated fatty acids may account for these apparently

contradictory findings'. 'Polyunsaturated fats are potent in adipose genesis in vivo during the gestation and lactation periods and thus changes in the fatty acid composition of ingested fats, rather than the total fat content of ingested food, may be important in the development of obesity and overweight across populations, in both adults and children' (Aihaud and Guesnet 2004).

2.3.3 Sedentary behaviour

According to Livingstone et al. (2003) physical inactivity has been linked with being obese but causal relationship has not been proven. Tremblay and Willms (2003) and Giugliano and Carneiro (2004) suggest an association between physical inactivity and obesity. Vandewater et al. (2004) also documented that children who are heavier, mostly engaged in inactive activities. Livingstone et al., (2003) suggest that physical activity levels are difficult to measure in adults and mostly challenging with regards to children, because of their complex and different physical activity patterns. Moore et al. (2003) however, employed a gadget which children were made to wear to assess their total physical activity levels (but had to be taken off when swimming and bathing). Distinct from other measurements, the gadget involved organized and incidental activity which helped to accurately assess overall physical activity of the children. They found that children with the highest activity level between ages 4-11 years had lesser weight gain, BMI, triceps and skinfold throughout childhood. While there is been a challenge about what is believed to be an acceptable level of physical activity (Livingstone et al. 2003), Reilly and McDowell (2003) distinguish some proof to buttress the proposition that interventions in addressing sedentary activity is pertinent to controlling obesity.

Television viewing which is part of sedentary lifestyle, has explicitly been associated with obesity (Livingstone et al. 2003). Therefore, a decrease in sedentary behaviour which can

be achieved by replacing television viewing with more physical activities, which eventually reduces the publicity to food-related adverts during television viewing hours (Caroli and Lagravinese 2002). In United States, there has been a projection that there is a probability of children and adolescents watching about 22,000 advertisements on television each year (Caroli and Lagravinese 2002). In Europe, there is little proof to buttress the association between obesity and television viewing, however food advertisement was found to be frequently shown during the hour's children watch TV programs. According to Lewis and Hill (1998) cereal, sweets and savory snacks account for about 60% of all food adverts. Jeffrey et al. (1982) implied that there is an increase in children's requests and purchase for foods with poor nutrition seen in adverts while watching television. Worldwide data from about 105 countries showed that 80% and more of adolescents aged 13-15 years failed to meet the required 60 minutes of moderate to vigorous physical activity daily with girls defaulting (Hallal et al., 2012). Another study by Nader et al (2008) indicated a significant reduction in moderate to vigorous physical activity levels of school- aged pupils within ages 9 – 15 years.

Obesity develops one pound per time, as such this lifestyle over a long period of time contributes to the surge in the prevalence of childhood obesity. Malhotra et al. (2015) admonishes that promoting physical activity over recommendation to eat healthily is a wrong approach to combat obesity as one cannot over run a bad diet and the junk food industry is to blame largely for the high increase in obesity rates.

2.4 Obesity and Socio-Economic Factors

Overweight prevalence among children has been observed to be connected with the socio-economic status (SES) of the neighborhood. For example, Oliver et al. (2005) established that children in lower SES neighborhoods had higher chance of being overweight compared

with those from higher SES neighborhoods in Canada. Also similar associations were found among the adult populations (Pearce et al., 2007).

Results from a cross-national correlation of patterns in overweight status from 1989 – 2007 (in 37 developing countries) found that high household SES was associated with higher gains in overweight prevalence (27 studies) contrasted with lower SES (10 studies) being connected with overweight prevalence (Jones-Smith et al., 2011). The authors also observed that gross national domestic product was clearly linked to quicker rise in overweight prevalence among the lower wealth groups as suggested by other investigators (Wang and Lobstein, 2006). This indicates that developing nations are likely to record increasing levels of childhood obesity since they are and will keep on experiencing economic developments.

A later survey of school-age children's data from sub-Saharan African nations (Muthuri et al., 2014b) propose that high household socioeconomic status was connected with higher body composition measures. The authors found 19 out of the 24 studies reported associations between higher SES and higher body composition, while the remaining found no significant associations.

For the most part, when inflation across all goods is adjusted for, food cost dropped throughout the years (Cawley, 2010), yet, prices of fruits and vegetables continue to rise. The current structure of food prices puts high fats and sugars at the lowest costs for calorie provision. Individuals and families with limited incomes will in response to these price changes select energy dense foods in order to save money which leads to poor quality diets and subsequent poorer weight and health outcomes. Evidence from the USA shows that the price increases of fruits and vegetables by 17% from 1997 to 2003 was associated with increased BMI among children and adolescents (Auld and Powell, 2009). Huang and Lin (2000), reported that a 10% reduction in fruit and vegetable prices increased consumption

by 7.2%. Evidence on the role of food prices in low income countries is lacking. Although it will be difficult to assess the exact impact of fruit and vegetable prices on consumption among the large rural populations engaged in farming, data can be provided on urban families which presents higher odds of overweight/ obesity. This information on diet quality and costs can inform national food policy and strategies to modify the food environment to improve outcomes especially among low- resourced families and settings (Story et al., 2008).

2.5 Assessment of Child Weight Status

Body Mass Index (BMI) is generally acknowledged as an index for characterizing weight status of individuals. Indices such as weight-for-height, weight-for-age and height-for-age, and weight percentiles have also been used to define weight status in children and adolescents (WHO, 2000).

Cole et al (2000) developed a definition of child overweight and obesity in light of broadly illustrative information from about six countries. The authors suggested sex-specific body mass index cut-off points for children by inferring BMI cut-off points of 25kg/m² and 30kg/m² representing overweight and obesity respectively at age 18 years. Although the authors recommend the use of these cut-offs for international comparisons of overweight and obesity, there have been arguments that the reference data used by the authors were not representative of non-western populations hence could not clearly establish the health consequences for children across different population above those cut-offs as has been seen in adult populations. Regardless, observation by Wang et al. (2000) and Abrantes et al. (2003) propose that the standard definitions for overweight and obesity published by Cole et al., (2000) is comparable with the WHO standards for assessing overweight and obesity in children and adolescents.

The WHO released new growth standards in April 2006 for infants and young children (WHO Multicentre Growth Reference Study Group, 2006) and for school-age children and adolescents (World Health Organization, 2006). The reference cut-offs for younger children was constructed on data on well, breastfed kids with no known restrictions to growth from six countries from varied geographical regions (Ghana, Brazil, India, Norway, Oman and the United States). The reference ranges for school- aged children and adolescents was also based on data combined from the WHO child growth standards and the 1977 National Center for Health Statistics/ WHO growth reference from age 5 to 19 years (De Onis et al., 2007).

Although BMI is extensively used as a population measure of weight status, there are limits to its use among pediatric populations (Higgins et al., 2001) since it is just a measure of excess weight relative to height, rather than excess fat. It has been argued that measured BMI is not related to immediate biological risk for disease in children and poorly correlated to fat mass in younger ages. Researchers have therefore proposed percentage of fat standards for defining health related obesity in children (Blizzard, 1996). Williams et al. (1992) established cut-points of 30% fat and 25% fat for defining obesity in girls and boys respectively. Also using skinfold measurements as Williams et al.,(1992), Dwyer and Blizzard (1996) established similar cut-points for boys and girls at 20% fat and 30% fat respectively.

Improving over previous methodologies, Higgins et al. (2001) using dual x-ray absorptiometry (DXA) derived two cut-off points, an upper 33% body fat and a lower cut-point 20% body fat to be associated with adverse cardiovascular risk profiles in children aged 4 to 11 years. The authors also suggested a waist circumference cut- point of 71cm for ascertaining obesity related cardiovascular risk in children. The authors were of the opinion

that these definitions provide alternative definitions of childhood obesity and may be useful in screening for adverse CVD risk-factor levels in children.

Freedman et al. (2008) assessed variations in body weight in children aged 5 to 18 years from different racial backgrounds (white, black, Hispanic and Asian) in relation to their BMI-for-age based on the Centers for Disease Control and prevention (CDC) growth charts. The authors found that at the same levels of BMI-for-age, black children had low fat (3% mean) than white children and Asian children also had higher levels of body fat (1% mean) levels than white children. Nevertheless, among overweight children, white kids had higher (~2-3%) body weight compared to Asian, black and Hispanic children. They concluded that the link of BMI-for-age to body corpulence among children varies with racial/ ethnic differences and more so with different categories of BMI.

Notwithstanding the limitations of BMI use in paediatric populations, Lindsay et al., (2001) after analyses of over 900 Indian children aged 5 to 20 years concluded that BMI is a good measure of adiposity and is strongly associated with measures of adiposity derived from DXA and cardiovascular risk factors in children. Child BMI has also been found to correlate well with cardiovascular risk factors in groups of overweight children from different racial (African American, Caucasian and native Americans) backgrounds (Morrison et al., 1999). In an editorial, Horlick (2001) explain that, the use of BMI in children is an attempt to measure a moving target of weight and stature - which increases and changes in composition with normal growth'. Horlick therefore recommended that the strength of the relationship between BMI, DXA fat variables and cardiovascular risk factors should be established through future studies to increase the sensitivity of childhood obesity definitions.

2.6 Dietary Assessment in Children

Dietary assessments methods used in children include direct observation of meals, food recalls, food records, diet histories and food frequency questionnaires.

Direct observation of meals could take the form of trained researchers who watch the foods, brand names and portion sizes consumed by children or weigh the actual food consumed. The direct observation style is used mostly among much younger children during specific eating times or in controlled school group activities. While a single observation provides a measure of actual intakes appropriate for group mean estimation, it cannot be used to predict health outcomes (McPherson et al., 2000). Although this method can be used if the purpose is to compare on aggregate terms the types of foods consumed by children during a specified period like lunch or breakfast, Simons-Morton and colleagues (1992) found that differences in observed portion sizes simultaneously estimated by different observers account for more differences in energy estimations. The relatively high researcher and respondent burden associated with the use of weighed food intake measurement makes its use among school-age children in the school setting less desirable when conducting large surveys. Although weighed food measurement gives accurate measures of foods actually consumed, the respondent burden is often associated with a higher tendency to alter regular consumption behaviour or increase tendency of underestimation of intakes (Livingstone et al., 1992).

Twenty-four-hour (24-hr) dietary recalls consists of structured interviews with children conducted by trained professionals to elicit information on all foods eaten by the child over a 24-hour period. Dietary information entails the names of foods eaten, estimated quantity (portion size) consumed, detailed description of contents of mixed dishes and food preparation methods (fried, boiled, roasted, smoked, etc.). Dietary recalls sometimes solicit information only for a given time period during the day like breakfast, lunch, supper or snack time. The time of the recall is known to affect accuracy of recalls and researchers are

advised to consider recall time to minimize omissions and food intrusions when working with children in the school setting (Baxter et al., 2009).

Food Frequency Questionnaire (FFQ) have been used to measure meal intakes among children and has been adapted for several population studies. FFQ's may be quantitative, semi-quantitative or non-quantitative. Non-quantitative FFQ's are used to assess the frequency of consumption of specific foods or food groups. Semi-quantitative are used to estimate frequencies of food consumption and also provide general estimates of energy and nutrient intakes at the population level. The quantitative FFQ's gather unusual quantities of frequently consumed foods and can be used to estimate intakes of energy and specific nutrients of individuals. Although FFQ's may be poor in estimating actual intakes of energy and nutrients, they are useful for determining dietary patterns of populations which have higher probability of chronic disease outcomes (Domel et al., 1994). The 7-day Food Frequency questionnaire is to gather dietary admissions of nourishment from certain nutritional categories over the quick recent days.

2.7 Physical Activity Assessment

Self-report measures of physical activity are most widely used for epidemiological research and it involves reporting of physical activity over a specified period using structured questionnaires, diaries, logs and recalls (Warren et al., 2010). Self-report measures are the least expensive and easiest way to collect data on a large sample but also the least accurate. Limitations of self-report measures are difficulty in estimating frequency, duration and intensity of physical activity in all domains, and social desirability bias (Sallis and Saelens, 2000). The cognitive demands of recall, limits its use in children below 9 years. While parental, teacher or caregiver assistance may be beneficial in very young populations, their use may become more difficult as children get more independent (Pate, 1993).

Objective methods of physical activity that offer higher precision of measurements include the use of pedometers and accelerometers. More accurate measures of energy expenditure include the use of doubly-labeled water, indirect calorimetry and heart rate calibration equations which may be needed for certain clinical studies, but the cost and inconvenience makes them impractical for field-based assessments with larger samples.

Different questionnaires are used to evaluate physical action levels in kids are, yet not constrained to, the accompanying,,: SAPAC - Self-Administered Physical Activity Checklist (McMurray et al., 2004); Adolescent Physical Activity Recall Questionnaire(A-PARQ)(Booth et al., 2002); Swedish Adolescent Physical Activity Questionnaire (SwAPAQ) (Ekelund et al., 2006) ; Youth Risk Behaviour Survey (YRBS) (Troped et al., 2007); Health Behaviour in School Aged Children (HBSC) (Booth et al., 2001); Children's Leisure Activities Study Survey (CLASS) (Telford et al., 2004).

Leisure Time Exercise Questionnaire (LTEQ) (Godin and Shephard, 1985), Seven-Day Physical Activity Recall (7D-PAR) (Sallis et al., 1993); Children's Physical Activity Interview (Simons-Morton et al., 1997); and Youth Media Campaign Longitudinal Survey (YMCLS) (Welk et al., 2007).

The utilization of mechanized as well as online surveys to evaluate physical movement have likewise been investigated in children and adolescents (Ridley et al., 2006, McLure et al., 2009, Moore et al., 2008) albeit a few challenges have been related to utilization of an electronic configuration (da Costa et al., 2013). Movement journals have chiefly been utilized among young people (Anderson et al., 2005, Bratteby et al., 1997, Welk et al., 2000).

2.8 Prevention and Control of Childhood Obesity

Given the rise in incidence of childhood overweight and obesity, Ariza et al. (2004) indicate that there is the need to carefully monitor the growth and development of children to help detect obesity and other diseases associated with weight gain. This involves recognizing children who are overweight or obese, examine disease or genetic processes that maybe contributing factors, assessing food intake and physical activity, as well as other diet-related behaviors, so that speculations are not made concerning risk factors of childhood overweight or obesity.

Several factors come to play in the development of obesity in children. For this reason, intervention and strategies to prevention and control overweight and obesity in children must take into consideration the possible determinants. Furthermore, it's necessary to ensure an increase in adherence with the strategies and approaches to the control of obesity. According to a study by Reinehr et al. (2003) obese children who never receive any therapy did not decrease in weight, and those who received at least one therapy in weight management did not have continual weight loss. Nonetheless, there was an obvious weight loss among those who received long-term weight management over two years. Weight management and control among the children included engaging in physical activity, education on nutrition as well as other behavior and lifestyle changes, with well-organized follow-ups over the two-year period. Though the above results are from one study, and not certainly generalizable, the authors propose that continuous interventions and support, which comprises of good nutrition, physical activity, and dietary habits/patterns, are important to equip overweight and obese children to achieve desired weight loss.

Notwithstanding the undoubted requisite for approaches to reduce overweight and obesity in children, 'Campbell et al. (2001) conducted a systematic review of literature and establish paucity of data on the success of obesity intervention programmes and approaches. The

Centre for Reviews and Dissemination (2002) also identified inadequate quality proof on the effectiveness of various strategies and interventions related to childhood obesity to inform national strategies or clinical practice. McLennan (2004) and The Centre for Reviews and Dissemination (2002) nonetheless state that, while there is no totally definite proof regarding the best interventions at present, these should include comprehensive management of the issues thought to be involved in the development of obesity, including diet and dietary education, exercise, decreasing sedentary activity, and family-based interventions. Westenhoefer (2002) identifies that, education strategies must be appropriate to the child's stage of cognitive development. This means those providing interventions must be aware of the level of understanding each child has and be able to communicate with them appropriately.

High adherence is crucial to tackling childhood obesity (Denzer et al. 2004). Although increased knowledge has been associated with changes in diet and lifestyle in some cases, knowledge without strategies to increase adherence is unlikely to change behaviour in the long term. To be successful, interventions must yield direct, perceivable and immediate benefits (Westenhoefer 2002).

CHAPTER THREE

METHODS

3.1 Introduction

This chapter describes how the study was carried out. It describes the study area, study design, sampling procedures, sample size determination, data collection techniques and tools, data analysis, ethical considerations and confidentiality.

3.2 Study Area

Sekondi-Takoradi Metropolis is one of the twenty-two (22) districts in the Western Region. It is located in the south-eastern part of the Western Region. The Metropolis is bordered to the West by Ahanta West District and to the East by Shama District. At the south of the metropolis is the Atlantic Ocean and at the northern part is Mpohor- Wassa East District. The metropolis covers land size of 219 km² and Sekondi-Takoradi is the regional administrative capital/headquarters. Though the smallest district in terms of land size, the Sekondi-Takoradi Metropolis is the most urbanized among the 22 districts in the region. The metropolis is divided into four (4) sub-metros namely: Sekondi, Takoradi, Effia-Kwesimintsim and Essikado-Ketan.

From the 2010 population census, the projected population was estimated to be 630,141 in 2016 based on the average annual growth of 4.0%. This represents about 23.5% of the regions total population, with a male and female population of 273,436 (49%) and 286,112 (51%) respectively. Population among rural and urban localities are 35,790 (3.9%) and 37,020 (96.1%) respectively. This reflects that most of the population in the metropolis reside in the urban communities. About 63.9% of the population are economically active with 89.1% employed and 10.9% unemployed. Though the metropolis has coastal and fertile land where skilled agriculture and fisheries could be done as the occupation, only 6.2%

males and 4.2% females are in this occupation. Almost half (47.2%) of the working population are self-employed without employees, and almost 70% of the working population are in the private informal sector, with private formal sector accounting for 15.3%, followed by public 14.1%. (Ghana Statistical Service, 2014). The economy is dominated by the service sector with the following Shipping/Forwarding, Hotel/Hostel/Restaurant, Bulk Oil Storage and Distribution, Transport services, Harbour and Port Services and Commerce.

The metropolis has about 80,220 (38.5%) children 3 years and older currently attending school and in primary school (37.5%) males and (39.4%) females respectively). About 60% of the populace in the metropolis are literate in English and Ghanaian Language.

The Sekondi-Takoradi Education Metro Directorate has about 225 primary schools in the metropolis, with 109 primary public schools and 116 primary private schools. The population of school children both private and public in the municipality was about 105,118 with a male to female ratio of about 1:1. The directorate has eleven (11) education circuits namely: Adiembra, Anaji, Aprembo-Kwesimintsim, Effia-Tanokrom, Essikado, Ketan, Kojokrom, Sekondi, Takoradi East, Takoradi Central and Takoradi West.

3.3 Study Design:

A quantitative, cross-sectional study was carried out in selected private and public schools in the Sekondi-Takoradi Metropolis. It entailed administration of a questionnaire obtaining current socio-demographic, socio-economic, dietary habits/patterns, physical activity levels and anthropometric information on a representative sample of the study population.

3.4 Study Population:

School children attending private and public schools in Sekondi-Takoradi Metropolis were targeted. Pupils within this group were in Upper Primary classes 4 - 5. The normal age range

for children in Primary schools in Ghana ranges from 6-12 years, nonetheless the upper age limit extended to 17 years because most children in the public schools either start schooling at relatively older ages or tend to spend longer years in school because of repetition in some classes due to academic difficulties. Minimum age for participating pupils (8years) was chosen due to cognitive requirements needed to provide adequate data on items listed in the questionnaire. The list of Primary schools within the metropolis was obtained from the Metropolitan Directorate of Education upon approval from the Regional Ghana Education Service (GES) (last updated in 2016).

3.5 Sample Size Calculation:

Sample size for study participants was calculated using Cochran's formula. This was based on combined prevalence 26.7 % of overweight and obesity, with overweight 15.8% and obesity (10.9%) documented by Mohammed and Vuvor (2012) among basic school children in University Primary, Legon, expected combined prevalence was set at 25% and margin of error set at 4% for the entire metropolis.

Sample size (n) was calculated based on the following values:

- Expected prevalence = 25%
- Z = 1.96 at 95% confidence level
- d = margin of error of 4% (for a greater precision)
- Addition of 10% of minimum sample size (n) to correct for non-response rate

$$n = (z^2pq)/d^2: n = \frac{1.96^2 * 0.25 * 0.75}{0.04^2} = 450$$

At 95% confidence interval, sample size estimation was = 450. Assuming a non-response rate of 10% (=45) pupils, the total sample needed for the study was **495** pupils

3.6 Sampling Procedure:

A multistage sampling technique was used. At the first stage, a list of the primary schools in Sekondi-Takoradi Metropolis was obtained from the Metro Directorate of Education. A simple random sampling (balloting technique) was used to select 4 private and 4 public schools from a total of 225 (109 public schools and 116 private schools) registered and accredited basic schools in the metropolis. Decision prior to beginning of the study was to replace schools that declined permission to participate in the study by another school with similar administration type.

Two private schools declined to participate in the study because the heads of institutions stated most parents are usually skeptical and not in favour about their wards being used in research work especially with regards to the research topic. These schools were replaced appropriately. In order to cater for losses to follow-up due to anticipated delays or refusal of some parents to consent and actual start of the data collection, the total number of pupils to be selected in each school was increased by twenty percent (20%). In each selected school, pupils in Upper Primary i.e. grade 4 and 5 were used. Almost all the public schools had 3 streams of each grade i.e. A, B and C and the private schools had 2 streams i.e. A and B. Considering the enrollment between the private and public schools, where private schools had a minimum of 36 pupils in a class compared to the public schools having 60 pupils in each class, the streams had to be put together to enable selection of a representative sample in each school. Balloting was employed to select participating pupils in each school. Pupils in all the streams of a particular grade were put together in one classroom to enable easy selection of pupils. This was done for both grades 4 and 5. Pre-labeled (yes and no) ballot papers in a bowl with expected number of participants in each grade was placed on a table for each pupil to pick. Pupils who picked “yes” were given assent and parental consent forms to take home for approval and those who picked “no” were exempted from the study.

In each of the four (4) public schools, 61 pupils were selected totaling 245 and 63 pupils from each private school selected totaling 252 to make up a total sample size of 497. This same procedure was done in all the eight (8) selected Primary schools.

3.6.1 Inclusion criteria:

Schools: All primary schools (both private and public) in the Sekondi-Takoradi Metropolis were eligible, but only randomly selected schools with the heads of institutions consenting to participate were involved in the study.

Pupils: School children attending the selected private and public schools in Sekondi-Takoradi Metropolis who were free from any physical or mental deformity and indicated their willingness by providing assent to participate in the study, whose parents also signed the consent forms in order to participate in the study.

3.6.2 Exclusion criteria

School children who met the inclusion criteria but had any physical and mental deformity that would interfere with anthropometric measurements, Body Mass Index (BMI) determination and responses to the questions. Nonetheless, no child was excluded from the study due to any physical or mental deformity.

3.7 Data Collection Instruments:

Four instruments were used to collect the data.

3.7.1 A structured questionnaire

A structured questionnaire was used to obtain relevant information required to meet the objectives of the study from school children who gave assent and had parental consent to participate in the study. The questionnaire had five (5) main sections A to D soliciting information on socio-demographics and socio-economic background information, dietary

habits/patterns, dietary assessment (using FFQ), physical activity levels and anthropometric measurements. Most of the items in the questionnaire were adapted from a previous study (Ghana School Survey, 2012).

3.7.1.1 Socio-demographic/Socio-economic information

Data collected include: name of school, type of school, sex, completed age (years), educational level of both parents, occupation of both parents, type of housing, area of residence, means of transportation to school, amount of money given daily to school. Also socio-economic status of the pupils was determined using the principal component analysis. Each level score was based on the ownership of nine (9) household assets: air-conditioner, computer/laptops, refrigerator/deep freezer, gas/electric cooker, television, microwave oven, VCD/DVD player, satellite dish and a car. This was used to group study participants into low, middle and high socio-economic households using the Filmer and Pritchett approach (2001)

3.7.1.2 Dietary habits/patterns

Data collected included consumption of breakfast, snack consumption, where lunch was usually gotten from i.e. from home, school, outside school or from the school feeding programme. Meal frequency and frequency of meals prepared at home were also assessed.

3.7.1.3 Dietary Assessment

The 7-day Food Frequency Questionnaire was used to collect information on the frequency of foods choices and drinks consumed within the immediate past week (7days). It was used to capture information on the number of times in a week foods from certain food groups were consumed. These food groups included: sweetened drinks like tampico, kalyppo, fruit juices, carbonated drinks and local drinks such as bissap or asana; breads, biscuits and pastries like pizza, cakes, cookies, crackers, pie, baked chips and buns; fried foods like fried

eggs, doughnut, koose, fried potatoes/yam; protein foods like meat, poultry, sausage and fish; fruits and vegetables and other high fat/caloric foods such as chocolate, ice cream, toffees/lollipops, pasta/noodles (indomie). Information on the sources where these food items were consumed was also collected.

3.7.1.4 Physical activity

A section of the Physical Activity Questionnaire for children (PAQ-C) was adapted and used. This comprised of physical activities done by the school children 7 days prior to the study. Data collected included participation of physical exercise/sporting activities such as skipping, walking for exercise, bicycling, jogging/running, swimming, football, basketball and ampe, as well as the frequency of the activities carried out. Duration of means of transportation to school (i.e. whether child is transported or walks to school and the time spent doing either of them)

3.7.1.5 Anthropometric measurements

Anthropometric measurement of weight (kg) and height (cm) were taken twice and recorded on the questionnaires and on another supplementary list. All measurements were taken in the school with pupils in their usual school uniform with their shoes and all heavy clothing such as jacket or sweater as well as items in their pockets removed. The measurements were taken using the WHO standard procedure. The principal investigator and two other research assistants were trained to carry out the body measurements of the pupils.

Weight measurement: body weight was measured using a portable Seca digital weighing scale to the nearest 0.1 kg. Each pupil was asked to stand still on the scale with their feet positioned slightly apart and the reading was taken and recorded on each questionnaire and on the supplementary list.

Height was measured to the nearest 0.5 centimeter using a portable stadiometer. Each pupil was asked to stand in an upright position with their feet together, with the back of their head, shoulder blade, back, buttocks, calf and heels touching the board of the stadiometer. The head was positioned to have the Frankfurt plane perpendicular to the board. The reading was taken at eye level and recorded. Each pupil was asked to take a deep breath and the head board was pressed firmly on the top of the head.

3.8 Training of Research Assistants

A two-day training session was organized for the research assistants. The aim of the training was to equip them with the pre-requisite skills needed to perform their task. The training was and carried out by the principal investigator. The content of the training involved a detailed description on key concepts and methods regarding the study. The following topics were discussed:

- Objectives of the study
- Ethical issues
- Interviewing skills and how to solicit information from participants (children)
- Appropriate translation of questionnaire into their local languages (Fante and Twi)
- Training on how to use and record responses using the FFQ and other sections of the questionnaire, and also the Seca weighing scale and stadiometer to be able to take weight and height measurements accurately.

3.9 Data Quality Control

Pre-testing was done in two schools which were not part of the selected schools. Questionnaires were administered to pupils between the age 8-16 years in Upper Primary 4 and 5. Some items in the questionnaire was taken out and few modified to ensure unambiguity and reliability of responses. Ongoing supervision of research assistants during

interviews were done. Data collected were checked daily to ensure that all information had been properly collected and questionnaires properly filled. Weighing scales were checked and adjusted every morning before beginning of weighing. Double data entry was done to ensure that accurate information was entered from the questionnaires.

3.10 Confidentiality

Interviews in each school were done concurrently but separately to ensure that pupils were comfortable enough to provide accurate responses to the questions asked. As much as possible research assistants carried out the interviews separated few meters away from other pupils.

3.11 Ethical Considerations

Ethical approval for the study was obtained from the Ghana Health Service Ethical Review Committee (Appendix 1). Permission was obtained from the Ghana Education Service (both from the Director General-Western Region and the Metropolitan Director of Education) and the Heads of the selected schools before any contact with the children.

Assent explaining study objectives, procedures, confidentiality, benefits and voluntary nature of the study was given to the school children to take home to seek parental approval. Parents and guardians were also required to sign a separate consent form to indicate their willingness for their wards to participate in the study. Each child was made to mark or thumb print an assent form after parental consent before participating in the study. Children with parental or guardian consent in addition to their assent only were involved in the study. Children could refuse to participate even if parents/guardian consented (Appendix 2 and 3). There were no direct benefits of this study to the child however, participation in this study gave more information to help us understand some of the things that contribute to unhealthy weights among school-age children and how best these can be addressed both in schools

and at home. There were no risks to child for participating in this study. Participants did not miss any class, class test or examination when participating in this study. Children were free to withdraw from the study at any time when they felt uncomfortable. Privacy and confidentiality of personal information of participants was ensured during interviews. The participants were identified by codes on the questionnaires, these were stored electronically in the computer with password protected and in hard copies with access only to the researcher. The results of this study was disseminated in such a way that no information was linked to the identity of the participants.

3.12 Actual data collection

Data was collected from all 8 selected schools and pupils from March to April 2017. The research team moved from one school to the other according to schedules and dates agreed upon with the heads of institutions and the principal investigator. All pupils (495) were interviewed and body measurements taken in their school premises. Due to the fact that the day for vacation was approaching, the team had to split into two to visit different schools on the same day. Interviews carried out with pupils lasted between 25 minutes to 50 minutes.

3.13 Study Variables

3.13.1 Dependent Variable

- The main dependent variable was BMI for age and sex of the children between the ages of 8-16 years in the selected schools (underweight, normal, overweight and obesity). BMI z-scores were categorized into ‘underweight’ (< -2 SD), ‘normal’ ($-1SD < BMA$ z-score $< +1SD$), ‘overweight’ ($+1SD \leq BMA$ z-score $< +2SD$) and ‘obese’ ($\geq +2SD$) based on WHO reference (2007).

3.13.2 Independent Variables

- Demographic characteristics: (age, sex, name of school, type of school, grade etc.)
- Socio- economic factors including area of residence, type of residence, means of transportation to school, parents educational level, parents job/occupation, amount of money given to school, ownership of certain household assets, for example air conditioner (AC), computer, microwave oven, satellite dish etc.
- Dietary habits and patterns: involves breakfast consumption, times and frequency of snack consumption, and other dietary habits and patterns.
- Dietary Assessment: the food frequency questionnaire (FFQ) with information on the food choices under various food groups, frequency of consumption of foods by the pupils and sources of the food.
- Physical activity patterns/levels: physical/sporting activities done by the school children 7 days prior to the study, frequency and duration of means of transportation to/from school.

3.14 Data Processing and Analysis

3.14.1 Data Processing

Data was entered in Microsoft Excel 2010 and exported to WHO AnthroPlus version 1.0.4 and STATA version 13.1 Software for further analyses. WHO AnthroPlus is a software for the global application of the WHO Reference 2007 for 5-19 years to monitor the growth of school-age children and adolescents.

3.14.2 Data Analysis

Descriptive statistics: univariate analysis on data collected was summarized and described as frequencies and percentages distribution tables and charts. Categorical variables were

described and expressed as frequencies and continuous variables were expressed as means (standard deviation) and median (interquartile range).

Anthropometric data: Anthropometric measurement (weight (Kg) and height (cm) with other required variables were exported into WHO AnthroPlus where BMI- for-age (BAZ), Weight- for-age (WAZ) and Height-for- age z-scores (HAZ) of the participants were calculated. The anthropometric data was presented in age and sex. According to Elder & Kiess (2004), it is the best approach since weight gain varies from age to age and within sexes.

After categorizing the nutritional status of the pupils according to BAZ, WAZ and HAZ, the overall nutritional status of the children was determined using the following classifications by WHO reference 2007:

- Underweight – (< -2 SD) for age and sex
- Normal – ($-1SD < BMA$ z-score $< +1SD$) for age and sex
- Overweight - ($+1SD \leq BMA$ z-score $< +2SD$) for age and sex
- Obese - ($\geq + 2SD$) for age and sex

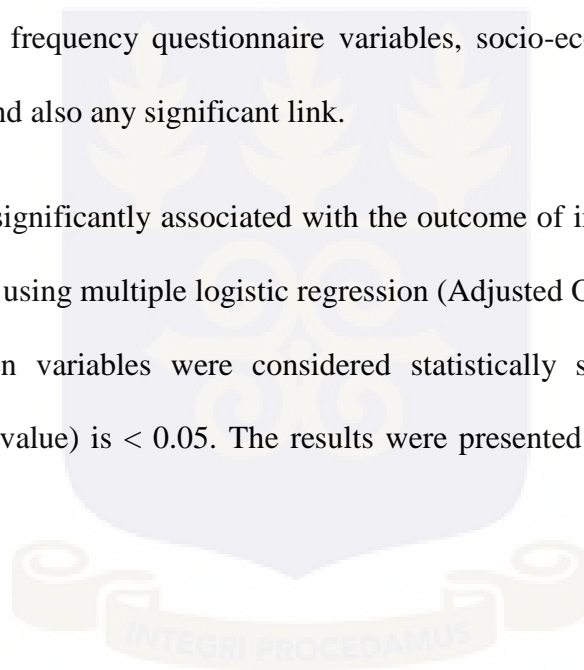
Physical activity levels were assessed using a physical activity index developed by researcher. An activity index score between 8-32 was developed out of 8 items (physical/sporting activities). Answers for each item started from the lowest activity response (Never =1) to the highest activity response (5-7days = 4). The mean of all the responses selected for each item was used to create an index score for each subject. The mean and average of their physical activity levels was further used to categorize two classification of the index i.e. below average physical activity index and average and above physical activity.

Dietary data: data obtained from the dietary habits and patterns as well as the Food Frequency Questionnaire was also used to generate frequencies and percentages. Frequency of consumption of the various food groups was also categorized into three (3) levels of consumers i.e. Low, Moderate and High consumers. Frequencies and percentages of level of consumption of various food items were also generated.

The categorizations were used for further analyses. Bivariate analyses were done using Chi-square test to determine the association between the main outcome variable (BMI status) and other independent variables (e.g. BMI versus socio demographics, dietary habits/patterns, food frequency questionnaire variables, socio-economic status, physical activity index etc.) and also any significant link.

Variables that were significantly associated with the outcome of interest were included in multivariate analysis using multiple logistic regression (Adjusted Odds ratio).

Relationship between variables were considered statistically significant if computed probability value (p-value) is < 0.05 . The results were presented using tables and charts where necessary.



CHAPTER FOUR

RESULTS

4.1 Socio-demographic characteristics of pupils

A total of 497 pupils between the ages of 8-17 years (252 from private and 245 from public schools) were recruited and participated in the study. More than half (52.1%) of the pupils surveyed were females, (259/497). Mean age of pupils was 10.4 years (SD = 1.2), with pupils in the public schools significantly older than those in the private schools (91.7% vs. 8.3%), p value <0.001). The highest number of pupils recruited were between the ages of 9-11 years (84%).

About two-thirds (63%) of the mothers of the pupils were working in the informal sector with a significantly higher proportion from the public schools (84.4% vs. 43.2%, p value <0.001). The occupation of fathers of the pupils vary significantly by school type, with a greater proportion of fathers of pupils from the private school employed in the formal sector compared to fathers of those in the public schools (81.8% vs. 31.1%, p value <0.001).

Significantly higher proportion of mothers and fathers of the private school pupils had attained tertiary level education compared to mothers and fathers of pupils from the public schools (63.7% vs.11.4%, p value <0.001) and (81.4% vs. 18.8%, p value <0.001) respectively. About half (49.6%) of the pupils in the private schools resided in the urban areas of the metropolis.

Regarding means of transportation to school, significantly more private school pupils were transported to school by the family's own car compared to their public school counterparts (57.5% vs. 8.6%, p value <0.001). Also, a significant proportion of pupils in the public schools walked to school compared to those in the private schools (58.1% vs. 8.3%, p value <0.001).

With regards to socio-economic status (SES) of the pupils, significantly higher proportion of pupils from the public schools belonged to the low SES group compared to those in the private schools (62% vs. 5.6%, p value < 0.001). Conversely, a higher proportion of pupils from the private schools belonged to the high SES group compared to those in the public schools (58.3% vs. 5.7%, $p < 0.001$).

Table 4.1 below shows the socio-demographic characteristics of the pupils



Table 4. 1: Socio-demographic characteristics of pupils by school type

Characteristic	Private (n=252) (%)	Public (n=245) (%)	Total (N=497)	p-value
Age				
< 12 years	245 (58.1)	177 (41.9)	422 (85.4)	< 0.001
> 12 years	6 (8.3)	66 (91.7)	72 (14.6)	
Sex				
Male	126 (50)	112 (47.1)	238 (47.9)	0.339
Female	126 (50)	133 (51.3)	259 (52.1)	
Mother's Occupation				
Informal	102 (43.2)	184 (84.4)	286 (63.0)	< 0.001
Formal	134 (56.8)	34 (15.6)	168 (37.0)	
Father's Occupation				
Informal	42 (18.2)	142 (68.9)	184 (42.1)	< 0.001
Formal	189 (81.8)	64 (31.1)	253 (57.9)	
Mother's Educational Level				
Primary/Elementary	8 (3.9)	74 (49.7)	82 (23.3)	< 0.001
Secondary	66 (32.4)	58 (38.9)	124 (35.1)	
Tertiary	130 (63.7)	17 (11.4)	147 (41.6)	
Father's Educational Level				
Primary/Elementary	2 (0.9)	46 (34.6)	48 (14.1)	< 0.001
Secondary	37 (17.6)	62 (46.6)	99 (28.9)	
Tertiary	171 (81.4)	25 (18.8)	196 (57.1)	
Area of residence				
Peri-urban	126 (50.4)	145 (59.4)	271 (54.9)	0.044
Urban	124 (49.6)	99 (40.6)	223 (45.1)	
Transportation to school				
Own car	145 (57.5)	21 (8.6)	166 (33.4)	< 0.001
Friends car	6 (2.4)	4 (1.6)	10 (2.0)	
Public transport	69 (27.4)	77 (31.4)	146 (29.4)	
Walk	21 (8.3)	142 (58.1)	163 (32.8)	
Other	11 (4.4)	1 (0.4)	12 (2.4)	
Socio-economic status*				
Low	14 (5.6)	152 (62.0)	166 (33.4)	< 0.001
Middle	91 (36.1)	79 (32.2)	170 (34.2)	
High	147 (58.3)	14 (5.7)	161 (32.4)	

P values are from Chi-square test. *based on possession of nine (9) household assets, amount of money given a child daily to school and the type of housing.

4.2 Anthropometric measurements of pupils

Table 4.2 below shows the BMI status of pupils who participated in the study. The height of study participants ranged from 122.5cm to 171 cm with a mean height of 142.6 ± 7.9 cm. Height did not differ significantly by school type (private = 142 ± 7.2 cm; public 142 ± 8.6 cm). Mean weight of the participants was 37.3 ± 10.9 kg and ranged from 15.6 kg to 96 kg. Weight also did not differ significantly by school type (private 39.8 ± 12.5 kg; public 34.7 ± 8.2 kg). The mean BMI of pupils in the study was $18.2 \text{ kg/m}^2 \pm 4.1$ and ranged from 13.2 to 39.5 kg/m^2 . However, there was a difference in the BMI of pupils in private and public schools (private $19.4 \pm 4.8 \text{ kg/m}^2$; public $17 \pm 2.8 \text{ kg/m}^2$). More than half (54.1%) of the pupils had BMIs within normal range, with significantly higher proportion of pupils from the public schools compared to those in the private schools (64.5% vs. 44.1%, p value < 0.001). Overall combined prevalence of overweight among the school pupils was 29.4%, (overweight 13.7% and obese 15.7%), with a significantly higher proportion from the private schools compared to the public schools (44.5% vs 13.9%, p value < 0.001). There were more overweight and obese pupils from the private schools compared to the public schools (18.7% vs. 8.6%, p value < 0.001) and (25.8% vs. 5.3%, p value < 0.001). There was also a significant difference in the proportion of underweight in public and private schools (21.6% vs. 11.5%, p value < 0.001) respectively. However, there was no significant difference in BMI status of the pupils by sex (male – 30.7% vs. female – 28.2%).

Table 4.2: Anthropometric measurements of pupils by sex and school type

BMI Status	<u>School Type</u>		<u>Sex of Pupil</u>		Total (N= 497)
	Private (n=252)	Public (n=245)	Boys (n=238)	Girls (n=259)	
Underweight	29 (11.5)	53 (21.6)	43 (18.1)	39 (15.1)	82 (16.5)
Normal	111 (44.1)	158 (64.5)	122 (51.3)	147 (56.8)	269 (54.1)
Overweight	47 (18.7)	21 (8.6)	31 (13.0)	37 (14.3)	68 (13.7)
Obese	65 (25.8)	13 (5.3)	42 (17.7)	36 (13.9)	78 (15.7)
Total overweight	112 (44.5)	34 (13.9)	73 (30.7)	73 (28.2)	146 (29.4)

4.3 Dietary Habits/Patterns of Pupils

4.3.1 Dietary Habits/Patterns

4.3.1.1 Breakfast consumption

More than half (58.2%) of the pupils had breakfast often on all the school days with private school pupils (78.2%) consuming breakfast often compared to public school pupils (36.9%).

There was a statistically significant difference in breakfast consumption by school type (private 78.2% vs. public 36.9%, p value < 0.001).

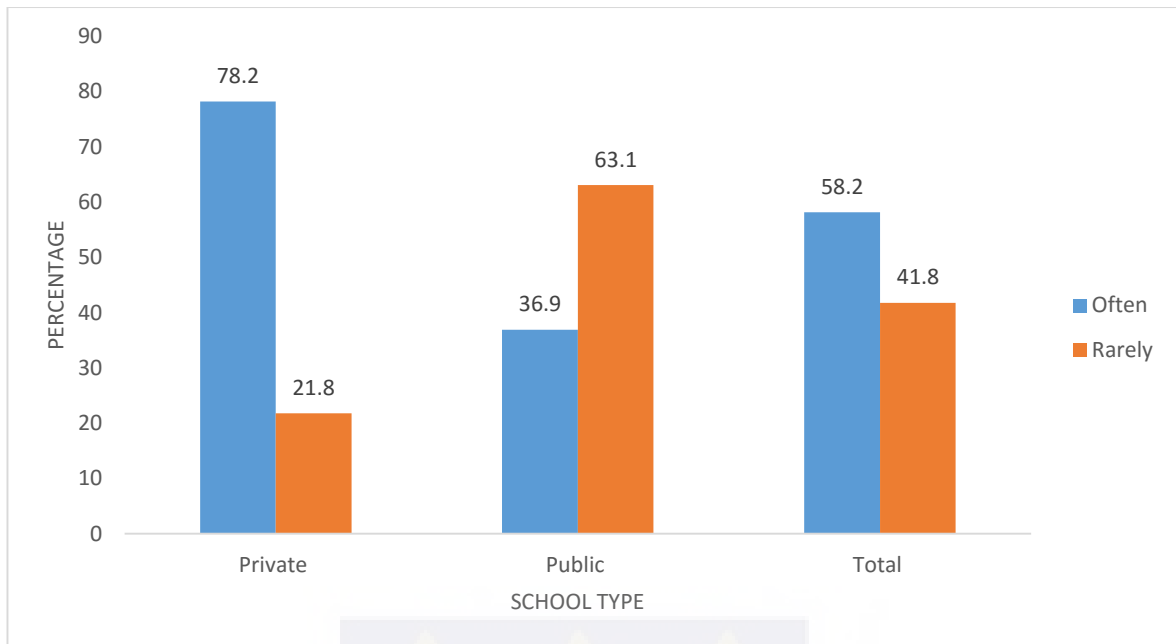


Figure 4.1: Breakfast consumption of Pupils by School type

4.3.1.2 Snack and Lunch consumption

For snack consumption, less than half (48.5%) of all the pupils had snacks often at break time during school days and the remaining (51.5%) had snacks rarely; pupils from private schools consumed a significantly higher proportion of snacks often at break time compared to pupils in public schools (63% vs. 32.9%, p value < 0.001). Only 18.3% of the total respondents reported eating snacks often after lunch during school days with a significant proportion of them from the private schools compared to the public schools (25.4% vs. 11.2%, p value < 0.001). About 10% of the pupils in the study had snacks often before bedtime, with 90.1% eating snacks rarely before bedtime. More pupils from the private schools had snacks often before bedtime compared to those from the public schools (13.9% vs. 5.9%, p value < 0.05). Out of the 497 pupils, 19.3% of them brought lunch from home often to school and 80.7% rarely brought lunch from home. Significantly more pupils from the private schools brought lunch from home often compared to those from the public schools (25.3% vs. 13%, p value 0.001). Majority (77.1%) of the pupils in the study had

lunch often in the school, with a significant higher proportion of the pupils from public schools eating lunch often in the school compared to their private school counterparts (87.8% vs. 66.9%, p value < 0.001). Only 5% of the pupils in the study often had lunch from outside their schools with more pupils from the public schools compared to the private schools (8.4% vs. 1.6%, p value 0.001). Only 18.5% of the pupils in the study were eating lunch often from the school feeding program (SFP). Significantly more pupils from public schools often had lunch from the SFP compared to their counterparts from the private schools (33.3% vs. 3.7%, p value < 0.001).

Majority of the pupils (75.5%) ate three meals per day, about 12% of them ate meals less than three times per day and 13.1% ate more than three meals per day as shown in Fig 4.2. Pupils in the private schools significantly ate more meals per day compared to their counterparts from the public schools (52.5% vs. 47.5%, p value < 0.05).

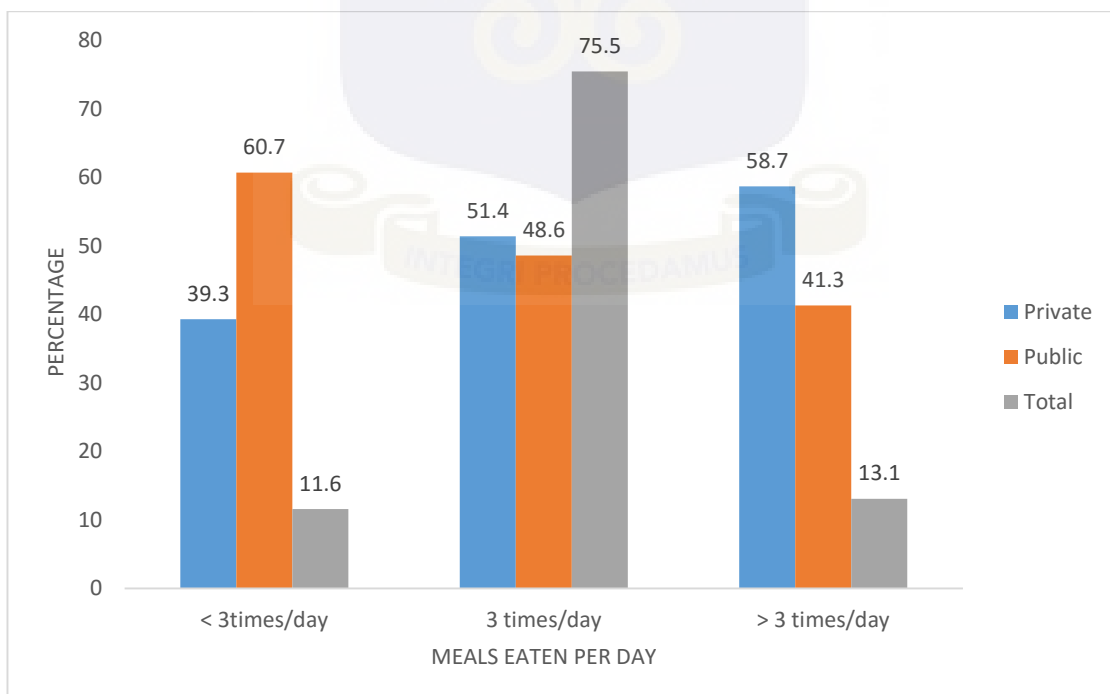


Figure 4.2: Meals eaten per day by pupils

Fig 4.3 below also shows the proportions of meals eaten per day which were prepared at home. Overall, 80.7% of the pupils had two or less of their meals eaten per day prepared at home and 19.3% of them had three or more of their meals eaten per day prepared at home. Significantly more pupils from the public schools had two or less of their meals eaten per day prepared at home compared to those from the private schools (51.7% vs. 48.3%, p value < 0.05).

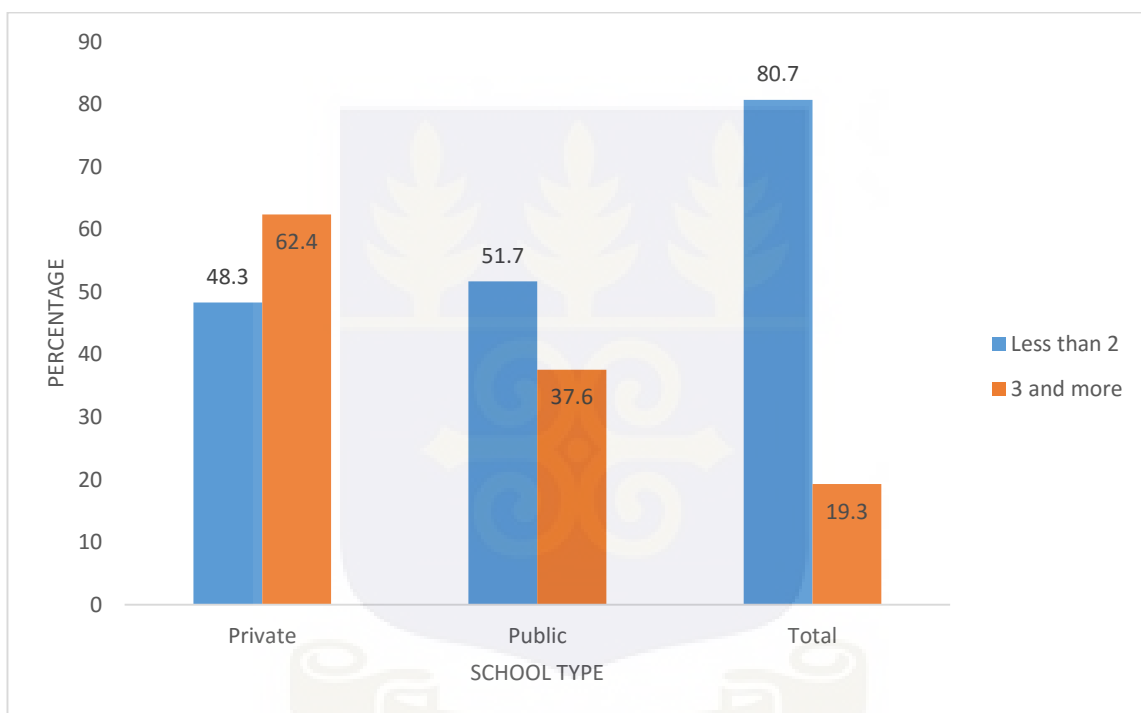


Figure 4. 3: Number of Meals Eaten per day Prepared at Home by School Type

4.3.1.3 Food Frequency Questionnaire

All pupils in the study consumed some of all the various food items within the past week preceding the study. Therefore, their levels of consumption of the various food items was categorized into low, moderate and high consumption. Generally, about 41% of the pupils had a low consumption of sweetened drinks, 38.6% moderate consumption and 20.5% high consumption levels. Significantly more pupils from the private schools consumed higher

levels compared to those in the public schools (53.9% vs. 46.1%, p value < 0.05). For breads/biscuits/pastries, Out of the total participants, 20.5% of the pupils had a low consumption, 45.1% moderate and 34.4% high consumption levels. There was also a statistically significant difference among those in the high consumption category by school type, (private 60.2% vs. public 39.8%, p value < 0.05).

All the pupils consumed fried foods with 21.7% pupils having low consumption, 41.7% having moderate consumption and 36.6% having high consumption levels. There was no statistical difference in the consumption levels of fried foods by school type. Almost half (49.7%) of the pupils in the study had a high consumption of protein foods, 31.6% moderate consumption and 18.7% low consumption of protein foods. Pupils from the public schools had high consumption of protein foods compared to their counterparts from the private schools. (61.1% vs. 38.9%, p value < 0.001). Fruits and vegetables was also consumed by all pupils in the study with 60.2% of the pupils having low consumption, 30.6% moderate consumption and only 9.3% of the pupils with high consumption. Significantly high proportion of the pupils with low consumption of fruits and vegetables were from the public schools compared to those from the private schools (54.2%, vs. 45.8%, p value < 0.001). Half (50.1%) of the pupils in the study had low consumption, 31.8% moderate consumption and 18.1% high consumption levels of other high fat/caloric foods. There was a statistically significant difference among those in low consumption category by school type (private 56.2% vs 43.8%, p value < 0.05).

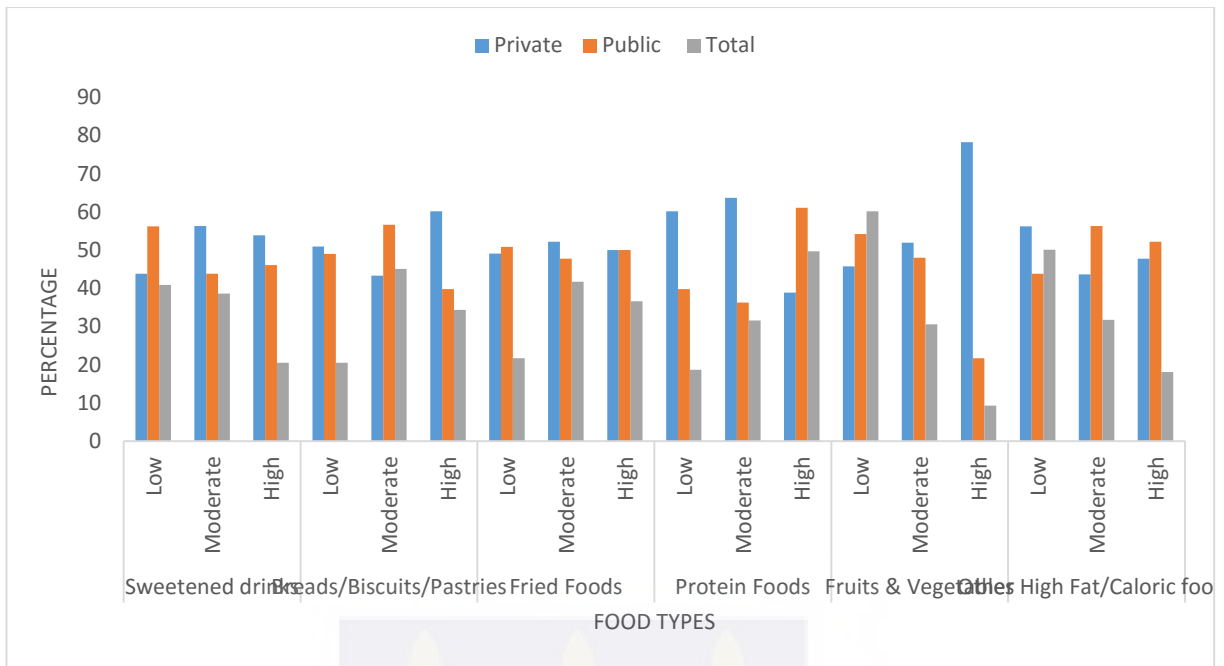


Figure 4. 4: Level of Consumption of the Various Food types by School Type

4.4 Physical Activity of Pupils

This section describes the frequency of physical activity that the pupils were involved in 7 days prior to the study. These activities involved skipping, walking for exercise, bicycling, jogging/running, swimming, football, basketball and ampe.

4.4.1 Skipping

Only 33.4% of the pupils engaged in skipping within the past week prior to the study, with 40.5% from the private schools and 26.9% from the public school engaged in this activity. From those who engaged in skipping 5-7 days within the week private 67% vs. 33% public, private 54.5% vs. 45.5% public skipped in 3-4 days, private 62.1% vs. 37.9% public skipped in 1-2 days and private 45.4% vs. 54.6% public never skipped within the past week.

4.4.2 Walking for exercise

About 47% of the pupils in the study engaged in walking for exercise, with 46.4% from the private and 46.6% from the public schools respectively. Out of those who walked for

exercise private 36% vs. 64% public engaged in walking for exercise in 5-7 days in the week, private 56.7% vs. 43.3% public engaged in walking in 3-4 days, private 52.3% vs. 47.7% public in 1-2 days and private 50.8% vs. 49.2% public never engaged in walking for exercise within the week.

4.4.3 Bicycling

Thirty-one percent of the pupils in the study engaged in bicycling within the past week prior to the study, with 29.4% from the private schools and 34.3% from the public schools engaging in bicycling. Out of those who engaged in bicycling, private 50% vs. 50% public engaged in bicycling 5-7 days within the week, private 33.3% vs. 66.7% public engaged in bicycling within 3-4 days, private 50% vs. 50% public also engaged in bicycling within 1-2 days and private 51.8% vs. 48.2% public never engaged in bicycling within the past week.

4.4.4 Jogging/Running

About 47% of the pupils engaged in jogging/running, with 52.8% from the private schools and 40% from the public schools. Sixty-four percent (64%) pupils from the private schools and 36% pupils from the public schools engaged in jogging/running 5 -7 days within the week, private 59.4% vs. 40.6% public engaged within 3-4 days, private 56.3% vs. 43.7% public engaged within 1-2 days and private 43.8% vs. 56.2% public never engaged in jogging/running within the past week.

4.4.5 Swimming

Only 10% of the pupils in the study engaged in swimming, with 12.7% from private schools and 9.8% from the public schools. Out of the total who engaged in swimming within 5-7 days, 25% pupils were from the private schools and 75% were from public schools, private 50% vs. 50% public engaged in swimming 3-4 days, private 59.1% vs. 40.9% public

engaged in swimming 1-2 days, and (private 49.9% vs. 50.1% public) never engaged in swimming within the past week.

4.4.6 Football

Fifty-four percent of the pupils in the study engaged in football, with 54.4% from the private schools and 53.9% from the public schools. Out of the total who engaged in football within 5-7 days 33% were from the private schools, and 67% from the public schools, private 35% vs. 65% public within 3-4 days; private 58.6% vs. 41.4% public within 1-2 days; and private 49.6% vs. 50.4% public never engaged in football within the past week.

4.4.7 Basketball

Only 14% of the pupils in the study engaged in basketball in the week prior to the study, with 19.4% from the private schools and 9% from the public schools. Out of the total who played basketball, private 100% vs. public 0 pupils played within 5-7 days, private 60% vs. 40% public played within 3-4 days, private 70.5% vs. 29.5% public played within 1-2 days and private 46.8% vs. 53.2% public never played basketball within the week.

4.4.8 Ampe

Less than half (48.7%) of the pupils mostly females in the study engaged in ampe, with 49.2% pupils from the private schools and 44.9% from the public schools. Out of those who played ampe within 5 -7 days 59.6% of the pupils were from private schools and 40.4% from public schools. For 3-4 days; 54.7% vs. 45.3%, for 1-2 days; 46.5% vs. 53.5% and never; 52.2% vs. 47.8% in private and public schools respectively.

Table 4.3: Number of Times Pupils Engaged in Physical Activities in the Week

Activity	Private (n=252) n(%)				Public (n=245) n(%)			
	Never	1-2 days	3-4 days	5-7 days	Never	1-2 days	3-4 days	5-7days
Skipping	149 (45.4)	82 (62.1)	12 (54.5)	8 (66.7)	179 (54.6)	50 (37.9)	10 (45.5)	4 (33.3)
Walking for exercise	135 (50.8)	80 (52.3)	17 (56.7)	15 (35.7)	131 (49.2)	73 (47.7)	13 (43.3)	27 (64.3)
Bicycling	173 (51.8)	53 (50)	7 (33.3)	14 (50)	161 (48.2)	53 (50)	14 (66.7)	14 (50)
Jogging/Running	112 (43.8)	98 (56.3)	19 (59.4)	16 (64)	144 (56.2)	76 (43.7)	13 (40.6)	9 (36)
Swimming	220 (49.9)	26 (59.1)	1 (50)	1 (25)	221 (50.1)	18 (40.9)	1 (50)	3 (75)
Football	110 (49.6)	109 (58.6)	14 (35)	14 (32.6)	112 (50.4)	77 (41.4)	26 (65)	29 (67.4)
Basketball	196 (46.8)	43 (70.5)	3 (60)	3 (100)	223 (53.2)	18 (29.5)	2 (40)	0
Ampe	122 (47.8)	69 (53.5)	24 (45.3)	31 (59.6)	133 (52.2)	60 (46.5)	29 (54.7)	21 (40.4)

4.4.9 Physical Activity Level

The mean physical activity index score of the pupils was 12.1 ± 2.7 with a range between 8 – 25. Pupils from the private schools had a physical activity index score ranging from 8 – 25, with a mean of 12.2 ± 2.8 , and those from public schools also had a mean physical activity index score of 11.9 ± 2.7 , ranging from 8 – 20. More than half (54.5%) of the pupils had a physical activity index score average and above, with 51.3% of the pupils from the private schools and 48.7% from the public schools as shown below in Fig 4.5. Physical activity levels did not significantly vary by school type private 51.3% vs. public 48.7%, p value > 0.05 .

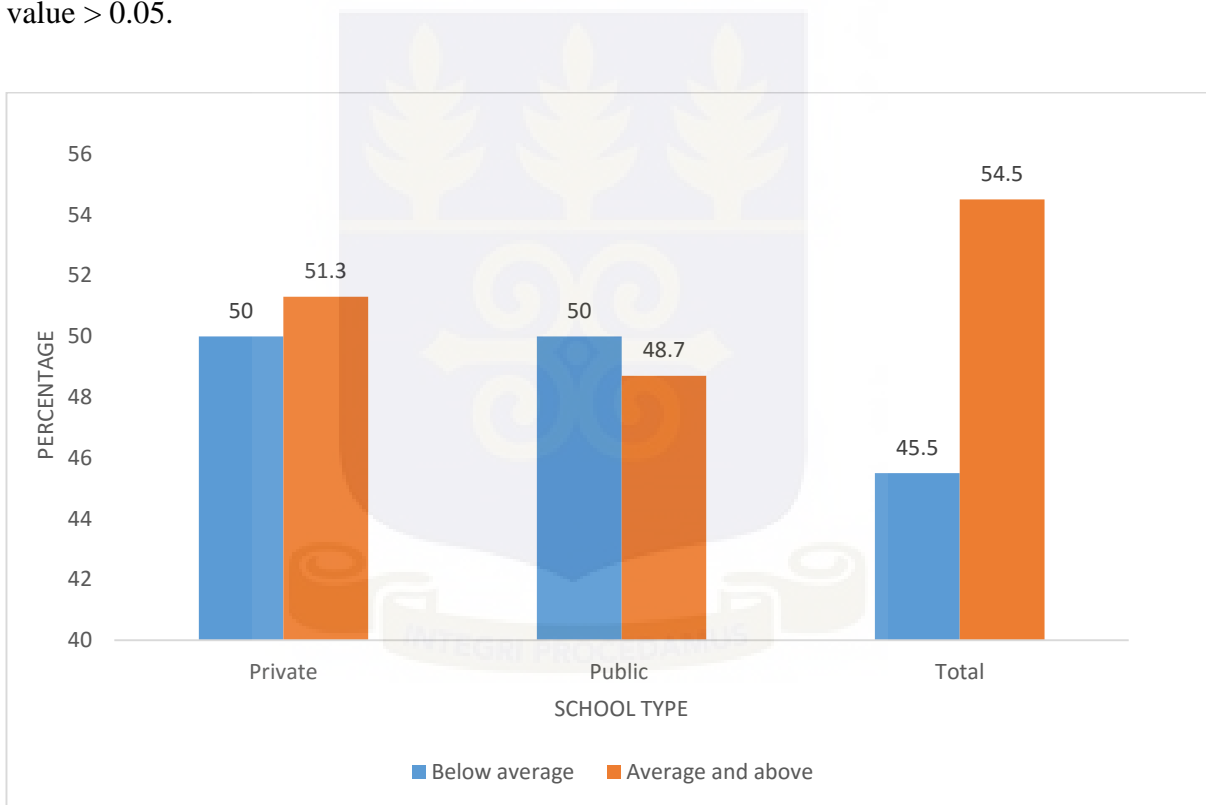


Figure 4.5: Physical Activity Levels of Pupils by School Type

Some of the pupils walked to school during the week. Out of those who walked 79% walked to/from school in all the 5 school days, 1.5% walked to/from school in 4 school days, 5.4% walked in 3 school days, 3.4% walked in 2 school days, 9.3% walked in a day and 1.5% didn't walk in any of the school days. Pupils walked within an average of 30 ± 17.8 mins,

with a range of 2 minutes – 90 minutes. About thirty-eight (37.5%) of the pupils walked for less than 30 minutes to/from school, 29.7% of them walked within 30 minutes and 32.8% walked for more than 30 minutes.

Out of those transported to school 89.2% were transported to school all the 5 school days, 1.3% were transported on 4 school days, 1.9% on 3 school days, 3.2% transported on 2 school days and 4.4% transported on a day. Pupils were transported to school within an average of 27 minutes \pm 18.9 minutes, with a range of 5 minutes – 90 minutes. Fifty-two percent (52.4%) of those transported to school took less than 30 minutes to reach school, 23.6% took 30 minutes to get to school and 24% took more than 30 minutes to reach school.

4.5. Factors Associated with Overweight and Obesity

4.5.1 Bivariate and Multivariate Analysis on Factors Associated with Overweight

Chi-square tests was performed to explore the association between BMI status (overweight and obesity) and all other independent variables such as BMI versus socio-demographics/socio-economic factors, dietary habits/patterns with food frequency questionnaire, and physical activity levels.

4.5.2 Overweight versus Socio-demographic and Socio-economic Factors

Chi-square tests done to determine association between overweight and socio-demographic showed that age, school type, mother's occupation, father's occupation, mother's educational level, father's educational level, means of transportation to school, amount of money given to school daily and socio-economic status (SES) of pupils were significantly associated with overweight. Being less than 12 years was significantly associated with overweight status ($p < 0.05$), and also being in a private school was significantly associated with overweight ($p < 0.001$). There was no statistical difference between overweight and sex of the pupils, the type of housing and area of residence. From the multiple logistic

regression model run on some independent variables associated with overweight, school type, mother's occupation, mothers educational level (tertiary level) and socio-economic status (middle) were significant. Age, father's educational level, father's occupation, means of transportation to school and amount of money given were significant at bivariate analysis level but lost its significance at the multivariate analysis level. Pupils in the public schools were (9%) less likely to be overweight compared to their counterparts in private schools (AOR= 0.09, 95% CI = 0.02 – 0.36, $p < 0.05$). A greater proportion of pupils in the study had parents who had formal occupation. Therefore, pupils whose parents were in the formal employment sector (occupation) were 21% less likely to be overweight compared to those whose parents were in the informal employment (AOR= 0.21, 95% CI = 0.60 – 0.72, $p < 0.05$). Pupils whose mothers have had tertiary education have almost 70% likelihood of being overweight compared to those whose mothers have had primary education (AOR= 6.9, 95% CI = 1.14 -419, $p < 0.05$). Pupils with parents within the middle socio-economic status level had a 66% likelihood of being overweight compared to those in the lower SES level (AOR= 6.6, 95% CI = 1.1 = 39.2, $p < 0.05$).



Table 4.3a Relationship between overweight and Socio-demographic characteristics

		Overweight				
		Bivariate analysis			Multivariate analysis	
Variable	Category	Frequency (%)	Yes (%)	No (%)	P - value	AOR 95% CI
Age	<12years	422 (85.4)	131 (31.0)	291 (69.0)	0.013	1
	≥ 12 years	72 (14.6)	12 (16.6)	60 (83.3)		1.36 (0.29 - 6.20)
Sex	Male	238 (47.9)	73 (30.7)	165 (69.3)	0.543	N/A
	Female	259 (52.1)	73 (28.2)	186 (71.8)		
School type	Private	252 (50.7)	112 (44.4)	140 (55.6)	< 0.001	1
	Public	245 (49.3)	34 (13.9)	211 (86.1)		0.09 (0.02 - 0.36)*
Mother's Occupation	Informal	286 (63)	71 (24.8)	215 (75.2)	0.006	1
	Formal	168 (37)	62 (36.9)	106 (63.1)		0.21 (0.60 - 0.72)*
Father's Occupation	Informal	184 (42.1)	39 (21.2)	145 (78.8)	0.001	1
	Formal	253 (57.9)	92 (36.4)	161 (63.6)		0.46 (0.15 - 1.44)
Mother's Educational Level	Primary/Elementary	82 (23.2)	18 (22.0)	64 (78.0)	0.003	1
	Secondary	124 (35.1)	39 (31.5)	85 (68.6)		1.37 (0.35 - 5.25)
	Tertiary	147 (41.6)	64 (43.5)	83 (56.5)		6.9 (1.14 - 41.9)*
Father's Educational Level	Primary/Elementary	48 (14)	9 (18.8)	39 (81.3)	< 0.001	1
	Secondary	99 (28.9)	19 (19.2)	80 (80.8)		0.53 (0.10 - 2.65)
	Tertiary	196 (57.1)	83 (42.4)	113 (57.6)		1.68 (0.27 - 10.2)

Significant p values* (p < 0.05)

4.3b Relationship between overweight and Socio-economic characteristics

Overweight

Variable	Category	Frequency (%)	Bivariate analysis		P - value	Multivariate analysis
			Yes (%)	No (%)		AOR 95% CI
Type of Housing	Own house	257 (52.7)	70 (27.2)	187 (72.8)	0.646	
	Rented house	201 (41.2)	64 (31.8)	137 (68.2)		
	Company/Gov't House	16 (3.3)	4 (28.6)	10 (71.4)		
	Family house	14 (2.9)	6 (37.5)	10 (62.5)		
Area of residence	Peri-urban	271 (45.9)	78 (28.8)	193 (71.2)	0.759	
	Urban	223 (45.1)	67 (30.0)	156 (70.0)		
Transportation to school	Own car	166 (33.4)	70 (42.2)	96 (57.8)	< 0.001	1
	Friends car	10 (2)	3 (30.0)	7 (70.0)		5.00 (0.39 - 64.1)
	Public transport	146 (29.4)	41 (28.1)	105 (71.9)		1.31 (0.61 - 2.83)
	Walk	163 (32.8)	30 (18.4)	133 (81.6)		2.09 (0.59 - 7.30)
	Other	12 (2.4)	2 (16.7)	10 (83.3)		0.29 (0.30 - 2.86)
Amount given to school	None	31 (6.2)	14 (9.6)	17 (4.8)	0.046	1
	GHC 1.00 - 4.00	466 (93.8)	132 (90.4)	334 (95.2)		0.85 (0.29 - 2.47)
SES	Low	166 (33.4)	22 (13.3)	144 (86.8)	< 0.001	1
	Middle	170 (34.2)	58 (34.1)	112 (65.9)		6.6 (1.1 - 39.2)*
	High	161 (32.4)	66 (41)	95 (59)		3.8 (0.5 - 25.2)

Significant p values* (p < 0.05)

4.5.3 Overweight versus Dietary Habits/Patterns

Breakfast consumption, consumption of sweetened drinks and pupils having lunch from school feeding program were significantly associated with being overweight at the bivariate level. A significant relationship was observed between breakfast consumption and overweight ($p < 0.05$). However, this association was not significant when the multiple logistic regression model was run, (AOR= 1.72, 95% CI = 0.79 – 3.76, $p > 0.05$). Consumption of sweetened drinks also lost its significance when included in the multiple logistic model. From the multiple logistic regression run lunch from school feeding program was found to be significantly associated with overweight status of the pupils (AOR= 0.12, 95% CI = 0.31 – 0.53, $p < 0.05$). Therefore, pupils who rarely ate lunch from the school feeding program were 12% less likely to be overweight than those who took lunch often from the SFP. Snack consumption at break time, after lunch and before bedtime were also not significantly associated with overweight at the bivariate level of analysis. Bringing lunch from home, buying lunch in school and buying lunch from outside the school also had no association with being overweight. Pupils having lunch from school feeding program was one of the dietary habits that was significantly associated with overweight status ($p < 0.05$). Number of meals eaten per day and the number of meals eaten prepared at home were also not statistically significant at the bivariate level. All other diet-related factors i.e. consumption of sweetened drinks, breads/biscuits/pastries, fried foods, protein foods, fruits & vegetables and other high fat/caloric foods were not significantly associated with being overweight at bivariate level and were controlled for at multivariate level since some literature found a relationship of these food types with overweight. However, these were still not significant at the multivariate level of analysis.

Table 4.4: Relationship between Overweight and Dietary Habits/Patterns of Pupils

Variable	Category	Frequency (%)	Overweight			P-value	Multivariate analysis AOR 95% CI
			Yes	No	Bivariate analysis		
Breakfast Consumption	Often	289 (58.2)	96 (34.3)	184 (65.7)	0.02	1	
	Rarely	201 (41.8)	49 (24.4)	152 (75.6)		1.72 (0.79 - 3.76)	
Lunch from SFP	Often	89 (18.5)	15 (16.8)	74 (83.2)	0.004	1	
	Rarely	393 (81.5)	127 (32.3)	266 (67.7)		0.12 (0.31 - 0.52)*	
Sweetened drinks	Low	203 (40.9)	47 (23.2)	156 (76.8)	0.038	1	
	Moderate	192 (38.6)	66 (34.4)	126 (65.6)		1.57 (0.73 - 3.37)	
	High	102 (20.5)	33 (32.4)	69 (67.6)		1.53 (0.58 - 4.00)	
Fried foods	Low	108 (21.7)	28 (25.9)	80 (74.1)	0.471	1	
	Moderate	207 (41.7)	59 (28.5)	148 (71.5)		1.68 (0.68 - 4.15)	
	High	182 (36.6)	59 (32.4)	123 (67.6)		1.46 (0.53 - 4.07)	
Fruits & Vegetables	Low	299 (60.2)	81 (27.1)	218 (72.9)	0.076	1	
	Moderate	152 (30.6)	45 (29.6)	107 (70.4)		1.34 (0.61 - 2.94)	
	High	46 (9.3)	20 (43.5)	26 (56.5)		2.79 (0.89 - 8.73)	
Other High Fat/Caloric foods	Low	249 (50.1)	76 (30.5)	173 (69.5)	0.496	1	
	Moderate	158 (31.8)	41 (26.0)	117 (74.0)		1.02 (0.44 - 2.33)	
	High	90 (18.1)	29 (32.2)	61 (67.8)		1.36 (0.50 - 3.70)	
Bread/Biscuits/Pastries	Low	102 (20.5)	30 (29.4)	72 (70.6)	0.436	1	
	Moderate	224 (45.1)	60 (26.8)	164 (73.2)		0.79 (0.33 - 1.88)	
	High	171 (34.4)	56 (32.8)	115 (67.2)		0.60 (0.23 - 1.55)	

Significant p values* ($p < 0.05$)

4.5.4 Overweight versus Physical Activity Levels

None of the activities engaged in by the school pupils was statistically significant at bivariate level. Physical activity levels of the pupils had no relationship with overweight at the bivariate level and still not significant at multivariate level after it was controlled for. However, literature had documented a relationship between physical activity levels and being overweight.

4.6. Bivariate and Multivariate Analysis of Factors Associated with Obesity

4.6.1 Obesity versus Socio-demographic and Socio-economic Factors

Bivariate analysis done showed a relationship between obesity and certain socio-demographic characteristics such as school type, mother's occupation, father's occupation, mother's educational level, father's educational level, means of transportation and socio-economic status of the pupils. Being less than 12 years was not significantly associated with obesity ($p > 0.05$). Being in a private school was statistically associated with being obese ($p < 0.001$). There was no association between obesity and sex, type of housing, area of residence and amount given to school daily.

From the multiple logistic regression model, only school type was significantly associated with obesity. All other socio-demographic characteristics including mother's occupation, father's occupation, mother's educational level, fathers educational level, means of transportation to school and SES which were significant at bivariate level but lost their significance when run in the multiple logistic regression model. It was found out that pupils in the public school were 3% less likely to be obese than their counterparts in the private schools (AOR= 0.03, 95% CI= 0.003 – 0.24, $p < 0.05$). Other socio-demographic characteristics that were not significant in the study were controlled for since literature found them significant. However, they were still not significant when included in the multiple logistic regression model.

Table 4. 5: Relationship between Obese and Socio-demographic characteristics

		Obesity				
		Bivariate analysis			Multivariate analysis	
Variable	Category	Frequency (%)	Yes (%)	No (%)	P - value	AOR 95% CI
Age	<12years	422 (85.4)	70 (16.6)	352 (83.4)	0.073	1
	≥ 12 years	72 (14.6)	6 (8.3)	66 (91.7)		2.20 (0.32 - 15.1)
Sex	Male	238 (47.9)	42 (17.7)	196 (82.4)	0.251	1
	Female	259 (52.1)	36 (13.9)	223 (86.1)		0.96 (0.47 - 1.95)
School type	Private	252 (50.7)	65 (25.8)	187 (74.2)	<0.001	1
	Public	245 (49.3)	13 (5.3)	232 (94.7)		0.03 (0.003 - 0.24)*
Mother's Occupation	Informal	286 (63)	31 (10.8)	255 (89.2)	<0.001	1
	Formal	168 (37)	39 (23.2)	129 (76.8)		0.66 (0.20 - 2.13)
Father's Occupation	Informal	184 (42.1)	18 (9.8)	166 (90.2)	0.003	1
	Formal	253 (57.9)	51 (20.2)	202 (79.8)		1.04 (0.36 -3.04)
Mother's Educational Level	Primary/Elementary	82 (23.2)	8 (9.8)	74 (90.2)	0.006	1
	Secondary	124 (35.1)	19 (15.3)	105 (84.7)		1.63 (0.31 - 8.54)
	Tertiary	147 (41.6)	38 (25.9)	109 (74.1)		2.6 (0.36 -19.2)
Father's Educational Level	Primary/Elementary	48 (14)	4 (8.3)	44 (91.7)	0.001	1
	Secondary	99 (28.9)	10 (10.1)	89 (89.9)		0.85 (0.22 - 3.26)
	Tertiary	196 (57.1)	49 (25.0)	147 (75.0)		0.64 (0.19 - 3.64)

Significant p values* (p < 0.05)

4.6.2 Obesity versus Dietary Habits/Patterns

Breakfast consumption, lunch from school feeding program and consumption of fruits and vegetables among pupils were associated with obesity at the bivariate analysis level ($p < 0.05$). However, all other dietary related variables were not significantly associated with obesity. Multiple logistic regression done found no association between the significant dietary related variables and obesity at the bivariate level. All other dietary related variables that were not significant in the study but literature documented significant were controlled for but were still not significant when run in the multiple logistic regression model.

Table 4. 6: Relationship between Obesity and Dietary Habits/Patterns of Pupils

Variable	Category	Frequency (%)	Obesity		0	Multivariate analysis
			Yes	No (%)		AOR 95% CI
Breakfast Consumption	Often	289 (58.2)	54 (19.3)	226 (80.7)	0.021	1
	Rarely	201 (41.8)	23 (11.4)	178 (88.6)		1.35 (0.52 -3.51)
Lunch from SFP	Often	89 (18.5)	4 (4.5)	85 (95.5)	0.001	1
	Rarely	393 (81.5)	72 (18.3)	321 (81.7)		0.17 (0.28 -1.08)
Fruits& Vegetables	Low	299 (60.2)	39 (13.0)	260 (87.0)	0.026	1
	Moderate	152 (30.6)	26 (17.1)	126 (82.9)		2.00 (0.78 -5.10)
	High	46 (9.3)	13 (28.3)	33 (71.7)		3.74 (1.06 -13.1)
Fried foods	Low	108 (21.7)	15 (13.9)	93 (86.1)	0.836	1
	Moderate	207 (41.7)	34 (16.4)	173 (83.6)		0.90 (0.32 -2.50)
	High	182 (36.6)	29 (15.9)	153 (84.1)		0.70 (0.21 -2.35)
Sweetened drinks	Low	203 (40.9)	29 (14.3)	174 (85.7)	0.773	1
	Moderate	192 (38.6)	32 (16.7)	160 (83.3)		1.08 (0.44 - 2.66)
	High	102 (20.5)	17 (16.7)	85 (83.3)		1.02 (0.33 -3.13)
Other High Fat/Caloric foods	Low	249 (50.1)	47 (18.9)	202 (81.1)	0.121	1
	Moderate	158 (31.8)	18 (11.4)	140 (88.6)		0.50 (0.18 - 1.35)
	High	90 (18.1)	13 (14.4)	77 (85.6)		0.86 (0.28 - 2.62)
Bread/Biscuits/Pastries	Low	102 (20.5)	19 (18.6)	83 (81.4)	0.413	1
	Moderate	224 (45.1)	194 (86.6)	30 (13.4)		0.97 (0.33 -2.63)
	High	171 (34.4)	142 (83.0)	29 (17.0)		0.69 (0.23 -2.06)

4.6.3 Obesity versus Physical activity level

Physical activity levels of the pupils were not significantly associated with obesity at the bivariate level and still did not make any significant contribution to the multiple logistic regression model in the presence of other significant variables which were controlled for. However, literature has found physical activity levels to be significantly associated with BMI status.

4.7 Summary of Findings

The summary of key findings from the data analyses are presented below:

4.7.1 Anthropometric measurements of the pupils

Overall combined prevalence of overweight and obesity among the school children in Sekondi-Takoradi Metropolis was 29.4%. A total of 269 (54.1%) pupils had a normal BMI status and 82 (16.5%) were found to be underweight. Out of the overall prevalence, 68 (13.7%) were overweight and 78 (15.7%) were obese. Combined overweight and obesity prevalence was higher in private schools compared to public schools (44.5% vs. 13.9%, $p < 0.001$). Overweight and obesity prevalence in private schools was 18.7% vs. 25.8% and that of those in the public schools was 8.6% vs. 5.3% respectively. Combined prevalence among girls (31.6%) was higher than boys (27.3%), with overweight and obesity prevalence in girls 17.7% vs. 13.9% and that in boys 13 vs. 14.3%. However, being male or female had no association with being overweight or obese (30.7% vs. 28.2%, $p > 0.05$). The mean BMI of the pupils was $18.2 \text{ kg/m}^2 \pm 4.1 \text{ kg/m}^2$. Mean age for the study participants was 10.4 ± 1.2 years, with children from the public schools were significantly much older than those in the private schools (10.9 ± 1.3 years vs. 9.8 ± 0.8 years, $p < 0.001$). The highest proportion of overweight (31%) and obesity (16.6%) was observed among those aged less than 12 years

(8-12). This difference however, was significant with overweight ($p < 0.05$) but not significant with obesity ($p > 0.05$).

4.7.2 Dietary Habits/Patterns

1. Majority (58.2%) of the pupils had breakfast often. Significantly more pupils in the private schools had breakfast often compared to those in the public schools (78.2% vs. 36.9%, $p < 0.001$).
2. Less than half (48.5%) of the pupils eat snacks often at break time. More private school pupils ate snacks often at break time compared to those in the public schools (63.5% vs. 32.9%, $p < 0.001$). Only 18.3% of the pupils had snacks often after lunch, with pupils from the private school taking it often compared to those in the public schools (25.4% vs. 11.2%, $p < 0.001$). Also about 10 % of the pupils ate snacks often before bedtime with more pupils from the private schools taking snacks before bedtime often compared to their counterparts in the public schools (13.9% vs. 5.9%, $p < 0.05$).
3. Only 19.3% of the pupils brought lunch from home private 25.3% vs. public 13%. Majority (77.1%) had lunch in school often, with more public school pupils having lunch in school often compared to private school pupils (87.8% vs. 66.9%, $p < 0.001$). Only 5% of the pupils had lunch outside the school often, with more public school pupils having lunch outside school compared to their counterparts in private schools (8.4% vs. 1.6%, $p < 0.05$). Only 18.5% of the pupils had lunch from the school feeding program often. Significantly more of the pupils in the public schools had lunch from SFP compared to those in the private schools (33.3% vs. 3.7%, $p < 0.001$).
4. Majority (75.5%) of the pupils ate 3 meals per day, with more pupils from the public schools ate less than 3 meals per day compared to those in the private schools 60.7%

- vs. 39.3%. Majority of the pupils had two or less of the meals per day prepared at home, with more public school pupils having two or less meals prepared at home compared to their counterparts in private schools (51.7% vs. 48.3%, $p < 0.05$).
5. About 20.5% of the pupils had high consumption of sweetened drinks. Significantly more pupils from the private schools consumed high sweetened drinks compared to those in public schools (53.9% vs. 46.1%, $p < 0.05$).
 6. There was also a statistically significant difference in those in the high consumption category of breads/biscuits/pastries by school type (private 60.2% vs. public 39.8%, $p < 0.05$).
 7. Majority (60%) of the pupils had a low consumption of fruits and vegetables, with a significant high proportion of pupils in the public schools compared to those in the private schools (54.2% vs. 45.8%, $p < 0.001$).
 8. Half (50%) of the pupils had a low consumption of other high fat/caloric foods, with a significant proportion of pupils from the private schools compared to those in the public schools (56.2% vs. 43.8%, $p < 0.05$).

4.7.3 Physical activity levels

1. More than half (54.5%) of the pupils had a physical activity level of average and above, with 51.3% pupils from the private schools and 48.7% from the public schools. Mean physical activity of the pupils was 12.1 ± 2.7 . Physical activity levels did not vary significantly by school type (private 12.2 ± 2.8 vs. public 11.9 ± 2.7 , $p > 0.05$).

4.7.4 Factors Associated with Overweight and Obesity

1. School type, mother's occupation, mother's educational level, being in the middle socio-economic status level and eating lunch often from the school feeding program

- had significant relationship with being overweight or obese after controlling for age, sex, physical activity levels, area of residence and other dietary related factors.
2. Pupils in the public schools were 9% less likely to be overweight compared to their counterparts in private schools (AOR= 0.09, 95% CI = 0.02 -0.36, $p < 0.05$). Pupils from the public schools also had a 3% decreased odds of being obese compared to other pupils in the private schools.
 3. Pupils whose mothers had formal occupation were 21% less likely to be overweight compared to those whose mothers had informal occupation (AOR= 0.21, 95% CI = 0.60 – 0.72, $p < 0.05$)
 4. Pupils whose mothers have had tertiary level education had almost 70% likelihood of being overweight compared to those whose mothers have had primary level of education (AOR= 6.9, 95% CI =1.14 – 41.9, $p < 0.05$).
 5. Pupils who rarely ate lunch from the school feeding program had a 12% less likelihood of being overweight. (AOR= 0.12, 95% CI = 0.31 – 0.53, $p < 0.05$).
 6. Pupils with parents within the middle socio-economic status level had a 66% likelihood of being overweight compared to those in the lower SES level (AOR= 6.6, 95% CI = 1.1 = 39.2, $p < 0.05$).

CHAPTER FIVE

DISCUSSION

The objective of the study was to determine the prevalence and factors associated with childhood overweight and obesity in school children in the Sekondi-Takoradi Metropolis of the Western Region of Ghana. This chapter presents in detail the discussion of the study findings organized by the objectives of the study:

- Prevalence of overweight and obesity in the school children
- Socio-economic factors associated with childhood overweight and obesity
- Dietary habits/patterns associated with childhood overweight and obesity
- Physical Activity levels of the school children

5.1 Prevalence of Overweight and Obesity

A combined prevalence of overweight and obesity observed among the primary school children in the Sekondi-Takoradi Metropolis was 29.4%, with 13.7% overweight prevalence and 15.7% obesity prevalence respectively. The overall combined prevalence is however, much higher than 26.7%, and 19.3% earlier reports documented in University Primary School, Legon by Mohammed and Vuvor, 2012 and Accra metropolis by Abachinga, 2001 respectively. The finding on overweight and obesity prevalence among school children in the present study is also higher than an overall 15% of overweight and obesity conducted among school age children in urban Ghana (Ghana School Survey, 2012). Goh (2006) – reported 12% overweight prevalence and Amo- Addae (2004) – reported 5% obesity prevalence. Other studies from the Northern regional capital, Tamale revealed an overweight and obesity prevalence of 9.8% and 7.5% respectively (Amidu et al., 2013). Another study within the Mfantseman municipality of the Central region of Ghana by Kwaw et al., (2013) documented an almost 50% prevalence of overweight and obesity with 23.9% obesity prevalence among school children in both private and public schools. Finding from

this study is also higher than the prevalence rate of overweight (11.8%) and obesity (15%) in a study conducted by Haijan and Heidari (2013) in Babol, Northern Iran, as well as a review by Muthuri et al., (2014) on the evidence of overweight and obesity transition among school- aged children in sub-Saharan Africa with a weighted average of overweight and obesity of 10.6% and 2.5% respectively. The estimated prevalence of overweight and obesity for another study by Obirikorang et.al., (2015) among school children in Kumasi was lower; 11.6% and 2.3% respectively than the findings in the present study. This lower prevalence reported in other studies may probably be due to the number of participants involved, geographical location, variation in lifestyles and also different definition cut- off used for overweight and obesity. These documented rates although indicating a rise in the trends of childhood overweight and obesity were however lower compared to the observed prevalence from this study making it an emerging `public health concern in the Sekondi-Takoradi metropolis. In line with this observation, a study by Patnaik et al., 2010 in Orissa-India among school children found overall prevalence to be 28.63% (overweight – 14.1% and obesity – 14.53%). This prevalence is however very high and confirms the literature explanation of increasing prevalence of obesity in developing countries. In agreement with findings of Schultz (2012), there was no significant difference observed in overweight and obesity between sexes (male: 13% and 14.3% vs. female: 17.7% and 13.9%). However, combined prevalence of overweight and obesity among girls (31.6%) was higher than boys (27.3%). This result was consistent with findings from previous studies by Haijan and Heidari (2013) in Babol, Northern Iran and all studies that have assessed nutritional status of school going children in Ghana to date (Mohammed and Vuvor, 2012, Kwaw et al., 2013, Ghana School Survey 2012, Amidu et al., 2013, Peltzer and Pengpid, 2011, Abachinga 2001). A review done by Gupta et al., (2012) found that the higher prevalence of overweight and obesity in females was due to girls having very low levels of physical activity in most

developing countries and mostly engage in minor household chores and are less involved in outdoor activities compared to boys. In contrast, other studies by Mushtaq et al., (2011), Patnaik et al., (2010) and Jabre et al., (2005) documented more boys were overweight than girls.

Consistent with findings of earlier studies by Ajayi et al., (2015) and Gupta et al., (2012), this study found overweight and obesity to be higher among the younger age group compared to the older pupils with the highest prevalence of 31% and 16.6% among those aged within 8-12 years. Gupta et al., (2012) associates this finding with the fact that children are more overweight or obese in the pre-pubertal phase compared with post pubertal phase, and the reason being that there is usually an increased self-consciousness among post pubertal children about weight gain and physical appearance. However, this relationship was not statistically significant and in line with a study by Mogre et al., (2013). Similar pattern of higher prevalence with younger age group was found in a study by Valen C et al., (2009). However, Toriola et al., (2012) reported a contrary pattern that there was increasing prevalence of overweight and obesity with advancing age.

In this study mothers educational level (tertiary) had a significant association with overweight, i.e. increase in mother's education was associated with an increase in overweight both at the bivariate and multivariate level of analysis. The findings in this study was in contrast with a study by Mohammed and Vuvor, (2012) that associated mothers educational level with decreased child overweight status and documented that this finding was expected as increase in mother's educational level has been linked with improved knowledge acquisition and use of health information and health services which eventually affects preferences for child health and family size. Reasons for the higher overweight pupils in this study may be due to parents with tertiary education belonging to the high SES group

and therefore having an affluent lifestyle like transporting pupils to school by cars instead of walking, easy availability of domestic help to take care of household chores as well as giving pocket money to pupils to buy their own lunch because of busy schedules at the place of work.

A greater proportion of pupils who were overweight and obese had mothers who had formal occupation. The study revealed an inverse association between overweight and formal occupation of mothers of the pupils. Pupils with parents who had formal occupation were at a reduced risk of being overweight compared to those whose parents were in informal occupation. Conversely, it is assumed that parents with formal occupation are likely to have had some higher to at least secondary level education with eventual increase in household income and this may have a positive influence on healthy-related behaviours, like purchasing of healthier foods, preparing balance meals at home and enrolling children in organized physical activities like swimming as well as purchasing bicycles for exercising. In contrast to our findings, a survey by Obirikorang et al., 2015 documented that there was a significant association between informal occupation of parents and the development of central obesity in school children.

5.2 Socio-economic factors associated with childhood overweight and obesity

Socio-economic status may affect the lifestyle including a population's access to food and patterns of physical activity and as a result influence their energy balance (Wang and Lim, 2012). There was a statistically significant association between middle and high SES and being overweight/obese at the bivariate level. After controlling for all other variables in the logistic regression model, the study found being in the middle SES significantly associated with being overweight. Middle SES predicted over 66% increase in the odds of pupils being overweight. This finding is in agreement with a study by Alangea et al., (2014) and Dapi et

al., (2009) where overweight was higher in the middle SES group compared to the low and high SES. Benkeser et al., (2012), also documented that women in the high and low wealth quintiles had reduced odds of being obese compared to those in the middle wealth quintile and food insecurity could be the reason for the lower prevalence of overweight among the lower SES. Several factors could be responsible for this high prevalence of overweight among pupils from families in the middle SES groups, it may be that parents of these pupils are of the working class and have little or no time to plan and prepare food for their kids and hence give them pocket money to purchase food in school. Parents in order to compensate for the inadequate time and care for their kids provide them with junk food and snacks which all contribute to overweight and obesity in children.

In agreement with all previous studies comparing overweight and obesity among private and public school pupils in Ghana, enrolling pupils from private and public schools in this study showed clearly that pupils from private schools have higher prevalence of overweight and obesity compared to their counterparts from public schools. This relationship was however statistically significant at both bivariate and multivariate level of analysis. This was related in a study by Amidu et al., (2013) with associated factors being parents/guardians with either relatively high SES and higher educational level. These suggest that pupils from the affluent homes are usually enrolled in private schools and have significantly higher prevalence of overweight and obesity than those in the lower SES. Reasons for this observation may be due to pupils from the high and medium SES receiving daily pocket money to buy lunch and snacks, and also affluent children usually resort to relatively inactive lifestyle and being transported to school by cars compared to their public school counterparts who usually walk to/from school (Gupta et al., 2012). Reason may also be that private schools are usually built in urban areas with not much open spaces so children

are not able to engage in physical activities during break time and physical education seems not to be included in their curriculum now.

5.3 Dietary habits/patterns associated with childhood overweight and obesity

All the diet- related factors tipped to be predictors of childhood overweight and obesity including consumption of sweetened drinks, breads/biscuits/pastries, fried foods, and other high fat/caloric foods, fruits and vegetables, snack consumption, having lunch from home, in and outside school, meals eaten per day and the number of meals eaten per day prepared at home, were all not significant at both level of analyses.

Breakfast has been documented to be the most important meal of the day and its consumption as part of a healthy diet has been found to significantly impact the health and well-being of children (Rampersaud et al., 2005). Regular consumption is known to maintain weight in children. Breakfast consumption among the pupils in the study was significant at bivariate level, however there was no significant association after controlling for other variables in the logistic model. Pupils in the private schools had breakfast regularly within the 5 school days compared to the public schools. Breakfast consumption regularly seems to have a protective effect against becoming overweight or obese and several studies have confirmed this (Fabritius et al., 2008), Rampersaud et al., 2005 and the Ghana Schools Survey 2012).

From this study, the pupils who rarely had lunch from the school feeding program had reduced odds of being overweight compared to those who often had lunch from the school feeding program. However, this finding was not significant in relation to obesity. Only 33% of the pupils in this study were patronizing the SFP, and were from the public schools. This was consistent with a study by Alangea et al, (2014). This finding may suggest the challenges with SFP where foods given to pupils are only rice-based with no vegetables or

proteins, and pupils have no food preferences therefore are dissatisfied with the food served and rarely ate it. Those who often ate from the SFP may actually have become overweight or obese due to marginal undernutrition.

Consumption of sweetened drinks did not predict a pupil being overweight or obese though there was a statistical significance at bivariate level. In contrast to this study findings, Malik et al., (2013) found daily consumption of sweetened drinks/ beverages to be associated with an increase in a child's BMI.

Our study also found that consumption of fruits and vegetables were very low among participants. Fruits and vegetables consumption was also not associated with overweight and obesity. Some studies also observed similar findings (Brady et al., 2000 and Steiner-Aseidu et al., 2012). Fruits provide essential vitamins, minerals and fiber that promote good nutrition and health (Pamplona-Roger, 2006), however, school children are not encouraged to eat them but prefer high-energy dense foods. Reason for the low consumption may be due to the high prices of fruits and vegetables, the non-availability of these in canteens in schools and also children not well educated and encouraged about the benefits of eating fruits and vegetables.

Consumption of breads/biscuits and pastries, fried foods and other high fat/caloric foods (like chocolate, ice cream, toffees, pasta etc.) also did not have any significant association with child BMI. This maybe probably be due to low to moderate consumption among the pupils.

5.4 Physical Activity levels of the school children

More than half of the pupils in the study had a physical activity level of average and above with pupils in the private schools engaging in a little more sporting activities than those from the public schools. This present study however did not find any statistical difference

in general physical activity of pupils based on school type. Majority of the pupils from public schools walked to/from school compared to those in the private schools. Conversely, more pupils from the private schools were transported to school compared to their public school counterparts.

Walking to/from school and being transported to school had no association with pupils BMI. This is probably because most pupils walked to/from school on most days of the week and majority of those transported to school either by their parent's car or public transport also walked either before reaching school or back home.

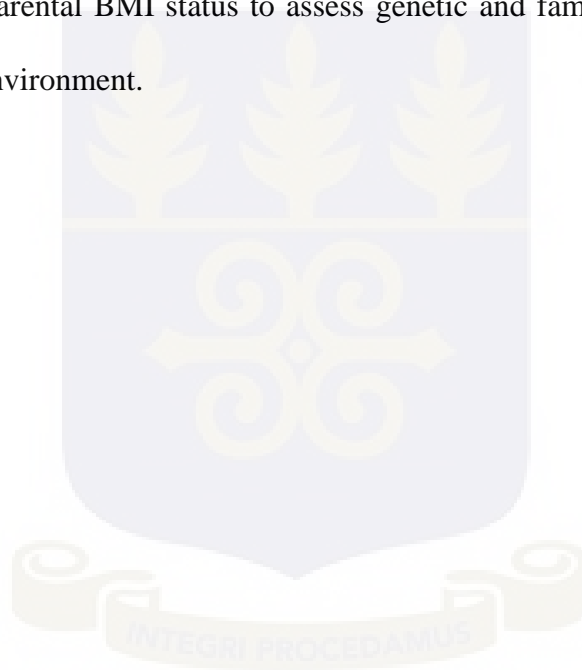
Consistent with findings of a study by Peltzer and Pengpid, (2011), this study also did not find any statistical differences between BMI and the physical activity levels (below average PA and average and above PA) at both bivariate and multivariate level of analysis in the study. In contrast, most studies found significant relationship between physical activity levels and overweight and obesity (Warraich et al., 2009, Janssen et al., 2004 and Haug et al., 2009).

5.5 Limitations of the study

1. This study was a cross-sectional study, therefore findings were associations and not causal relationships.
2. Schools recruited for the study were urban and in peri-urban areas of Sekondi-Takoradi Metropolis and findings may not necessarily reflect the situation in the rural parts of the metropolis.
3. Variables used in assessing physical activity levels was scanty, this might account for the fact that physical activity levels did not predict overweight and obesity. Variables such as sedentary behaviour (hours watching TV/playing

video games, number of times a sporting activity is played and engaging in physical education (PE) in schools).

4. The 7-day food frequency questionnaire (FFQ) used to determine dietary patterns and frequency of consumption of certain food types in the children though a very good tool could not collect detailed data on foods whose impact are quantity dependent, for example fruits and vegetables.
5. In addition, a number of factors known to be associated with BMI status of children were not assessed including, skipping of breakfast, environmental factors, parental BMI status to assess genetic and family influence and social (home) environment.



CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

- Results from this study estimated a high combined prevalence of 29.4% in school children in the Sekondi-Takoradi metropolis, with overweight 13.7% and obesity 15.7% especially in female participants and pupils in the private schools.
- This study revealed a high combined prevalence of overweight and obesity 44.5% (overweight 18.7% vs. obesity 25.8%) among private school children compared to 13.9% (overweight 8.6% vs. obesity 5.3%) in public school children.
- The study revealed that more pupils in the private schools had breakfast often, ate snacks during break time, after lunch and before bedtime compared to their counterparts in public schools. More pupils from the private schools had a high consumption of sweetened drinks and breads/pastries compared to other pupils from public schools.
- Mother's occupation and educational level were significantly associated with a child being overweight and obese.
- Being in the middle SES significantly increased the odds of a child being overweight in this study.
- Having lunch rarely from the SFP significantly predicted a decreased odds of a child being overweight or obese.
- Findings from this study revealed that, over nutrition and undernutrition co-exists among school children in the metropolis and public health interventions should incorporate measures to avert both.

- Overweight and obesity is an emerging public health issue of concern within the Sekondi-Takoradi metropolis especially in private schools and therefore should be studied in greater detail with well-funded generalizable studies.

6.2 Recommendations

The following recommendations to stakeholders are to enable them achieve control in childhood overweight and obesity and overall health of the children especially those in private schools.

6.2.1 Ghana Education Service (GES)

1. The School Health Education Programme (SHEP) should be strengthened by incorporating more knowledge about nutrition and physical activity and nutrition related diseases in school curriculum. The GES must ensure SHEP coordinators are placed in private schools to also benefit from the program.
2. The quality and adequacy of food provided to pupils in the public schools under the school feeding program must be monitored to ensure food provided is nutritious and well balanced for pupils to be satisfied.
3. GES must collaborate with other policy makers and develop policies regarding food vending in schools and ensure the ban on sweetened beverages and energy dense foods and provide healthier food choices such as fruits and vegetables in schools for purchase by pupils who are usually given pocket money for lunch and snacks.

6.2.2 Ghana Health Service (GHS)

1. Must educate parents particularly mothers on overweight/obesity and its resultant rise in non-communicable diseases in later life, and provide information on benefits of healthy lifestyle and dietary habits to ensure their children also adopt. Mothers must be made aware of their influence on child weight and general health outcomes.

2. The GHS must collaborate with GES to make available in schools, teaching and learning materials displayed on the classroom walls and canteens promoting healthy lifestyles that pupils can adopt.



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APPENDICES

Appendix 1: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this letter should be quoted.



Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
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Email: ghserc@gmail.com

My Ref: GHS/RDD/ERC/Admin/App/17/328
Our Ref. No.

Akua Bodiwaa Amoh-Yeboah
School of Public Health
University of the Ghana
Accra

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC: 46/12/2016
Project Title	“Factors Associated with Childhood Overweight and Obesity in School Children in Sekondi-Takoradi Metropolis”
Approval Date	14 th March, 2017
Expiry Date	13 th March, 2018
GHS-ERC Decision	Approved

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report **after completion** of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
DR. CYNTHIA BANNERMAN
(GHS-ERC CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

Appendix 2: Parent Consent Form – For Child’s Participation

Title: Factors associated with childhood overweight and obesity in school children in Sekondi- Takoradi Metropolis

Principal Investigator: Akua Boadiwaa Amoh-Yeboah (Ms.)

Address: Department of Epidemiology and Disease Control, University of Ghana School of Public Health. P. O. Box LG 13. Legon, Accra.

General Information about Research

Your child has been selected to participate in a childhood overweight and obesity study. Childhood overweight and obesity is a problem in most parts of the world especially developing countries including Ghana. When children are too heavy for their age and height, it is very likely to persist through adolescence into adulthood. It predisposes these children to the development of non-communicable diseases like diabetes, hypertension and other heart diseases. We currently do not know the extent of the problem here in Sekondi-Takoradi. We also do not have full understanding of the factors that contribute to unhealthy weights among children of school going age in Sekondi-Takoradi. This study will involve primary school children aged 6 – 12 years, private and public schools. This study seeks to find the proportion of primary school children who have weights above the normal and determine factors that are associated with this problem. It is hoped that knowledge gained from this study will help us develop appropriate interventions to help the children eat healthily and have healthy body weight.

If you agree for your child to participate, we will take your child's body weight and height measurements. We will also collect information on his/her eating habits/patterns and physical activity levels. Both body measurements and completion of questionnaires will take place in your child's school. Your child will be involved in this study for just one day.

Possible Risks, Discomforts and Inconveniences

Though there are no risks linked with participating in this study as procedures to be carried out are routine. We will be asking questions bothering your personal life. You should talk to the research assistant if you have any discomfort and ask questions whenever for clarification.

Possible Benefits

There will be no direct benefit of this study to your child. We hope however, participation in the study will help generate information that will help researchers determine factors that are associated with overweight and obesity among school-age children and develop interventions and strategies to encourage healthy eating among school children.

Confidentiality

All information collected from your child will be kept in strict confidence and be used for research purposes only. Your child's identity and or personal information will not be disclosed in any publication and only study investigators will have access to your information. The results of this study may be presented at scientific or published in scientific journals.

Compensation

Your child will be given results of his/ her body measurements and interpretation to bring

home. In addition, your child will receive an exercise book and a pen for participating in the study.

Additional Cost

You will bear no cost for your child's participation in this study.

Voluntary Participation and Right to Withdraw from the Research

Participation in this study is entirely voluntary. Your child is free to withdraw from the study at any time. You may also withdraw your child's participation in this study at any time without any consequence to you or your child.

Contacts for Additional Information

In case you have further questions regarding this study, please direct them to Akua Boadiwaa Amoh-Yeboah (Ms.) on telephone numbers 0243-326320 and 0504-228005.

Participant's Right

The Ghana Health Service Ethics Review Committee has reviewed and given approval for this study to be conducted.

Do you have any questions or clarifications?

If any of your questions were not satisfactorily answered, or you have further questions regarding this study, you may contact:

Akua Boadiwaa Amoh-Yeboah (Principal Investigator) on: Tel. 0243-326320 or e-mail: boadiwaa14@gmail.com

Dr. Samuel Oko Sackey (Supervisor), School of Public Health on: Tel. 0242-216542 or e-mail: sackey492003@yahoo.co.uk

STATEMENT OF CONSENT

The above document describing the benefits, risks and procedures for the research has been read and explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate in this study voluntarily and that I may choose to withdraw at any time. I understand that information regarding my personal identity will be kept confidential.

By signing this consent form, I have not waived any of the legal rights that I have as a participant in the study.

Participant signature/Thumb print_____

Date_____

If volunteers cannot read the form themselves, a witness must sign here:

I was present while the benefits, risks and procedures were read to the volunteer. All questions were answered and the volunteer has agreed to take part in the research.

Signature of witness_____

Date_____

I certify that the nature and purpose, the potential benefits, and possible risks associated with participating in this research have been explained to the above individual.

Signature of Person Who Obtained Consent_____

Date_____

Appendix 3: Child Assent Form

Title: Factors associated with childhood overweight and obesity in school children in Sekondi- Takoradi Metropolis

Introduction

My name is Akua Boadiwaa Amoh-Yeboah (Ms.) and I am from the Department of Epidemiology and Disease Control at the University of Ghana School of Public Health. I am conducting a research study entitled Factors associated with childhood overweight and obesity in school children. I am asking you to take part in this research study because I am trying to learn more about the things that contribute to unhealthy weights among primary school children aged 6 to 12 years. Unhealthy weights among children is a problem in most parts of the world especially developing countries including Ghana. We want to find ways to prevent this because it can lead to some health problems later in life, especially in adulthood. Your participation in this study will last for only one day.

General Information

If you agree to be in this study, you will be asked to give some information about you and your household, your eating habits and the foods and drinks you have taken over the past 7 days, your physical activity and how often you do certain things like watching television or playing video games. We will measure your height and let you stand on a weighing scale to measure your weight. The body measurements and answering of questions will take place in your school.

Possible Benefits

Your participation in this study will give us more information to help us understand some of the things that contribute to unhealthy weights among school-age children and how best

we can prevent this. The results of your measurements will be given to you to take home and share with your parents. You will also be given an exercise book and a pen for participating in this study.

Possible Risks and Discomforts

There are no risks to you for participating in this study. You will also not miss any class, class test or examination when participating in this study.

Voluntary Participation and Right to Withdraw from the Research

You can stop participating at any time if you feel uncomfortable. No one will be angry with you if you do not want to participate.

Confidentiality

Your information will be kept confidential. No one will be able to know how you responded to the questions and your information will be anonymous.

Contacts for Additional Information

You may ask me any questions about this study. You can call me at any time on 0243-326320 or 0504 -228005 or talk to me the next time you see me.

Please talk about this study with your parents before you decide whether or not to participate. I will also ask permission from your parents before you are enrolled into the study. Even if your parents say —yes you can still decide not to participate.

STATEMENT OF CONSENT

By making a mark or thumb printing below, it means that you understand and know the issues concerning this research study. If you do not want to participate in this study, please

do not sign this assent form. You and your parents will be given a copy of this form after you have signed it.

This assent form which describes the benefits, risks and procedures for the research titled *“Factors associated with overweight and obesity in school children in Sekondi-Takoradi Metropolis”* has been read and or explained to me. I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate.

Child’s Name _____

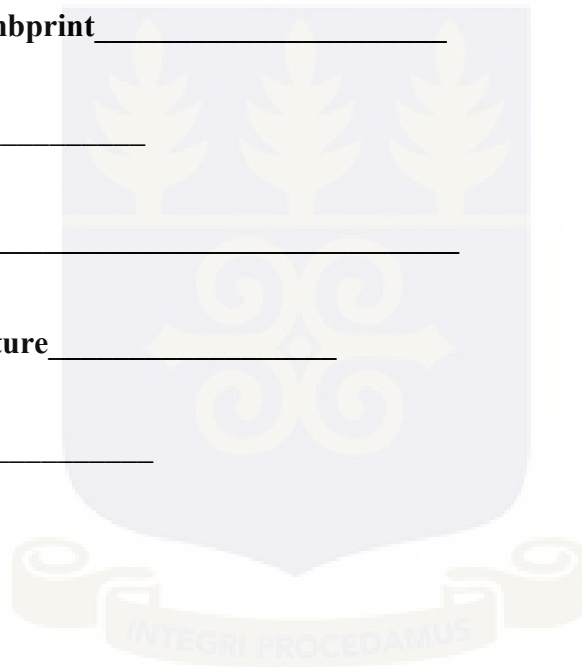
Child’s Mark/Thumbprint _____

Date _____

Researcher’s Name _____

Researcher’s Signature _____

Date _____



Appendix 4: Questionnaire

QUESTIONNAIRE: FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY IN PRIMARY SCHOOL CHILDREN IN THE SEKONDI-TAKORADI METROPOLIS, WESTERN REGION.

A. SOCIODEMOGRAPHIC AND ECONOMIC BACKGROUND INFORMATION

1. Name of School: _____

2. School type

1. Private

2. Public

3. Sex

1. Male

2. Female

4. Age

____ yrs

5. Mother/Guardian's occupation

1. Artisan or petty trader

2. Professional

3. Office worker

4. Don't know

5. Unemployed

Other: _____

6. Educational level of mother/guardian

1. Primary/Elementary

2. Secondary

3. Tertiary

4. Vocational

5. None

6. Don't know

7. Father/Guardian's occupation

1. Artisan or petty trader

2. Professional

3. Office worker

4. Don't know

5. Unemployed

Other: _____

8. Educational level of father

1. Primary/Elementary

2. Secondary

3. Tertiary

4. Vocational

5. None

6. Don't know

9. Type of housing

1. Own house

2. Rented house

4. Company/Govt house

3. Family house

5. Other

10. Where do you live?

urban

1. Peri-urban

2. Urban

11. How do you usually get to school?

1. Own car

2. Friend's car

3. Public transport

4. Walk

5. Other

12. How much money are you given a daily to school

1. None

2. <GHC1.00

3. GHC 1-4.00

4. GHC 5-10

5. GHC 10.00

13. Does your family own any of the following items?

- | | | | |
|-----------------------------------|--------|-------|--------------------------|
| 13.1 Air-Conditioner | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.2 Computers/Laptops | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.3 Refrigerator/Deep freezer | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.4 Gas/electric cooker | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.5 Television | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.6 Microwave ovens | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.7 VCD/DVD player | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.8 Satellite dish/DSTV/Multi TV | 1= Yes | 2= No | <input type="checkbox"/> |
| 13.9 Car | 1= Yes | 2= No | <input type="checkbox"/> |

B. DIETARY HABITS /PATTERNS

- | | Always | Very Often | Less often | Not at all (rarely) |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1. How often do you eat breakfast before coming to school | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. How often do you take snacks at these time? | | | | |
| 2.1 Break time | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.2 After lunch | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.3 Before bedtime | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. How often do you do the following? | | | | |
| 3.1. Bring lunch from home | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.2. Buy lunch in school | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.3. Buy lunch from outside school | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3.4. Get lunch from school-feeding program | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

C. OTHER DIETARY HABITS /PATTERNS

1. How many meals do you usually eat in a day?
2. How many of the meals you eat in a day is (are) prepared at home?

D. 7- DAY FOOD FREQUENCY QUESTIONNAIRE

Please indicate any of the following foods you ate within the past week and how often you eat them

FOOD ITEMS	Past one week 1= Yes 2= No	Number of times within the week	Where did you get your food from? Please write 0= Not applicable 1= Home 2= School Vendor 3= Street Vendor
<u>SWEETENED DRINKS</u>			
1.Tampico, Kalypso, Healthylife, , Caprisun etc	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.Fruit juices (Ceres, Pure Heaven etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.Minerals (Fanta, Coke, Sprite, Malt)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.Local drinks (asana, sobolo/bissap etc)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>BREADS,BISCUITS AND PASTRIES</u>			
5.Bread/ Cakes/ Pizzas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.Biscuits/cookies/crackers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.Pastries (pie, baked chips, bans, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>FRIED FOODS</u>			
8.Doughnut/ Bofrot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.Akara / Koose	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.Fried potatoes/chips/yam with chicken/meat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11.Fried eggs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.Fried rice/ jollof rice/ braised rice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>PROTEIN FOODS</u>			
13.Meat (beef/mutton/pork/bush meat)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14.Poultry (chicken/duck/turkey/birds)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.Sausage/ bacon	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.Fish	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>FRUITS AND VEGETABLES</u>			
17.Citrus/ Pineapple/ Mango/Watermelon/ Banana/Pawpaw/ Apple	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.Green Leafy (kontonmire) Carrots/ Cabbage/ Lettuce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>OTHER HIGH FAT/CALORIC FOODS</u>			
19. Chocolate/Ice Cream	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Toffees/candies/lollipops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Pasta/Noodles (indomie)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

E. PHYSICAL ACTIVITY QUESTIONNAIRE (ELEMENTARY SCHOOL)

Have you done any of the following activities in the past 7 days (last week)? If yes, on how many days in the week? (Tick only one box per row).

Activity	Frequency (no. of days within the past 7 days)			
	Never	1-2 days	3-4 days	5-7 days
1.Skipping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.Walking for exercise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.Bicycling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.Jogging /Running	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.Swimming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.Football	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.Basketball	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8.Ampe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. On how many days during the week do you walk to/from school?

9.1 If you walk, how long does it take you to reach school? (min) _____ mins

10. On how many days in the week we you transported to school?

10.1 If you were transported, how long does it take you to reach school? (min) _____ mins

E. ACCESS TO INTERNET

1. Do you sometime use internet on a mobile phone or computer? 1= Yes 2= No

1.1 If YES, whose phone do you often have access to?

- 1- Mother
- 2- Father
- 3- Siblings
- 4- Friends
- 5- Others

F. ANTHROPOMETRIC MEASURES

1. Weight _____ kg

2. Height _____ cm

3. BMI _____ kg/m²