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PREVALENCE AND DETERMINANTS OF CHILDHOOD OBESITY AMONG SCHOOL-AGE CHILDREN IN THE SUNYANI MUNICIPALITY

BY:

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(BSc. NURSING)

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DECLARATION

I declare that this submission is my work towards the award of an MSc and that to the best of my knowledge, it does not contain any materials previously published by another person nor material which has been submitted for the award of any other degree in any University, except where due acknowledgement has been made in the text.

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DEDICATION

This dissertation is dedicated to God Almighty and my family for their support and encouragement.

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My deepest gratitude goes to my supervisor Dr Emmanuel Nakua for his guidance, support and numerous feedbacks in the development of this thesis. To him, I say God replenish abundantly whatever he has lost during this period.

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ABSTRACT

Background

Childhood obesity is one of the persisting problems of our generation. There is a growing burden of overweight and obesity among children in Ghana. It poss several health problems to the individual later in life. In Ghana, the studies done on obesity focused on adult obesity with fewer on childhood obesity as compared to other countries where interventions are being implemented even at the school level. The objective of this study is to assess the prevalence of overweight and obesity among school-age children in the Sunyani Municipality.

Methods

The study was a cross-sectional design involving school children between the ages of 6 and 18years. A total of 423 participants were enrolled in the study. Anthropometric measurement of children's height and weight. The age-specific and sex-specific distribution of the body mass index using specific international classification body mass index standards. Questionnaires were administered individually to a school child that met the inclusion criteria and self-administered questionnaire to key informants in the selected schools.

Results

The finding of the study revealed that the prevalence of overweight and obesity is 9.7% and 6.4% respectively. The overall prevalence of overweight and obesity 16.1%. The results indicated that children attending private schools are about three times more likely to be overweight (3.84; 95% CI: .1.94 - 7.6; p 0.001) and obese (4.43; 95% CI: .1.92 - 10.24; p 0.001) compared to children in public schools. (4.43; 95%

CI: .1.92 - 10.24; p 0.001) It also revealed that females have 1.9 times at risk rate of overweight but are 20% less likely to be obese than their male counterpart. Increase in age was associated with reduced risk of being overweight (, 0.4, 95% CI:0.17-0.946; p<0.037). Sex (p=0.004), age (p=0.014), mother's education (p= 0.011), number of times of eating breakfast in a week (p=0.032), consumption of snack per day(p=0.029), time spent playing digital games(p=0.021) and watching TV (p=0.01) were significantly associated with the overweight and obesity.

Conclusion

Childhood overweight and obesity is prevalent in the Sunyani Municipality predominantly among private school children (10.4%). Age sex maternal education, high socioeconomic status, times of eating breakfast in a week, time spent playing digital games and watching TV are direct predictors of childhood overweight and obesity. All schools had a policy relating to food but not all of those schools had a policy on physical education. A greater number of them constituting about two-thirds of them had.

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LIST OF ABBREVIATIONS AND ACRONYM

BC - Before Christ

BMI - Body Mass Index

GDHS - Ghana Demographic and Health Surveys

GES - Ghana Education Service

GHS - Ghana Health Service

Kg - Kilometres

MoE - Ministry of Education

MOH - Ministry of Health

MUGA - Multi-Use Games Area

PE - Physical Education

OBW - Overweight and Obesity

SES - Social Economy Status

TV - Television

WHO - World Health Organization

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CHAPTER ONE

1.1 Introduction

The World Health Organization (WHO) considers childhood obesity a serious public health challenge of the 21st century due in part, to its association with numerous harmful health outcomes. Obesity remains ―one of today‘s most visible– yet most neglected–public health problems‖ (Manyanga *et al*, 2014; Ofori-Asenso *et al*, 2016)

A comprehensive study shows that, worldwide, 42% of adults and approximately onefifth of children are overweight or obese. In the United States, the largest industrialized country, one-third of children are overweight or obese. In China, the largest developing country and the second largest economy in the world, 10–20% of children are overweight or obese, and the combined prevalence of Overweight and Obesity (OWB) in boys in large cities is even higher than that in the United States (Wang *et al.*, 2017).

OWB is used to represent abnormal or excessive fat accumulation that has the potential to exert negative effects on health. Obesity occurs when calories intake exceeds the energy requirements of the body both for physical activity and for growth. The increasing prevalence of obesity is widely attributed to genetic factors, changes in dietary and physical activity patterns and the increasing availability of high fatty foods (Ofori-Asenso *et al.*, 2016). Obesity is the result of biological, behavioural, social, environmental and economic factors and the complex interactions between them, which can produce a positive energy balance (Wang, Lim and Program, 2015).

The nutritional status of a person is frequently described by the Body Mass Index

(BMI), which is the ratio of the weight (Kg) and the square of height (metres). Over the years, BMI has widely been used to assess OWB in adults. Individuals are categorized according to BMI as follows; underweight (BMI <18.5 kg/m2); normal (18.5–24.9 kg/ m2); overweight (25.0–29.9 kg/m2) and obese (≥30 kg/m2) (Wang, Lim and Program, 2015).

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Because there are no criteria accepted by all to be used in defining childhood obesity based on excessive body adipose tissue, weight-based classification based on body mass index (BMI, kg/m2) has been routinely used for both epidemiological and clinical purposes (Yanovski, 2016).

Pediatric OWB is of concern because of both immediate and later onset health consequences. Children at the highest levels of BMI are usually at the greatest risk of obesity-associated health problems (Yanovski, 2016). Obesity has many health and financial consequences on individuals, their families and society in general (Wang, Lim and Program, 2015). Childhood Obesity is more likely to lead to Adult Obesity and the resultant poor health throughout adulthood; thus obesity appears to be a major contributor to many preventable causes of morbidity (Yanovski, 2016). Obesity in children is associated with numerous health risks including hypertension, cardiovascular disease, stroke, diabetes, gall bladder disease, cancer, mental illness and predisposition to adulthood obesity (Cyril *et al*, 2016).

The problems associated with obesity are great at present and will become even more so in time to come. In 2010, 43 million children (35 million in developing countries) were overweight and obese; 92 million were at risk of overweight. The global prevalence of childhood OWB increased from 4.2% in 1990 to 6.7% in 2010. Such a

trend is expected to continue and the prevalence may reach 9.1% or approximately 60 million children in 2020 (Wang, Lim and Program, 2015).

In Ghana, obesity/overweight have been noted to be an ascending public health problem that could have a huge negative impact on national resources. The Ghana Demographic and Health Surveys (GDHS) from 1993 to 2014 reported a rising prevalence of obesity among Ghanaian women (especially, those from 15–49 years) from 3.4% to 15.3%. The World Health Organization estimates that in 2008, around

7.5% of Ghanaians were obese with higher prevalence in women (10.9%) than in men (4.1%) (Ofori-Asenso *et al.*, 2016).

1.2 Problem Statement

Childhood obesity is a serious public health threat in many industrialized and developing countries worldwide and the problem shows no sign of abating. This epidemic calls for immediate and effective population-based approaches to be employed to counteract its rise. OWB, as well as other lifestyle-related chronic diseases, are largely preventable. The problem is once developed, obesity is difficult to cure (Lanari and Bussini, 2014).

In time past, childhood and adolescent OWB were mostly associated with affluence and the developed world (Manyanga *et al.*, 2014). As noted earlier, the driving forces behind these trends include globalization, which is recognized to be dictating a widespread ―nutrition transition‖ in many countries characterized by a shift from traditional to western diets and an increasingly sedentary lifestyle (Ofori-asenso *et al.*, 2016).

Most of the studies done in Ghana which focus on obesity are done concerning adults. Very few focused on children. As a result, information on childhood obesity is rare.

There is a growing burden of OWB among Ghanaian children in the country over the last ten decade rising from 7% (GSHS, 2008) to 9.7% (Manyanga *et al.*, 2014) and 14.7% (Aryeetey *et al.*, 2017). The ages of these children vary but they all fall within the ages classified as childhood ages.

The school serves as a medium for socialization with education as one of the key functions. School children in Ghana spend about one-third of the day in school and so the influence of the school cannot be overlooked in promoting and instituting a healthy lifestyle in its pupils which will reduce the prevalence of childhood obesity.

In Ghana, the studies done on obesity centred around adult obesity with very few on childhood obesity as compared to other countries where interventions are being implemented even at the school level. This does not give a clear picture of the situation in Ghana which makes childhood obesity little-known and underrated.

Therefore, the main objective of this study was to assess the prevalence of OWB among school-age children in Sunyani municipality. The study will also explore the key risk factors of OWB among school-age children in Sunyani metropolis.

1.3 Aim

To assess the prevalence and determinants of obesity among school-age children in Sunyani Municipality.

1.4 Specific Objectives

1. Compare the prevalence of childhood obesity between private and public school children in the Sunyani Municipality.
2. To determine the risk factors of obesity among school children in Sunyani Municipality.

3. To determine factors that will influence healthy living at school and home. **1.6 Conceptual Framework**

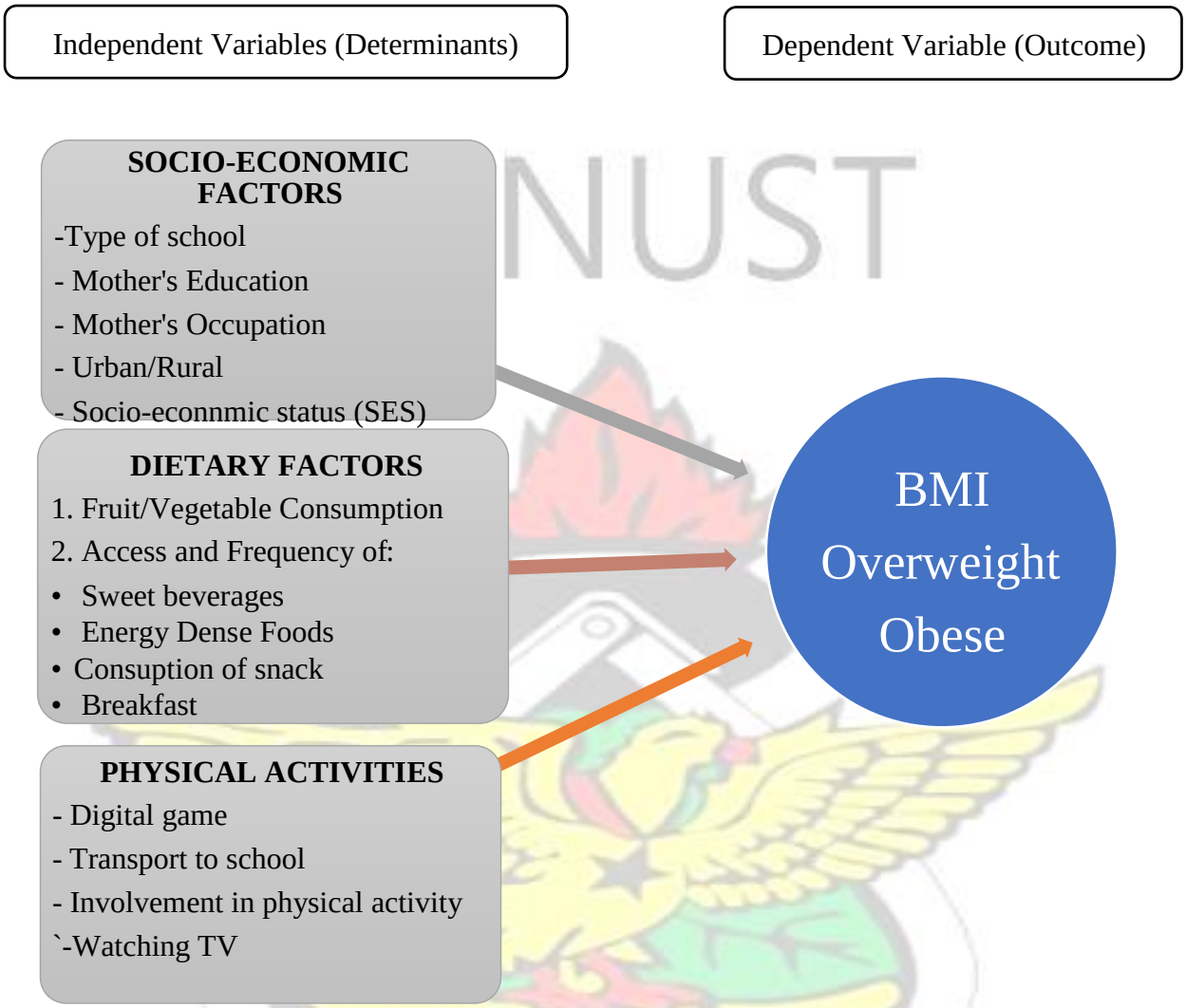

Figure 1.1: Conceptual Framework

Based on the above figure, healthy living is the independent variable and the Body Mass Index (BMI) status is the dependent variable. The factors that influence the healthy living, on the other hand, is the mediator variable as it explains the relationship between healthy living (independent variable) and BMI status (dependent variable). In other words, by means of the mediator variable (gender, age, type and location of school, the educational level of guardians, type of residence, as well as guardian), the independent variable (number of meals taken in a day, frequency of breakfast, lunch and supper

eaten in a week, the average number of cups of water drunk in a day and the conscious engagement in physical activities) influences the BMI status outcomes (underweight, normal, overweight or obese), which is the dependent variable.

1.7 Significance

Schools serve as important channels through which vital behavioural changes to reduce childhood obesity can be addressed since children spend most of the day time in school. Children spend many hours in school and schools serve as important channels through which important behavioural changes to reduce childhood obesity can be channelled. The emphasis on elementary school for most interventions seems to be justified because the dietary behaviours are forming in this age group and are more amenable to change, and changing unhealthy behaviours to more healthy ones can go a long way to addressing the problem of childhood OWB (Programs and Sharma, 2011).

Therefore, identifying and dealing with obesity in childhood is vital to decrease lifelong peril and guard wellbeing, thus gives a justification for identifying the prevalence of obesity and also assess the school contribution for a healthy living.

This will help breach the data on the degree and determinants obesity among schoolgoing children that is grounded on a representative sample from the Sunyani Municipality.

The study has significance for Ghana because most studies on obesity and have been conducted among adults and not children. Since childhood obesity is a growing problem, it is important to know the prevalence and factors associated with obesity in Ghana, to enable effective policy development.

1.8 Research Questions

1. What is the prevalence of OWB among public and private school children in the Sunyani municipality?
2. What are the risk factors of obesity among school children in the Sunyani municipality?
3. What are the factors in school and home that will influence healthy living?

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of related works on the prevalence of childhood obesity among school children conducted by other researchers. This is done through secondary sources including journals or articles, books, web pages and online sources.

This chapter is thus divided into sections comprising the concept of Obesity. Furthermore, studies that are related to the objectives of this topic are reviewed as well as a conceptual framework developed to guide the study.

2.2 Conceptual Review

This section provides an in-depth description of the development of obesity and thus entails the explanation of the general concept of what obesity is and how it comes about. Obesity is a medical condition or disorder of a person that results from excessive intake of fatty food and other related factors. This segment thus provides the degree of the existence of the phenomenon as well as the causes and the effects it has on the human body in general.

2.2.1 Meaning of obesity

For a larger part of human history and until recently, many people attributed weight gain to good living, wealth and prosperity. Many years ago, before Christ (BC), some scholars revealed that good health of the human body comprises of a balance of four characteristics namely; blood, black bile, yellow bile and phlegm. Hence, the production of more or less could lead to the causes of many diseases. Among many of the diseases is Obesity which is associated with excessive weight gain. Obesity is a

medical condition resulting from excess weight gain or carrying excess body fat (Adom *et al*, 2017). The World Health Organization [WHO], (2018) also defines obesity as abnormal or excessive fat that accumulates under the tissues of the human body. Barkhru, (2006) describes obesity as a physical condition characterized by an excessive deposit of fats in the adipose tissues of humans. The human body needs food to keep it alive yet, Mohammed and Vuvor, (2012) indicate that the condition results from consuming foods above physiological need. According to the WHO (2009), OWB is the fifth leading cause of mortality globally and a major risk factor for non-communicable diseases including cardiovascular diseases, diabetes and some cancers. The condition is measured using the Body Mass Index (BMI) which is defined as a ratio of a persons' weight in kilograms over the square of the height in meters. The general rule for decision making rest on the ratio derived from the calculation. Thus an answer between the range 18 - 25 is recognized as normal whereas greater than the upper limit is termed as overweight and the less than the lower limit termed as underweight.

2.2.2 Prevalence of obesity

Weight gain has over the years accelerated worldwide due to several factors. Given that WHO's fact concerning obesity revealed that the rate of the condition has tripled between 1975 and 2016. The tripling of the prevalence translates that averagely, today's adult is 3 times at risk to the condition (_NCD Risk Factor Collaboration‘, 2016). The facts also recorded 1.9 billion overweight adults and 650 million obsessed adults. Again, about 41 million and 340 million children under age five and children and adolescent respectively were also reported to have that condition (WHO, 2018).

In a surveillance initiative for WHO European Childhood obesity program among 19 countries who participated found the prevalence for OWB in boys and girls 6-9 years of age to range from 18% to 52% in boys and from 13% to 43% in girls for overweight,

and that the prevalence of obesity ranged from 6% to 28% among boys and 4% to 20% among girls. (Wijnhoven *et al*, 2014)

Africa is experiencing similar trends though the battle of malnutrition persists. Thus Lobstein, Baur and Uauy (2004) indicate that obesity is gradually permeating into the African continents. Likewise, Scott *et al*, (2012) and Kimani-Mugare, (2011) assert that the prevalence of both conditions (obesity and overweight) is rising in Sub- Saharan Africa. Between the years 1992 and 2005, a couple of studies were conducted within Africa. One of such studies is Ziraba *et al* (2009) whose study indicated that women in Sub-Saharan Africa were found to be overweight and obsessed. Also, a study in the Urban Regions of West Africa was reported to the prevalence doubled within the same year (Mbanya and Ramiaya, 2006). Finally, a study by Puoane et al., (2002) revealed a 56% OWB among women and men respectively.

The prevalence of OWB was 15% amongst school children 9–15 years living in Accra and Kumasi, Ghana (Aryeetey *et al.*, 2017). In a study conducted in Adentan Municipality of the Greater Accra Region of Ghana involving children aged 8-11 who were attending public and private primary schools found the prevalence to be 9.2% for overweight and 7.2% for obesity. Also, they found more girls (10.6%) to be overweight than boys (6.9%) whereas more boys (9.3%) than girls (5.9%) were obese. Moreover, a significantly higher percentage of children in private schools were overweight and obese (12.9 and 11.0%) as compared to those in public schools (5.5 and 3.3%).

There is an increasing trend and all the studies were done in Accra and Kumasi. There is a lack of data with regards to the prevalence in other regions of the country.

2.2.3 Causes of obesity among children

The mechanism of the development of Obesity is believed to be not fully understood; however, the condition comes about as a result of multiple causes. Obesity results when energy intake exceeds the energy given out. Hence one could attribute the condition to dietary intake. According to Dehghan, Akhtar-Danesh and Merchant (2005), the condition is best known to have serious complications on the physical and physiological health of children. Thus Dehghan et al., (2005) assert factors that can be associated with the development of the disorder include environmental factors, general lifestyle preferences of individuals as well as cultural factors. The influence of genetic factors and a conducive environment can usher the child into that condition hence, it believed that genetic factors play a significant role in the development of the condition (Nowicka and Flodmark, 2008).

For example, a child who comes from Obesity lineage and allowed to live unhealthily is susceptible and likely to become obsessed. Furthermore, behavioural and environmental factors are also associated with childhood obesity. Just as Mohammmed and Vuvor (2012) stated that obesity results from the intake of food in excess of what the physiology of the body needs, Rome (2011) supports the view that consumption of fatty foods and high sugar diet, intake of tobacco as well as poor exercise remain the main causes f this condition. This implies that foods containing high calories with low nutritional values are easily made available to the children hence leading to obesity. Again, it is asserted that parental influences such as their indulgent behaviour particularly their feeding styles play a vital role in the development of the condition in children (Xu, Wen and Rissel, 2015). Thus, no or short duration of breastfeeding according to Arenz *et al* (2004), has been identified as a risk factor of childhood obesity.

Another behavioural factor that can be associated with Obesity is the lack of physical activity. When children spend more time/ hours without any physical activity, they are likely to end up with that condition (Wright and Aronne, 2012). Thus, watching television, playing video games for longer periods among others are some of those poor habits children are known to be some of these poor behavioural habits. Hence engaging in physical activity improves the cardiovascular health of everyone and reduces the risk of getting the condition. A recent study by Khan *et al*, (2017) sums the section up with a list of factors that causes that enhances the condition. These include; heredity, eating more without exercise and socio-cultural condition. Furthermore, they include that the lack of awareness concerning health principles or living healthily consequently increases the risk of the development of several serious health conditions such as coronary heart disease, high blood pressure, cancer, sleep apnea, gallstones, osteoarthritis and infertility or irregular periods groups.

2.2.4 Effects of obesity among children

Obesity is rate as one of life‘s threatening health issues across the globe as it noted for its contribution to many serious medical conditions including cardiovascular diseases, hypertension, diabetes, stroke among others (Bales and Buhr, 2008). Children are likely to experience medical, psychosocial and societal problems. First and foremost, children face the likelihood of suffering from acute and chronic physiological problems that eventually persist in their adulthood (Wills, 2004). The excessive energy intake without a corresponding expense of that energy easily turns into complications for many including children. The process reveals a significant impact on the children's physical, social, mental and self-esteem. Sahoo *et al*, (2015) indicate that one of the likely effects is the child experiences poor academic performance and low quality of life. In the USA for example, Weiting (2008) asserts children go through psychosocial

challenges such as depression, anxiety, lower quality of life as well as low self-esteem. The effect can also be in the form of social problems where the child is teased, stigmatized or bullied because of the body size. This can result in Psychological trauma (Beck, 2016). Neumark-Sztainer et al (2002) supports the above assertion and opines that ―weight gain is predictive of vulnerability to bullying among peers‖. Children can be diagnosed with cardiovascular-related diseases such as high blood pressure, high cholesterol as well as type 2 diabetes mellitus.

2.3 Empirical review

This section, otherwise titled empirical framework, is a review of existing academic works or pieces of literature on the prevalence of obesity in children, the risk factors of obesity in children, as well as the factors that influence healthy living at school and home.

2.3.1 The prevalence of childhood obesity amongst school children attending private and public school.

Globally, there is a rapid nutritional transition and change in the pattern of diseases from one of high mortality in children and infants, as well as every age group to one of the man-made diseases such as those attributed to poor eating habits, smoking, drinking and other lifestyle choices (Sahoo et al., 2015). In other words, the rising death rates and diseases are mainly as a result of unhealthy lifestyle habits. It is, therefore, not surprising that there is a rise in the prevalence rate of nutrition-related diseases such as obesity, which has reached epidemic levels, especially in developed nations (Sahoo *et al.*, 2015). The situation is more worrying when the highest prevalence rate of obesity in children was reported in developed countries (Gupta, 2009). But that is not to say

that the situation (obesity in children) is not prevalent in developing countries (Gupta, 2009).

In a study, students in 2 government and 2 private schools in Meerut city. For this study, a comparative analysis was also done between the children going to the private school and thus going to the government schools which found out that 71% of overweight subjects were in private school. This shows the OWB is more prevalent among private school-going children (Joshi and Kumar, 2019).

In a study conducted by Aryeetey *et al.,* (2017), who examined the prevalence and predictors of OWB among school-aged children in urban Ghana sampled pupils separately for public and private schools. In public schools, the estimated sample was 954; in private schools, the estimate was 1808. The overall prevalence of OWB was 14.7% among the children, with 4.4% being obese. A higher proportion of children were overweight (including obese) in the private compared to the public schools (21.4% vs 11.2%, $p < 0.001$).

In a cross-sectional study conducted in Adentan Municipality of the Greater Accra Region of Ghana children attending public and private primary schools found the prevalence to be 9.2% for overweight and 7.2% for obesity. Also, they found more girls (10.6%) to be overweight than boys (6.9%) whereas more boys (9.3%) than girls (5.9%) were obese. Moreover, a significantly higher percentage of children in private schools were overweight and obese (12.9 and 11.0%) as compared to those in public schools (5.5 and 3.3%). The overall prevalence of overweight (and obesity) was 16.4%; 16.5% of girls and 16.2% of boys and by school type 23.9% private and 8.8% public. (Adom *et al.*, 2019)

It is against this backdrop that this section reviews studies on the prevalence of obesity among school children in private and public schools.

2.3.2 The risk factors of obesity among school children

In recent years, obesity among children is considered a major public health issue. For instance, in the year 2010, over 42 million children around the world and under age five years alone were overweight, and almost 35 million of these children were living in developing countries (Sahoo *et al.*, 2015). Generally, the causes or the risk factors of obesity are the imbalance between energy intake and expenditure, along with dietary intake preferences and lifestyle choices. Also, there is a lot of evidence that shows that the genetic background of an individual is crucial to determining the risk of obesity (Sahoo *et al*., 2015). This section, however, reviews studies on the risk factors of obesity among school children.

The overall prevalence of OWB was 14.7% among the children, with 4.4% being obese. A higher proportion of children were overweight (including obese) in the private compared to the public schools (21.4% vs 11.2%, $p < 0.001$). (Aryeetey *et al.*, 2017).

In a cross-sectional study, Kambondo and Sartorius (2018) identified the prominent risk factors for OWB among primary school children in Zimbabwe. Concerning the responses obtained, the results of the study identified the urban location of schools, households with fewer siblings, higher socio-economic status of parents and positive parental diabetes status as the risk factors for obesity among the primary school children.

Risk factors of OWB, the findings showed the factors that were significantly associated with being overweight or obese in the study sample, based on multiple logistic regression. Female children were twice as likely to be overweight or obese compared

to male children (AOR = 2.38, 95% CI: 1.79, 3.18). None of the dietary habits that were assessed was significantly associated with the risk of overweight or obesity (Aryeetey *et al.*, 2017).

Thibault, *et al*. (2010), found the prevalence of OWB to be greater in boys and children who were younger. Low socioeconomic status of fathers (OR 1.78, 1.22– 2.60, $P < 0.01$) and sedentary behavior (OR 1.33, 1.02–1.74, $P < 0.05$) increased with being OWB.

Though Ogden *et al*. (2010) also found the prevalence of OWB to be higher in males than in females among the white American adolescents, interestingly it was the reverse in the black American adolescents.

Boys were more likely than girls to suffer from obesity, especially as SES increases (OR = 1.73–3.04, $P < 0.01$). Maternal education was most significantly associated with increased risks for child overweight/obesity in low and medium SES groups (OR = 1.59–2.66, $P < 0.05$) but not in the high SES group. Maternal employment was significantly associated with childhood obesity risk only in the medium SES group (OR = 1.79, $P < 0.05$), although the magnitude of ORs was similar across all three SES strata. Having both parents as overweight or obese was a significant factor in the risk of child obesity across all three SES strata, though the risk gradient increased as SES increased (OR = 2.64–6.26, $P < 0.05$). (Yardim *et al.*, 2018).

Children living in households in the third SES tertile had 56% higher odds of being overweight or obese when compared to those from households in the first tertile (lowest SES). After adjusting for biologic factors, dietary and physical activity habits, and SES, those attending private schools were more likely to be overweight or obese compared

those who attended public schools (AOR = 1.74, 95% CI: 1.31, 2.32) (Aryeetey *et al.*, 2017).

Also, Aryeetey *et al.*, (2017) found that high maternal education and household SES were factors which increased the risk for OWB. Children of mothers who received formal education beyond the secondary level were more likely to be overweight or obese compared to those whose mothers had no education (AOR = 1.91, 95% CI: 1.07, 3.42). However, being educated up to the secondary level was not linked with overweight.

The mean age of children who participated in the study was 12.2 ±1.7 years and more than half of them were female. Most of the children ate breakfast during the school week, with 85% having breakfast more than three days per week. Consumption of fruits and vegetables was low. Only 20% and 38% had consumed fruits and vegetables >5 times, respectively, the previous week. (Aryeetey *et al.*, 2017)

In a study conducted by Karki *et al* (2019), the results revealed that children of mothers who had finished university-level education were 3 times more likely to be OWB (OR = 3.1, 95% CI: 1.2–7.7) than their counterparts who had just finished high school. Children who consumed processed meat and its products, (such as sausages, ham, roasts) snacks, (such as potato crisps, chips) and confectionaries (such as sweets and ice cream) more than twice a week were almost 3 times more likely to be overweight or obese than those who consumed less than twice a week (OR=2.9, 95% CI: 1.6–5.1). Results indicated that factors including the sex of children, mother's level of education, the rate of junk food consumption, means of transport to and from school, and sedentary behaviours on weekend greatly and significantly influenced childhood OWB as has

been presented in the table. Male children had twice the risk of being OWB than female children (OR = 2.2, 95% CI: 1.3–3.5).

About three-quarters of the children (76%) walked to school at least four out of the five school days in a week and more than half (58%) did household chores during the week. However, involvement in sporting activities was low, with less than one-third of the children engaging in a sport at least three times a week (Aryeetey *et al.*, 2017).

In another study, Bhuiyan, Zaman and Ahmed (2013) identified the risk factors associated with OWB among school children and adolescents between the age of 10 years and 15 years in Dhaka, Bangladesh. Here, the results of the study identified having overweight parents and family history of obesity, limited exercise, low parental education, as well as sedentary activities such as watching television and playing video games as the risk factors for obesity among the school children and adolescents.

Children who did not engage in physical activity was found to be associated with overweight (OR=1.13, 95% CI=1.01–1.27) and obesity (OR=1.14, 95% CI=1.01–1.30). children who engaged in two or more hours in a day of TV watching, or playing video games and on computers were more likely to be obese than the others. Frequently consuming snacks, eating fast food and insufficient sleep were also significant risk factors for overweight and obesity but yet, sweetened drinks were not significant (*Shan et al*, 2010). Physical activity was a determinant of overnutrition among the children. Children who engaged in sports for less than three times a week were at a 44% higher odds of being overweight or obese when compared to those who were involved in sporting activities at least three times a week (Aryeetey *et al.*, 2017).

Children who went to school by school buses (OR = 2.3, 95% CI: 1.1–4.7) personal or public vehicles (OR = 2.4, 95% CI: 1.2–6.7) or used vehicles in general as their primary

means of transport to and from school, run twice the risk of being OWB compared to those who went to school on foot. A significant colouration was not identified between sedentary behaviours on weekdays and childhood OWB, but on weekends and childhood OWB there was a significant colouration. Children who spent more than the recommended screen time of less than or at most 2 hours a day on weekends, were 3 times more likely to be OWB than those who adhered to the recommendation (OR = 3.0, 95% CI: 1.2–7.3) (Karki *et al*, 2019).

Saha *et al*., (2018) examined the prevalence and risk factors of obesity in children in Sylhet City in Bangladesh. The study was carried out in two Bengali medium schools on children between the ages of 10 and 14 years. It was revealed that the lack of physical activity or exercise, as well as outdoor games, were the risk factors for obesity among school children.

Comparing children who were driven by cars to schools to children who were bussed, cycled, and walked to school, the odds of OWB were 0.72, 0.61, and 0.59 times lower respectively. Also, children who spent more than one hour a day on the computer had a 1.94 chance of being obese and 1.64 chance of being overweight as compared to children who did not spend time on the computer (Duncan *et al*, 2011).

Al-Dalaeen and Al-Domi (2017) examined the factors associated with obesity among children in Amman, Jordan. Here, the study specifically examined the relationship between obesity, sedentary behaviour, small-screen recreation, television watching and perinatal influences, including birth weight and breastfeeding. Based on the responses gathered, the results of the study revealed that sedentary behaviour and watching television were risk factors of obesity among children.

2.3.3 The factors that influence healthy living at school and home

Research also suggests that obesity continues from childhood to adulthood: 40–60% of obese school-age children become obese adults. While some individuals are genetically more susceptible to obesity than others, genetics alone are not enough to cause obesity. Obesity is more likely to be a result of behaviours such as diet and eating patterns and changes to physical activity and factors such as availability and affordability of healthy food and access to physical activity opportunities (Lewis, Holmes and Morris, 2018)

More than half (59%) of the schools said they had a food plan. All but two of the schools had a named person with specific responsibility for healthy eating or PE. Most commonly, the named individual responsible for the area of healthy eating was a middle leader (79%). Forty-one of the schools we visited (69%) had two or more hours of PE in the timetable each week. The schools that did not all indicated that children were active in other ways, though in a few of these this was _playtime', which may or may not have been physically active. One school did have two hours timetabled for PE but was frank that time was being lost in getting changed and set up. Football was both the most commonly offered and the most likely to be named as a favourite sport (Lewis, Holmes and Morris, 2018)

The second most popular activity with pupils was dodgeball, which was only available in a quarter of the schools we visited. We also asked pupils which sports and physical activities they would like to do more of in school. Every option offered was chosen by at least 9% of pupils. The activity most pupils wanted more of was dodgeball (33%), followed by football (30%), swimming (28%), tennis (20%), cycling (19%), basketball (19%) and rounders (18%) (Lewis, Holmes and Morris, 2018).

Eighty-nine per cent of the schools sampled had some timetabled curriculum time for teaching about food and healthy eating. In delivering their whole curriculum, schools used support from sports and food professionals (28%) and offered activities such as cooking (26%), growing food (21%) and whole-school assemblies about healthy living (24%) (Lewis, Holmes and Morris, 2018).

Two schools had limitations with their outdoor space: one because it was small and the other because space was shared with the community and this restricted children's ability to move about freely. Similarly, several schools used their dining halls as venues for their outdoor activities, which limited the proper organization and participation of such activities (Lewis, Holmes and Morris, 2018).

Pallan, (2010), explored the contextual influences on the development of childhood obesity. The study drew attention to the potential influence of certain physical activity characteristics of schools on childhood overweight and obesity, particularly the amount of time devoted to physical activity. A further systematic review identified that interventions which included the provision of compulsory aerobic physical activity through schools were more likely to be effective at reducing overweight and obesity prevalence. Wolfenden, L., Wiggers, J., d'Espaignet, E.T. and Bell, A.C., 2010.

Facilities for this included having larger equipment to develop climbing and balancing skills, such as trim trails, climbing frames and climbing walls and even a wooden pirate ship, an area for team sports, such as a _multi-use games area‘ (MUGA) or a fenced-off or enclosed area of outside space, sporting or active equipment for children to use such as softballs, skipping ropes, stilts, hoops, beanbags, circus equipment and space hoppers, equipment to encourage other activities such as table tennis, a _wellie wall', which enables children to play wellie football when the field is too wet – this not only

encourages team sports but also alleviates the otherwise cramped conditions on the playground (Lewis, Holmes and Morris, 2018).

Ninety per cent of the schools we visited had a full production kitchen. The remaining schools had hot food transported in. Food was prepared and cooked on site. However, responsibility for this was generally something that the schools contracted out. The large majority of schools we visited did this, either with a local authority caterer (42%) or a commercial caterer (42%). Only one in 10 schools managed catering inhouse. Sixty-eight per cent also provided breakfast clubs. Again, the food for this was mostly delivered by external companies. Children who had school meals usually (73%) made their own choice of what to eat. Only a small minority were helped to choose by someone at home (12%) or the lunchtime staff (8%) (Lewis, Holmes and Morris, 2018).

The most common way that parents were involved with the school around physical activity was being invited to some kind of event (such as sports day, inter-school sport or fundraising activities). Eighty-three per cent of parents said that their school did this. Many parents had also been invited to events around healthy eating (38%) (Lewis, Holmes and Morris, 2018).

CHAPTER THREE

METHODOLOGY

3.1 Study Design

The study was a cross-sectional design conducted from June to September which explored the prevalence and risk factor of obesity involving school children at the basic level.

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3.2 Study Location

The Sunyani Municipality is situated in the core of Bono Region formally called the Brong Ahafo Region. The region has Sunyani as its regional capital. Sunyani is bordered by five districts: Asutifi (southwards), Tano South (eastwards), Wenchi (northwards), Berekum and Dormaa East (westwards).

The population of the Municipality according to the 2010 Population Housing Census stands at 123,224 with 61,610 males and 61,614 females. The ethnicity is Bono and the speak Bono- Twi. Approximately about 48% of the population is engaged in agriculture production, 24% also employed in the service sector and 15% and 3% of the populaces also into commerce and industry respectively. According to a survey conducted by the municipal Planning Coordinating Unit in 2010, the densely populated areas are mostly in the low-income group whereas in the less dense areas are mostly in the high and medium-income groups.

The municipality has numerous schools at all level from pre-school through to primary, junior and senior high through to tertiary (colleges and universities). There are 127 schools at the primary level comprising of 66 public and 61 private schools with a total population of 53,662 students.

About 80% of the children are within the age group are in school so to get a true representation of the sample size, the study was conducted among school children in the Sunyani municipality.

3.3 Study Population

The study involved school children between the ages of 6 and 18years who are in the basic level within the municipality. In a document compiled by the African Child policy forum (2013), in Ghana, a child is a person below the age of 18 years.

Inclusion criteria:

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All school children

- A person below the age of 18 years.
- Should be in basic school.
- Students whose parents/guardians gave consent.
- Students who agreed to take part in the study.

Exclusion criteria:

- A person above 18 years child.
- Students whose parent/guardians did not consent to the study.

3.4 Sample Size Estimation

In every study, sample size estimation is very important to obtain a sample that is representative of the target population, increase the precision and robustness of the results. The Cochrane formula was used to calculate the sample size based on the following parameters:

Thus, *Necessary Sample Size (n) = (Z)² * P*(1-P) / (e) ²* (Where: e (0.05), **e** the margin of error (0.05), **p** (0.5) is the (estimated) proportion of the population which has the attribute in question, **q** is 1 – **p** (0.5), **z** is 1.96 given a confidence interval of

95%)

$((1.96)^2 \times .5(.5)) / (.05)^2$

(3.8416 x .25) / .0025

.9604 / .0025

384.16 (385 respondents are required). 10% (38.4) was added to this number (adjusted) for potential non-respondents. Thus, a total of 423 participants were recruited for the study.

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3.5 Sampling Method

This study used probability and non-probability sampling methods. The study adopted a multistage sampling in selecting the respondents. In the first stage: 8 schools (4 private and 4 public) were purposively selected from the Sunyani municipality for study because GES supervision in those schools was optimum and hence maintained the school environment and instructions as required by GES.

The second stage: The number to sample from each class was estimated using the population proportion-to-size. The lottery method (simple random) was use to select the 243 participants.

In each school, pupils who picked ―yes‖ were recruited into the study. Overall, 160 and 260 participants (from a total of 53, 662 meeting inclusion criteria) were selected from the private and public schools respectively.

All staff in charge of structuring and organizing of physical activities and planning of food for the pupils in the eight (8) selected schools were asked to participate in the study. The staffs were purposively selected because of their familiarity with the feeding and physical activities of the pupils in school.

3.6 Data Collection Tool/Method

The main instrument or tool for data collection was a structured questionnaire Interviewer-administered questionnaires was administered individually to a school child that met the inclusion criteria to elicit information on the sociodemographic and the risk factors for childhood Overweight and Obesity (dietary habit, physical activity and screen time). Using the principal component analysis, 10 household items was used to score and classify the socioeconomic status based on the number of items owned. These were classified into five (5) quintile; poorest, poor, moderate, wealthy and wealthiest.

The second aspect assessed the anthropometric measurements. Weight was assessed using a weighing scale where students were allowed to stand on it barefooted with the head up and recorded in the nearest 0.1 kilograms. The height was also measured with a rod as the student stood with the buttocks and upper back straight and heads up. The height was measured to the nearest 0.1 centimeter (cm). The Body mass index (BMI) was calculated as weight (kg)/(height (m)2). The age specific and sex specific distribution of the body mass index using WHO classification BMI standards.

A self-administered questionnaire was administered to key informants in the selected school which obtained information on policies regarding food and physical education and the application of the policy as well as the effectiveness of the polies. It was to assess the contribution of the school towards a healthy living.

3.7 Pilot

To ascertain the validity and reliability of the methods employed in the research, a pre-testing was conducted at the Holy Spirit international school, Fiapre Sunyani West. The

pre-test revealed the suitability of the methods and instruments employed in the research. This led to early detection of possible errors or distortions in the research instruments. The lessons gathered during the pre-test were very useful in the actual fieldwork. Any ambiguous question was detected during the pre-test and the necessary corrections will made accordingly.

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3.8 Study Variables

Dependent Variable

The dependent variables for this study was Body mass index (Overweight and Obesity) **Independent Variables**

The independent variable of this study was Determinants of childhood obesity

Table 3.1 Variable Table

Objective	Dependent Variable	Independent variable	Conceptual Definition of dependent variable	Scale of measurement	Indicators	Data Collection Method	Type of statistical analysis
Compare the prevalence of childhood obesity between urban and rural school children	Body Mass Index (Overweight and Obesity)	Height and weight	Overweight is defined as having excess body weight for a particular height from fat, muscle, bone, water. Obesity is a state of excess body fat	Ratio scale	Proportions, frequencies	Measurement of height and weight	Univariate Analysis
To determine the risk factors of obesity	Overweight and Obesity	Sociodemographic characteristic Dietary habit Physical activity Screen time	Overweight is defined as having excess body weight for a particular height from fat, muscle, bone, water. Obesity is a state of excess body fat	Ordinal scale Ratio scale Nominal scale Interval scale	Chisquare Multinomial regression	Questionnaire	Univariate Bivariate Multivariate

To determine factors that will influence healthy living at school and home	Overweight and Obesity	Healthy eating in school Physical activity in school	Overweight is defined as having excess body weight for a particular height from fat, muscle, bone, water. Obesity is a state of excess body fat	Nominal scale Ordinal scale	Proportions, frequencies	Questionnaire	Univariate

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3.9 Data Analysis

Data was entered into Microsoft Excel spreadsheet and data cleaning was done to remove and modify inaccurate or irrelevant information and after imported into STATA version 15.0 for analysis. A descriptive statistic which were presented using pie charts and frequency distribution tables. Pearson's chi-square test was applied to categorical data to determine the association between the risk factors and the outcome of the study (BMI). With a 95% confidence interval and a significant level of 5%. The multinomial logistics regression model was employed to determine the relationship between the independent and the dependent variables. The prevalence of Overweight and Obesity in the sub-categories for the difference in each of the individual variables in sociodemographic, dietary habits and physical activity was estimated. The relative risk ratio was estimated using the multinomial regression with a 95% confidence interval (CI) to risk factors.

A univariate analysis was used to assess the contribution of the school towards a healthy living.

3.10 Limitation

This study is conducted in the Sunyani Municipality of Ghana and hence the results are limited to the study area and not generalizable over the entire country.

The study design employed for this study was cross-sectional and hence limited by the inherent limitations of the design which makes the data collection prone to recall biases. The genetic influence on obesity and overweight could not be determined or be removed from the data and hence making it difficult to explain observed prevalence (obesity and overweight) by the factors such as physical activity, dietary lifestyles alone etc.

3.11 Delimitation

Data collection team were trained intensively for two weeks with series of demonstrations on how to administer the data collections instruments and how to measure the outcomes of the study to minimize errors and recall biases.

3.12 Ethical Consideration

Ethical clearance was sought from the Committee on Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology.
Administrative permission was also sought from the Municipal office of the Ghana Education Service, Sunyani as well as the selected schools to conduct the study.

Written Informed consent was initially obtained from all parents/guardians whose children were participant in the study to provide signed consent before the questionnaire was administered. The Children who were able to understand the proposed research significantly were informed and all questions and concerns addressed appropriately and the voluntary nature of participating and their autonomy to withdraw from the study at any point they desire to was explained. To ensure anonymity of participants their identity was not declared.

CHAPTER FOUR

RESULTS

4.0 Introduction

This chapter presented the results of the study. The socio-demographic profile of the respondents was first presented, followed by the risk factors of obesity among school children, the comparison of the prevalence of childhood obesity between urban and rural school children and the factors that influenced healthy living at school and home.

Socio-demographic detail of respondents

As presented in Table 4.1, the majority, 383 (90.5%) of the respondents had their school located in the urban area of the municipality. Also, 263 (62.2%) of the respondents attended a Public school. Slightly more half of the respondents were females constituting about 219 (51.8%). Results from the study, it indicated 38.3% were within the ages of 9-10 years and 8 (1.9%) were between 17-18 years. The youngest and the oldest respondents were 7 and 18 years respectively. The mean age was 10 with a standard deviation of 2.22 years.

On religious affiliation, majority of 395 (93.4%) of the respondents were Christians. About one-third of the respondents' 140 (33.1%) fathers had tertiary level education and 16 (3.8%) said their fathers completed primary school. 199 (47.0%) said that their fathers were Artisans, whilst just 2 (0.5%) of the respondents indicated that their fathers were self-employed. 115 (27.2%) of the children had their mothers completed Junior High School / Middle School, whilst 39 (9.2%) of the mothers ended at Primary School. Almost half 211 (49.9%) of the mothers were Artisans and 34 (8.0%) formal. Regarding the socioeconomic status, using the wealth quintile 22.46% were classified as poor and 15.84% medium.

Table 4.1: Socio-demographic background characteristics of respondents

Socio-demographic background characteristics		Number of Respondents N (=423)	% (=100%)
Location/Setting of school	Rural	40	9.5
Respondents	Urban	283	90.5
Type of school	Public	263	62.2
	Private	160	37.8
Gender of respondents	Male	204	48.2
	Female	219	51.8
Age group of Respondents	7-10 years	276	65.0
	11-14years	126	29.8
	15-18 years	21	5.0
Religion of respondents	Christianity	395	93.4
	Islam	27	6.4
	Traditional	1	0.2
Respondents Father's highest educational level	None	55	13.0
	Primary	16	3.8
	JHS/ Middle school	97	22.9
	SHS	70	16.5
	Technical/ Diploma	45	10.6
	Tertiary	140	33.1
Respondents Father's Occupation	Professional Artisan	169	40.0
		199	47.0
	Formal	25	5.9
	Self-employed	2	0.5
	Not employed	28	6.6
Respondents Mother's highest educational level	None	65	15.4
	Primary	39	9.2
	JHS/ Middle school	115	27.2
	SHS	62	14.7
	Technical/ Diploma	43	10.2
	Tertiary	99	23.4
Respondents Mother's occupation	Professional Artisan	134	31.7
		211	49.9
	Formal	34	8.0

	Not employed	44	10.4
Socioeconomic status	Poorest	92	21.75
	Poor	95	22.46
	Medium	67	15.84
	Wealthy	85	20.09
	Wealthiest	84	19.86

Source: Field data

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The risk factors of obesity among school children in the Sunyani Municipality

Information on some risk factors of obesity among the respondents was solicited and below are the findings from the study presented in tables.

Table 4.2 The frequency of the intake of food by Respondents

Characteristics of Food intake		Number of Respondents N (=423)	% (=100%)
Frequency of meals eaten in a day	One	1	0.2
	Two	38	9
	Three	339	80.1
	More than 3 times	45	10.6
Frequency of breakfast eaten in a week	Daily	395	93.4
	1-3 Days/Week	21	5
	4-6 Days/Week	7	1.7
Frequency of lunch eaten in a week	Daily	403	95.3
	1-3 Days/Week	10	2.4
	4-6 Days/Week	10	2.4
Frequency of supper eaten in a week	Daily	402	95
	1-3 Days/Week	7	1.7
	4-6 Days/Week	14	3.3
Types of food patronized by Respondents	N	Percent *	
Fried rice	354	86.1%	
Fried chicken	353	85.9%	
Burger	14	3.4%	
Potato chips	107	26.0%	
Pizza	190	46.2%	

Fried turkey tail (chofi)	37	9.0%
Fried doughnuts	250	60.8%
Hamburgers	15	3.6%
Fried yams or potatoes or plantains	386	93.9%

Multiple responses *

Frequency of patronage of some selected foods

Frequency of intake of some selected	foods	Number of Respondents N (=423)	% (100%)
Frequency of consumption of junk foods	Rare	256	60.5
	Often	163	38.5
	Very often	4	0.9
Frequency of snacks in a day	One	311	73.5
	Two	26	6.1
	Three	19	4.5
	More than 3 times	13	3.1

Source: Field data

As presented in Table 4.2, the majority of the respondents 339 (80.1%) ate three times a day, however, 1 (0.2%) ate just once a day. Results from the study also indicated that the majority of the respondent, 395 (93.4%) take breakfast every day and 7 constituting about (1.7%). Most of the respondents 403 (95.3%) and 402 (95.0%) take lunch and supper respectively daily.

Also, out of the 423 respondent 22.6% patronize fried yams, potatoes, and plantains This was followed by fried rice (20.8%), fried chicken (20.7%), fried doughnuts (14.7%), pizza (11.1%), potato chip (6.3%), fried turkey tail (chofi) (2.2%), hamburgers (0.9%), and burger (0.8%).

More than half 256 (60.5%) of the respondents rarely patronize those foods whilst less than one percent 4 (0.9%) of the respondents patronize them very often. Majority of the respondents 311 (73.5%) take snacks just once a day and 13 (3.1%) take snacks more than three times a day.

Frequency of Consumption of some selected types of diets

As shown in Table 4.3, out of the 423 respondents, 35.5% consumed fresh, tin, powdered milk or yoghurt 2-3 times a week whilst 31 (7.3%) 4-6 times a week. On the consumption of cereals and grains, 48.7%, stated that they do not take cereals and grains at all and 29 (6.9%) 4-6 times a week. Results also indicated that a little more than half 226 (53.4%) of the respondents frequently consume legumes/nuts 2-3 times a week whereas 7 constituting (1.7%) 4-6 times a week. A little more than half 228 (53.9%) of the respondents frequently consume eggs 2-3 times a week and just 20 constituting 4.7% do consume eggs 4-6 times a week. On the consumption of fresh fish, half 212 (50.1%) of the respondents take in fresh fish about 2-3 times a week while 15 (3.5%) 4-6 times a day. The percentage of respondents that consume vegetables 2-3 times a week was 45.9% with a minimum of 8.3% consuming vegetables 4-6 times a week. On fruit consumption, 44.7% take in fruits 2-3 times a week and 24 (5.7%) 4-6 times a week. Findings from the study indicated that about half 213 (50.4%) of the respondents do not consume fats/oils in a week and 9 (2.1%) indicated 4-6 times a week.

Table 4.3: Frequency consumption of diets

Dietary Variable		**Number of Respondents N (=423)**	**% (=100%)**
Consumption of fresh, tin or powdered milk or yoghurt	Never	127	30.0
	Once a week	115	27.2
	2-3 times a week	150	35.5
	4-6 times a week	31	7.3
Consumption of cereals and grains	Never	206	48.7
	Once a week	35	8.3
	2-3 times a week	153	36.2
	4-6 times a week	29	6.9
Consumption of legumes/nuts	Never	61	14.4
	Once a week	129	30.5

	2-3 times a week	226	53.4
	4-6 times a week	7	1.7
Consumption of eggs	Never	84	19.9
	Once a week	91	21.5
	2-3 times a week	228	53.9
	4-6 times a week	20	4.7
Consumption of fresh fish	Never	108	25.5
	Once a week	88	20.8
	2-3 times a week	212	50.1
	4-6 times a week	15	3.5
Consumption of vegetables	Never	65	15.4
	Once a week	129	30.5
	2-3 times a week	194	45.9
	4-6 times a week	35	8.3
Consumption of fruits	Never	123	29.1
	Once a week	87	20.6
	2-3 times a week	189	44.7
	4-6 times a week	24	5.7
Consumption of fats/oils	Never	213	50.4
	Once a week	116	27.4
	2-3 times a week	85	20.1
	4-6 times a week	9	2.1

Source: Field Data

Table 4.4: Engagement in Physical activity

Engagement in Physical activity

		Freq	Percent
Consciously engage in any physical activity	No	44	10.4
	Yes	379	89.6
Number of times involved in physical activity	Never	17	4.02

	Once a week	7	1.65
	Twice a week	239	56.5
	Three times a week	87	20.57
	More than three times a week	73	17.26
Means of transport to school	School bus	94	22.22
	Bicycle	8	1.89
	Motorbike	13	3.07
	Walking	191	4.02
	Public transport	117	27.66
How many hours do you sleep per day	Less than 6 hours	9	2.13
	6-7 hours	57	13.48
	8-9 hours	285	67.38
	10-11 hours	71	16.78
	More than 11 hours	1	0.24
Screen time			
		Freq	Percent
Time spent watching TV	Less than 1 hour	125	29.55
	1-2 hours	172	40.66
	2-3 hours	102	24.11
	4-5 hours	17	4.02
	More than 5 hours	7	1.65
Time spent on the Internet a day	Less than 1 hour	383	90.54
	1-2 hours	32	7.57
	2-3 hours	8	1.89
Time spent playing digital games (video games, computer games)	Less than 1 hour	296	69.98
	1-2 hours	94	22.22
	2-3 hours	30	7.09
	4-5 hours	3	0.71

Table 4.2.5, out of the 423 respondents, majority 379(89.6%) consciously engage in any physical activity. To find out how many times respondents were involved in physical activity, 239 (56.5%) representing the majority said they are involved twice a week and 7(1.65%) said once a week. Also, most of the respondents 191(45.15%) walk to school while 8(1.89%) ride bicycle

Table 4.2 indicates that more than one-third of the respondents (40.66%) spend 1-2 hours watching TV while 1.65% spend more than 5 hours. Also, the majority (90.54%}

spend less than 1 hour and 1.89% spend 2-3 hours on the internet a day. More than half of the respondents (296) spend less than 1-hour playing digital game whereas 3 respondents spend 4-5 hours on digital games.

Categorization of Body Mass Index (BMI) of Respondents

Table 4.5: Categorization of BMI of Respondents

Respondents Body Mass Index		**Number of Respondents N (=423)**	**% (=100%)**
Categorization of Body Mass Index	Underweight	59	13.9
	Normal	296	70.0
	Overweight	41	9.7
	Obese	27	6.4

The Body Mass Index of the Respondents were computed from the data collected and this is presented in table 4.5. It is categorized into Underweight, Normal, Overweight and Obese. Majority of the respondents 296 (70.0%) had Normal BMI status, 59 (13.9%) were Underweight, whilst 41 (9.7%) were Overweight. Those found to be Obese were 27 and constituted 6.4% of the total respondents.

Table 4.6 Relationship between BMI status and the type of school

TYPE OF SCHOOL	**BMI STATUS**			
	Underweight	Normal	Overweight	**OBESE**
PUBLIC	**35**	**204**	**15**	**9**
	8.27	**48.23**	**3.55**	**2.13**
PRIVATE	**24**	**92**	**26**	**18**
	5.67	**21.75**	**6.15**	**4.26**
TOTAL	**59**	**296**	**41**	**27**
	13.95	**69.98**	**9.69**	**6.38**

In Table 4.6, the results indicate that of the 59 respondents who were underweight in terms of BMI status, a greater proportion 35 (8.27%) and out of 296 respondents who had a normal BMI status, a majority (204) of the respondents were in public school. Also, majority 26 (6.15%) out of the 41 respondents who were overweight, were

schooling in private schools. Out of the 27 respondents who were obese 18 respondents were attending private schools.

Table 4.7. Relationship between BMI and risk factors of obesity

VARIABLE	**Overweight n (%)**	**Obesity n (%)**	**Chi-square**	**P-Value**
Gender				
Male	10(2.36)	14(3.31)	13.3586	0.004
Female	31(7.33)	13(3.07)		
Age				
7 to 10 years	31(7.33)	23(5.44)	15.9834	0.014
11 to 14 years	7(1.65)	4(0.95)		
15 to 18 years	3(0.71)	0		
Mother's educational level				
No Education	4(0.95)	1(0.24)	16.4754	0.011
Basic Education	12(2.84)	5(1.18)		
Post-basic Education	25(5.91)	21(4.96)		
Mother's occupation				
Professional	17(4.02)	13(3.07)	11.8256	0.223
Artisan	19(4.49)	12(2.84)		
Formal	2(0.47)	2(0.47)		
Not employed	3(0.71)	0		
Times do you eat breakfast in a week				
Daily	35(8.27)	23(5.44)	13.8161	0.032
1 - 3 Days/Week	5(1.18)	29(0.47)		
4 - 6 Days/Week	1(0.24)	29(0.47)		
Consumption of junk food				
Rarely	27(6.38)	13(3.07)	4.541	0.604
Often	14(3.31)	14(3.31)		
Very Often	0	0		
Consumption of Snacks per day				
One	28(6.62)	20(4.73)	22.8248	0.029
Two	4(0.95)	1(0.24)		
Three	1(0.24)	0		
More than 3 times	5(1.18)	1(0.24)		
None	3(0.71)	5(1.18)		
Consumption of Vegetables				
Never	5(1.18)	3(0.71)	16.8351	0.051
Once a week	18(4.26)	7(1.65)		
2 -3 times a week	16(3.78)	12(2.84)		

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4 - 6 times a week	2(0.47)	5(1.18)		
Consumption of Fruits				
Never	15(3.55)	5(1.18)	12.3153	0.196
Once a week	11(2.60)	4(0.95)		
2 -3 times a week	13(3.07)	17(4.02)		
4 - 6 times a week	2(0.47)	1(0.24)		
Consumption of Sugary Foods				
Never	20(4.73)	9(2.13)	10.702	0.297
Once a week	10(2.36)	4(0.95)		
2 -3 times a week	7(1.65)	7(1.65)		
4 - 6 times a week	4(0.95)	7(1.65)		
VARIABLE	**Overweight n (%)**	**Obesity n (%)**	**Chi-square**	**P-Value**
Intake Water (per cup) per day				
0 to 1	2(0.47)	3(0.71)	14.8808	0.094
2 to 3	19(4.490)	5(1.18)		
4 to 5	15(3.55)	17(4.02)		
6 to 7	5(1.18)	2(0.47)		
Walking or riding a bicycle to or from school				
Daily	22(5.20)	10(2.36)	11.8384	0.22
1 -3 Days/Week	1(0.24)	1(0.24)		
4-6 Days/Week	1(0.24)	1(0.24)		
None	17(4.020)	15(3.55)		
Involvement in physical activity				
Never	2(0.47)	0	15.2871	0.226
Once a week	0	0		
Twice a week	31(7.33)	14(0.31)		
Three times a week	4(0.95)	4(0.95)		
More than three times a week	4(0.95)	9(2.13)		
Time spent playing digital games				
< 1 hour	22(5.2)	15(3.55)	19.4998	0.021
1 to 2 hours	15(3.55)	11(2.60)		
2 to 3 hours	3(0.71)	1(0.24)		
4 to 5 hours	1(0.24)	0		
Time spent watching TV				
< 1 hour	8(1.89)	6(1.42)	26.2388	0.01
1 to 2 hours	16(3.78)	8(1.89)		

2 to 3 hours	9(2.13)	11(2.60)		
4 to 5 hours	5(1.18)	1(0.24)		
> 5 hours	3(0.71)	1(0.24)		
Sleep time per day				
less than 4			8.1884	0.77
4 to 5	0	0		
6 to 7	6(1.42)	3(0.71)		
8 to 9	30(7.09)	16(3.78)		
10 to 11	5.(1.18)	8(1.89)		

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The chi-square table suggests that type of school, sex, age, mother's education, number of times of eating breakfast in a week, consumption of snack per day, time spent playing digital games and watching TV were significantly associated with the overweight and obesity.

Table 4.8 Factors that influence healthy living at school and home by Respondents Sociodemographic characteristic

	Overweight			**Obese**		
	RRR	**P-value**	**95% CI**	**RRR**	**P-value**	**95% CI**
Type of School						
Public	1					
Private	3.84	0.001	1.94 - 7.6	4.43	0.001	1.92 - 10.24
Sex						
Male	1			1		
Female	2.94	0.005	1.39 - 6.21	0.88	0.75	0.34 - 1.94
Age						
7 to 10	1			1		
11 to 14	0.4	0.037	0.17 - 0.946	0.309	0.035	0.1 - 0.92
15 to 18	0.96	0.95	0.27 - 3.44	-	0.001	0.08 - 0.2
Mother's Education						
No education	1					
Basic education	1.24	0.73	0.38 – 4	2.06	0.52	0.23 - 18.08
Post basic education	2.39	0.12	0.79 - 7.23	8.04	0.04	1.05 - 61.39
Mother's Occupation						
Professionals	1			1		
Artisan	0.59	0.14	0.29 - 1.19	0.49	0.09	0.21 - 1.11
Formal	0.37	0.19	0.08 - 1.69	0.48	0.35	0.1 - 2.26

Not employed	0.41	0.17	0.11 - 1.48	-	0.98	0
Socioeconomic status						
Poorest	1			1		
Poor	1.63	0.45	0.46 - 5.82	-	0.98	0
Medium	4.89	0.001	1.48 - 16.11	-	0.98	0
Wealthy	2.26	0.2	0.65 - 7.87	-	0.98	0
Wealthiest	3.8	0.03	1.13 - 12.86	-	0.98	0

To identify the relative risk ratio for the risk variables related to sociodemographic, dietary habits, physical activity and screen time, a multinomial logistics regression model was fitted (Table 4.3.5). The results indicated that children attending private schools are about three times more likely to be overweight (3.84; 95% CI: .1.94 - 7.6; p 0.001) and obese (4.43; 95% CI: .1.92 - 10.24; p 0.001) compared to children in public schools. It also revealed that females 1.9 times at risk of overweight (Table 4.3.5) but a 20% less likely to be obese than their male counterpart. Age 11-14years was associated with reduced risk (60%) of being overweight (, 0.4, 95% CI:0.170.946; p<0.037) or obese (0.31, 95% CI:0.1-0.92; p<0.035). Mother's with post-basic education and the professional group were more likely to have overweight and obese children. High socio-economic status as measured by increasing wealth quintiles of household wealth was associated with some diverse levels of childhood overweight.

Table 4.9 Dietary habit

	Overweight			**Obese**		
	RRR	**P-value**	**95% CI**	**RRR**	**P-value**	**95% CI**
Eating Breakfast						
Daily	1			1		
1 - 3 Days/Week	0.19	0.269	0.010 - 3.57	2.45	0.27	0.51 - 11.86
4 - 6 Days/Week	0.47	0.569	0.035 - 6.28	6.13	0.04	1.06 - 35.26
Frequency of consumption of junk food						
Rarely	1			1		
Often	0.88	0.7	0.44 - 1.74	1.82	0.14	0.82 - 4.01
Very Often	-	0.98	0	-	0.001	0.04 - 0.12

Consumption of Snacks per day						
One	1			1		
Two	1.46	0.51	0.47 - 4.57	0.51	0.52	0.07 - 4.01
Three	0.51	0.53	0.07 - 4.03	-	0.99	0
More than 3 times	7.67	0.001	2.09 - 28.18	2.15	0.49	0.24 - 19.31
None	0.58	0.38	0.17 - 1.99	1.34	0.58	0.48 - 3.79
Consumption of Vegetables						
Never	1			1		
Once a week	1.86	0.25	0.65 - 5.3	1.2	0.79	0.29 - 4.86
2 - 3 times a week	1.22	0.72	0.42 - 3.49	1.52	0.53	0.41 - 5.62
4 -6 times a week	0.85	0.76	0.15 - 4.73	3.55	0.1	0.78 - 16.15
Consumption of Fruits						
Never	1			1		
Once a week	1.08	0.86	0.46 - 2.49	1.17	0.82	0.3 - 4.55
2 - 3 times a week	0.62	0.23	0.28 - 1.76	2.42	0.09	0.86 - 6.79
4 -6 times a week	0.81	0.08	0.17 - 3.9	1.21	0.86	0.13 - 11.12
Intake Water (per cup) per day						
0 to 1	1			1		
2 to 3	1.23	0.79	0.26 - 5.76	0.22	0.05	0.05 - 0.99
4 to 5	0.83	0.82	0.17 - 3.98	0.63	0.49	0.17 - 2.38
6 to 7	3.33	0.19	0.55 - 20.22	0.89	0.91	0.13 - 6.18

From the results presented in the table above, children who ate breakfast 1-3 days/week(0.19, 95% CI:0.1-3.57; p<0.269) and 4-6 days/week (0.47, 95% CI:0.356.28; p<0.569) had a lower risk of being overweight than those who ate breakfast daily, this was not same for the obese group. It was found that children who eat 1-3 days/week (2.45, 95% CI:0.51-11.86; p<0.27) and 4-6 day/week (6.13, 95% CI:1.0635-26; p<0.04) were one time or five times more at risk of being obese. No significant association was in the intake of fruits and vegetables and intake of water.

Table 4.10 Physical activity and screen time

	Overweight			**Obese**		
	RRR	**P-value**	**95% CI**	**RRR**	**P-value**	**95% CI**
Walking or riding a bicycle to or from school						
Daily	1			1		
1 - 3 Days/Week	0.45	0.4	0.06 - 3.51	0.98	0.99	0.12 - 8.15

4 -6 Days/Week	0.69	0.73	0.08 - 5.61	1.52	0.7	0.18 - 12.96
None	1.28	0.48	0.65 - 2.52	2.48	0.03	1.07 - 5.73
Involvement in physical activity periods						
Never	1			1		
Once a week	-	0.999	0	-	1	0
Twice a week	1.57	0.72	0.14 - 17.76	-	0.996	0
Three times a week	0.09	0.17	0.003 - 2.85	-	0.996	0
More than three times a week	0.36	0.45	0.03 - 5.01	-	0.995	0
Time spent playing digital games						
< 1 hour	1			1		
1 -2 hours	2.68	0.01	1.31 - 5.49	2.88	0.01	1.25 - 6.62
2 - 3 hours	1.67	0.44	0.45 - 6.11	0.81	0.85	0.01 - 6.53
4 -5 hours	4.99	0.19	0.43 - 57.32	-	1	0
Time spent watching TV						
< 1 hour	1			1		
1 -2 hours	1.6	0.29	0.66 - 3.9	1.07	0.99	0.36 - 3.18
2 - 3 hours	1.63	0.34	0.59 - 4.44	2.65	0.07	0.94 - 7.53
4 -5 hours	6.74	0.001	1.82 - 24.95	1.79	0.61	0.19 - 16.61
>5 hours	18.19	0.001	2.61 - 125.18	8.08	0.12	0.64 - 102.3
Sleep time per day						
less than 4	1			1		
4 to 5	-	0.99	0	--	1	0
6 to 7	-	0.99	0	-	1	0
8 to 9	-	0.99	0	-	1	0
10 to11	1	1	0	1	1	0

The results indicated that children who did not walk or ride bicycle to school were 28% at risk of being overweight (1.28, 95% CI:0.06-2.52; p<0.48) and about 1.5 times at risk of being obese (2.48, 95% CI:1.07-5.73; p<0.03) than those who did some amount of walking or riding to school. Moreover, for those children who were involved in

physical education period, those who were involved for three or more than three times a week were having less risk of developing Overweight and Obesity.

However, involvement in physical activity periods and sleep time were found not to be significant. Time spent watching television was found to have an increased risk with an increasing period (table 4.3.7). There was no significant association in the sleep period per day.

Key Informants Responses on Healthy Living In School

Table 4.11: availability of food policy

	Responses	**Number (=20)**
Availability of School Policy on food	Yes	20
Characteristics of school policies relating to food for feeding during school hours	**Number**	**Percent ***
Buy from food vendors	7	35.0%
School feeding program	8	40.0%
Provision of food by the school	12	60.0%
Students are required to bring food from home	4	20.0%
Methods of promoting healthy eating in school		
Curricular sessions	3	15.0%
Activities involving parents	3	15.0%
Caterers vary the content of the food	19	95.0%
Method of obtaining lunch in schools		
Schools meal	17	85.0%
Pupils bring lunch from home	7	35.0%
Pupils go home for lunch	3	15.0%
Level of Effectiveness of policy relating to food in promoting healthy eating		
Very effective	12	60
Moderately effective	8	40
Has had no effect	0	0
Prioritizing healthy eating in school		
Strongly disagree	0	0
Disagree	0	0
Neutral	0	0
Agree	11	55
Strongly agree	9	45
Provision of Drinking water by the school throughout the day		
No	4	20.0
Yes	16	80.0
Methods of Provision of drinking water to school pupils		
Providing water in a container	12	60.0
Pupils bring their own	1	5.0

Student buy their water	1	5.0
Other	6	30.0
Method of school meals provided for Pupils		
Brought in ready prepared	3	15.0
Prepared/Cooked on site	17	85.0
Frequently of inspection of health cards of food providers at the school canteen/vendors		
Less than 6 months	3	15.0
7-12 months	4	20.0
More than 12 months	11	55.0
Never	2	10.0

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Multiple responses * Source: Field data Table 4.11 shows that all schools had a policy relating to food. Out of the 20 respondents, 38.7% of schools, said school provided food to students and students 12.9% of school require students to bring food from their homes. A majority (85.0%) of respondents stated that schools provide meals for students to have meals prepared or cooked in the school. Majority 19 (76.0%) of the respondents stated that the caterers varying the content of the food was a method of promoting healthy eating, whilst through activities involving parents, and curricular sessions took 3 (12.0%) each. 17 (63.0%) of respondents indicated that they provide lunch to students whilst 11.1% stated pupils are usually required to go home for lunch.

60.0% of respondents said their schools had very effective policy relating to healthy eating, whiles 40.0% had a moderately effective policy relating to healthy eating and slightly more than half of 11 (55.0%) of the respondents agreed that healthy eating is high on the list of priorities in the school, whilst 9 (45.0%) of the teachers strongly agreed. The majority (80.0%) of schools provides water throughout the day for the

pupils. Also, slightly more than half (55.0%) of schools inspect health cards of food providers at the school canteen/vendors were inspected more than 12 months interval and just one-tenth 10.0% of the teacher indicated that they never inspect the health card of the food providers.

Table 4.12: The extent to which healthy eating is supported

	Strongly supported	Supported	Weakly supported	Not supported	Total
School leadership/ management	12 (60%)	8 (40%)	0 (0.0%)	0 (0.0%)	**20 (100.0%)**
Teachers	14 (70%)	6 (30%)	0 (0.0%)	0 (0.0%)	**20 (100.0%)**
Non-teaching staff	14 (70%)	6 (30%)	0 (0.0%)	0 (0.0%)	**20 (100.0%)**
Catering & kitchen staff	14 (70%)	6 (30%)	0 (0.0%)	0 (0.0%)	**20 (100.0%)**
Pupils	13 (65%)	6 (30%)	1 (5.0%)	0 (0.0%)	**20 (100.0%)**
Parents	12 (60%)	7 (35%)	1 (5.0%)	0 (0.0%)	**20 (100.0%)**

Source: Field data

As shown in Table 4.12, 12 (60.0%) of the respondents confirmed that healthy eating was strongly supported by school leadership/ management, 14 (70.0%) by teachers. 14 (70.0%) by non-teaching staff, 14 (70.0%) by caterers and kitchen staffs, 13 (65.0%) by pupils and 12 (60.0%) by parents

Choice of the type of meals for lunch by the Pupils for School provided meals

The study explored whether the pupils had the opportunity to choose the type of food they would like to eat. As shown in the Pie Chart below, for the school provided meals, 60.0% of pupils do not have a choice concerning what they eat.

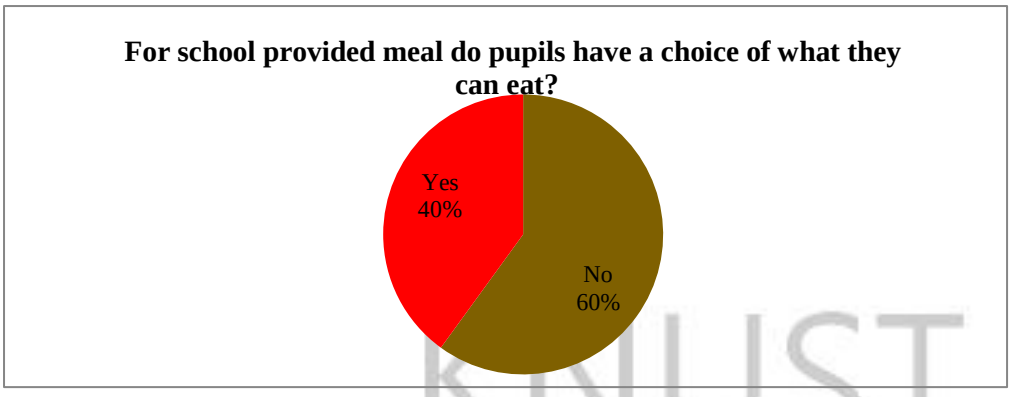

Figure 4.1: Do pupils have a choice of what they can eat

Source: Field data

Availability of School Policy on Physical Education

The availability and implementation of school policy on physical education are as important as that of food in ensuring the health of pupils to enhance learning. The study, therefore, explored the availability of this policy in the schools of the pupils.

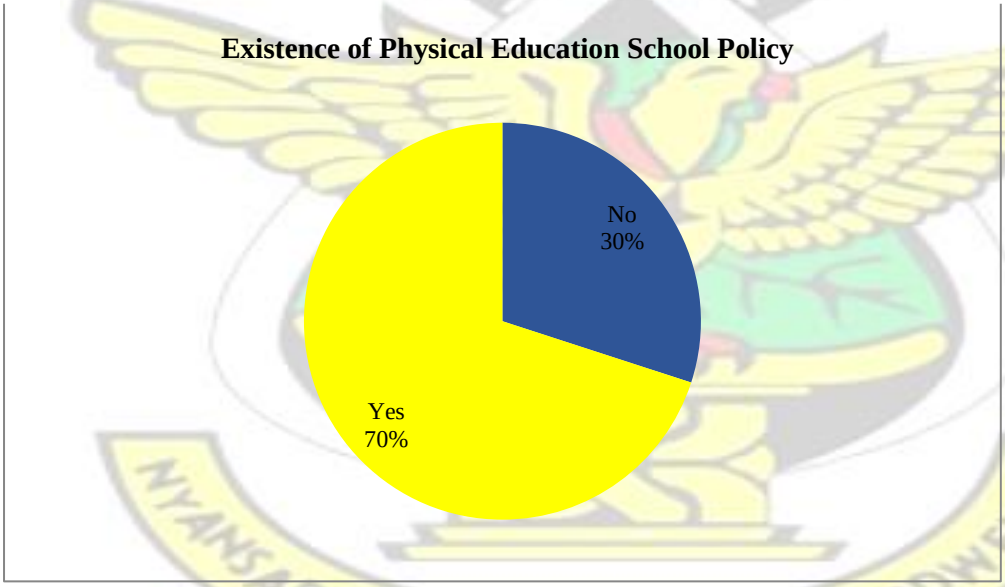

Figure 4.2: Availability of school policy relating to physical education

As presented in Figure 4.2, the majority of the respondents 14 (70.0%) confirmed that their schools have a policy relating to physical education.

Table 4.13.: Content of School policy relating to physical education

Coverage of Policy on Physical Activity	**Number** **Percent ***	
Having a designated physical education teacher	2	10
Playtime activity	9	47.4
Curricular physical activity	6	31.6
School sports	17	89.5
Physical activity participation and priority		**N (=20)** **Percentage ***
Effectiveness of physical activity Policy in school	Very effective	4 20.0
	Moderately effective	14 70.0
	Has had no effect	2 10.0
Rating of Prioritization of Physical in school	Strongly disagree	0 0.0
	Disagree	0 0.0
	Neutral	6 30.0
	Agree	10 50.0
	Strongly agree	4 20.0
Total curriculum time (hours) allocated to physical education for pupils per week, excluding changing time, time to arrive at the venue, etc.		**N (=20) % (=100%)**
Total curriculum time (hours) allocated to physical education for pupils per week	Less than 1 hour	6 30.0
	1-2 hours	9 45.0
	2-3 hours	5 25.0
	4-5 hours	0 0.0
	More than 5 hours	0 0.0

Category of Teachers involved in Physical Education and the type of sporting activity		**N (=17)**	**Percentage ***
Who teaches physical education in the school?	PE teacher	1	5.9%
	A non-specialist in PE Teacher	16	94.1%
Which sports/physical activities shown below are Pupils engaged in during PE	Walking	16	84.2%
	Jogging/ running	13	68.4%
	Skipping/Jumping/Ampe	16	84.2%
	Dancing	10	52.6%
	Football	19	100.0%
	Basketball	1	5.3%
	Volley/ Handball	5	26.3%
	Athletics (e.g. running, jumping, field games)	17	89.5%

Source: Field data

Multiple responses *

The results from respondents in Table 4.13 indicated that half (50.0%) of the school policy relating to physical education covers school sports whilst 5.9% of schools have a designated physical education teacher. A majority (70.0%) of the schools' policy relating to physical activity was moderately effective in increasing the participation of physical activity in the school and half 10 (50.0%) of the respondents agreed that physical activity was high on the list of priorities in the school. Out of the 20 respondents, 9 constituting 45.0% stated that about an hour or two is allocated to physical education for pupils per week and 5 (25.0%) said between 2-3 hours per week and 19.6% of respondents said the school engage in football during PE and basketball (1.0%).

Availability of Facilities and Equipment available for Physical Activities

The availability of facilities as well as equipment for Physical activities was also explored in supporting the drive to ensure healthy living by pupils in the schools surveyed.

Table 4.14: Facilities and equipment available for physical activities

Availability of Facilities and equipment for Physical Activities		**Number**	**Percent ***
Availability of Playground for Physical Activities for Pupils at the school	Always	19	95.5
	Usual	1	0.5
	Occasionally	0	0.0
	Never	0	0.0
Availability of Ball for Physical Activities for Pupils at the school	Always	11	55.0
	Usual	6	30.0
	Occasionally	1	5.0
	Never	2	10,0
Availability of Courts for Physical Activities for Pupils at the school	Always	3	15.0
	Usual	6	30.0
	Occasionally	5	25.0
	Never	6	30,0

Availability of Jump ropes for Physical Activities for Pupils at the school	Always	5	25.0
	Usual	8	40.0
	Occasionally	2	10.0
	Never	5	25,0
Availability of Coordination activities for Pupils at the Schools	Always	1	5.0
	Usual	6	30.0
	Occasionally	8	40.0
	Never	5	25,0
Areas for improving the promotion of Physical activities in the Schools			
School curriculum	None	1	5.0
	Little	7	35.0
	Some	6	30.0
	Substantial	6	30.0
Extracurricular activities	None	1	5.0
	Little	11	55.0
	Some	4	20.0
	Substantial	4	20.0
School as a medium for community education	None	2	10.0
	Little	6	30.0
	Some	10	50.0
	Substantial	2	20.0
School as a medium for community education	None	3	15.0
	Little	6	30.0
	Some	8	40.0
	Substantial	3	15.0
School sports/physical activity facilities	None	2	10.0
	Little	6	30.0
	Some	7	35.0
	Substantial	5	25.0

Source: Field Data

Multiple response *

As presented the majority 95.0% of schools had playgrounds and are always available for physical activities during breaks and lunchtimes, 55.0% of the schools had balls which were always available. Again, 30.0% had courts and are usually available during PE, 40.0% of schools had jump ropes and are usually available and finally, 40.0% of schools had coordination activities available occasionally.

As shown in Table 4.14, out of the 20 responses 7 (35.0%) said the school curriculum needs a little improvement relating to physical activity while 11 (55.0%) of the respondents stated that a little improvement should be done about the extracurricular activities Half of the respondents 10 (50.0%) stated that some improvements need to be done about the school been a medium for family education whilst 8 (40.0%) stated that some improvement should be done concerning the school been a medium for community education and finally, 35.0% stated that some improvement should be done concerning the school sports/ physical activity facilities.

CHAPTER FIVE

DISCUSSIONS

5.0 Introduction

This chapter seeks to discuss the prevalence of obesity among school children and also compare the prevalence for private and public school, the risk factor that accounts for obesity and school influence or contribution for a healthy living.

5.1 The prevalence of childhood obesity among public and private schools in the Sunyani municipality.

The study revealed that the prevalence of OWB among school children in the Sunyani municipality is 9.7% and 6.4% respectively with the overall as 16.1%. Previous study by Aryeetey *et al.*, (2017) recorded a prevalence of OWB as 15% amongst school children 9–15 years living in Accra and Kumasi, Ghana. Similarly, Adom *et al.*, (2019) in their study, involving children aged 8-11 who were attending public and private primary schools in Greater Accra Region also found the prevalence to be 9.2% for overweight and 7.2% for obesity with the prevalence to be (Overweight and Obesity) 16.4%. Urbanization has led to changes in lifestyle, physical inactivity and promotion

of unhealthy eating habits could have resulted in the high prevalence of obesity in children in urban areas.

In comparing the Public and private school prevalence the public school, the results from the study indicated that children attending private schools are about three times more likely to be overweight and obese. This meant that OWB in children was more prevalent in private schools than in public schools. This may be ascribed to the fact that most of the private schools use buses to pull students to their schools, or their parents own cars to transport to students to school. Likewise, Aryeetey *et al*, (2017) also found out that children in private schools had an increased likelihood of being overweight or obese as compared to those who are in public schools. Also, Karki et al (2019) found out that children who used school buses or own or public vehicle as their main mode of transport to and from school had a two-fold increase in the risk of being OWB than children who walked. Moreover, a significantly greater proportion of children in private schools were overweight and obese as compared to those in public schools.

5.2 The risk factors of obesity among school children.

The findings gathered based on the risk factors of obesity among the school children was categorized into sociodemographic, dietary habits, physical activity and screen time. Sex, age, mother‘s education, number of times of eating breakfast in a week, consumption of snack per day, time spent playing digital games and watching TV were significantly associated with the outcome of the study.

5.2.1 Sociodemographic Characteristic

Among the school children in the Sunyani Municipality, 11-14years was found to be associated with reduced risk of being overweight or obese and the females were 1.9 times at risk of being overweight but a 20% less likely to be obese than their male

counterpart. Aryeetey *et al*, (2017) also reported that female children, unlike their male counterparts, were two times likely to be overweight or obese. However, these findings were contrary to that of Yardim *et al.*, (2018) and Karki *et al*, (2019) who established increased OWB among the male children in Turkey and Nepal

respectively. It is unclear the reasons for these disparities in our findings. However, limitations in study methodologies, as well as population profile differences giving rise to diverse genetic makeup environmental factors and cultural differences, could account for this variance. Though Ogden *et al*. (2010) also found the prevalence of OWB to be higher in males than in females among the white American adolescents however interestingly, this was not same in the black American adolescents, it was the reverse though the study was conducted in the same population.

Children of mothers who had post-basic education and were professional were more likely to be overweight and obese. The study established that children from households of high socioeconomic status as measured by increasing wealth quintiles of household wealth was associated with some diverse levels of overweight. Increase education could lead to better employment which increases socioeconomic status. Also, Aryeetey *et al* (2017) found that high maternal education and household wealth were identified as a factor which increased the risk for OWB. Mothers with no education were more likely to have their children not being overweight or obese as compared to those with secondary education and above. Maternal education, low and middle socioeconomic status according to Yardim *et al* (2018), was greatly associated with childhood OWB. Surprisingly high socio-economic status of mothers had no significant association with overweight/obesity of the child. They also established a significant relationship between maternal employment and the risk of the child becoming obese/overweight.

Thibault, *et al*. (2010), found children whose fathers had low socioeconomic status o (OR 1.78, 1.22–2.60, $P < 0.01$) to have increased risk of being OWB.

5.2.2 Dietary Habit

Children who ate breakfast 1-3 days/week and 4-6 days/week had a lower risk of being overweight than those who ate breakfast daily, but interestingly, this was not the same for the obese group. It was found that children who eat 1-3 days/week and 46 day/week were one time and five times more at risk of being obese. No significant association was in the intake of fruits and vegetables and intake of water. However, Aryeetey *et al.*, (2017) found that a greater proportion of children had an intake of breakfast for more than 3 days/week within the school week. However, intake of fruits and vegetables among the children was minimal. One out of five and four out of ten children consumed fruits and vegetables respectively.

Karki *et al* (2019) also revealed that children who took processed meat and its accompanying products, snacks and confectionaries had three times increase in their risk of becoming overweight or obese.

5.2.3 Physical Activity and Screen Time

The study found that children who did not walk or ride a bicycle to school were 28% at risk of being overweight and about 1.5 times at risk of being obese than those who did some amount of walking or riding to school. This was similar to a study by Duncan *et al,* (2011) whose findings indicated that the odds of OWB of children who were driven by cars to schools to children who were bussed, cycled, and walked to school, they were 0.72, 0.61, and 0.59 times lower respectively. These findings were consistent with another study which found that children who went to school by buses, personal or public vehicles or used vehicles in general as their principal mode of transportation to and

from school, run twice the risk of being OWB compared to those who went to school on foot (Karki *et al*, 2019). Increased physical activity decreases the risk of OWB in children

Also, children who spent more than one hour a day on the computer had a 1.94 chance of being obese and 1.64 chance of being overweight as compared to children who did not spend time on the computer

Moreover, for those children who were involved in physical education period, those who were involved three or more than three times a week were having less risk of developing OWB. Increase time spent watching television was found to have an increased risk with increasing period. In the same way, Al-Dalaeen and Al-Domi (2017) who specifically examined the relationship between obesity, sedentary behaviour, small-screen recreation, television watching and perinatal influences, including birth weight and breastfeeding, revealed that sedentary behaviour and watching television were risk factors of obesity among children. Duncan *et al* (2011) also established that children who spent more than one hour a day on the computer had a 1.94 chance of being obese and 1.64 chance of being overweight as compared to children who did not spend time on the computer. However Karki *et al*, (2019) examined time spent more than the recommended screen time of less than or at most 2 hours a day on weekends and found those children to be 3 times more likely to be OWB than those who were adherent but Aryeetey *et al* (2017), also found that television watching was not significantly high among the children they studied. One out every seven respondents, before the study, watched television for a minimum of five times within a week.

5.3 Healthy Living in School

Physical activity and eating healthy can help in preventing OWB and should be stared early in life to prevent the development of this condition. The importance of the school

cannot be overlooked. Healthy eating and physical activity can be promoted through policy, practice and creation of a supportive environment to enhance learning and cultivate positive attitude toward good health.

This study found that all schools had policy relating to food and a greater number of schools' policy was related to physical education. Most of the school stated that food was provided by the school through the canteen system or the school feeding program with a few requiring students to bring their food from their homes. Majority of the schools stated that the method of promoting healthy eating is by caterers varying the content of the food, with few involving parents in activities and curricular sessions and the policy eating is very effective and high on the list of priorities in the school. Moreover, most of the schools providing meals have meals prepared or cooked in school. This study also explored the possibility of the pupils having the opportunity to choose the type of food they would like to eat and about two-thirds said that for the school provided meals, pupils do not have a choice concerning what they eat. In another study, they found that more than half of the schools said they had a food plan. All but two of the schools had a named person with specific responsibility for healthy eating or PE. Most commonly, the named individual responsible for the area of healthy eating was a middle leader. Eighty-nine per cent of the schools sampled had some timetabled curriculum time for teaching about food and healthy eating. Ninety per cent of the schools we visited had a full production kitchen. The remaining schools had hot food transported in. Food was prepared and cooked on-site (Lewis, Holmes and Morris, 2018)

This study found that the majority of the schools provides water throughout the day for the students by providing water in a container whereas the rest said pupils bring their water or students buy their water. About half of the schools inspect the health cards of

food providers at the school canteen/vendors were inspected more than 12 months interval and just one-tenth of the teacher indicating they never inspect the health card of the food providers.

Two-thirds or more stated healthy eating was strongly supported or supported by leadership/ management and teachers of the school the non-teaching staff, caterers and kitchen staffs as well as pupils and parents.

Half of the responses that came said the policy of physical activity covers physical education and content of the school policy on physical education it covers school sports. Only one school had a designated physical education teacher. Also, half of the schools agreed that physical activity was high on the list of priorities in the school. Majority of the schools' participation in physical activity in the school was moderately effective. Less than half of schools had allocated about an hour or two for physical education per week and a quarter between two to three hours per week. Similarly, in another study, the period allocated for PE on the timetable was two or more hours per week. As to whether the children were active during PE was not indicated by some of the schools. It was considered as playtime so some of the children may not have been physically active. One of the schools was honest to say the time was lost in getting changed and setting up though the allotted time was two hours on the timetabled for PE (Lewis, Holmes and Morris, 2018). Also, Rangana, (2015), in a qualitative study conducted found forty-eight percent of respondents agreed that lack of time management by teaching staff for PE and extra_ curricular activities influenced childhood obesity. Interestingly, Pallan, (2010), studies explored the contextual influences on the development of childhood obesity. The study drew attention to the potential influence of certain physical activity characteristics of schools on childhood overweight and obesity, particularly the amount of time devoted to physical activity.

The utilization of the period is very vital and the schools should ensure that students utilize the period judiciously and not just allocating periods without utilization.

However, 19.6% engage in football and 1.0% basketball during PE. In research by Lewis, Holmes and Morris, (2018) they found that the most usually accessible and the most likely to be termed, the favourite sport was football.

Furthermore, availability and access to facilities was a major consideration in the study, almost all schools have playgrounds, one third have courts and are always available for physical activities during breaks and lunchtimes. About half the schools have balls which are always available for use, more than one third usually have jump ropes and coordination activities availability for physical activities. However, in a study by Lewis, Holmes and Morris, (2018). they found that facilities like climbing frames, wooden pirate ship, trim trails, and climbing walls were available to develop climbing and balancing skills, beanbags, softballs, skipping ropes, circus equipment, hoops, stilts were also available for children to use to make active or sporting. Moreover, Rangana, (2015), found that thirty eight percent of respondents strongly agreed that un-availability of facilities and equipment for PE and Extracurricular activities had an effect on children developing obesity while thirty four percent of them agreed. However, a little more than one-tenth of the respondents disagreed that, un-availability of facilities and equipment for PE and Extracurricular activities could influence obesity in children.

One-third of the schools needed a little improvement in the curriculum to improve physical education. A little more than half did not need any improvement in the extracurricular activities in improving physical education. Half of the schools needed some improvements on the school been a medium for family education whilst a quarter needed some improvement concerning the school is a medium for community

education whereas 35.0% needed improvement concerning the school sports/ physical activity facilities. Clarke (2015), found, lack of facilities and space, time, support and funding were perceived barricades that prevented schools from promoting health both within and outside the curriculum which could have an impact on the children developing obesity. The peril and its associated barrier will remain not until leaders of school leaders feel well supported for them to dedicate more resources and time

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CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0 Introduction

The conclusions drawn are based on the findings derived from the study and their respective discussion and recommendations are made to help address childhood obesity.

6.1 Conclusion

Childhood overweight and obesity are prevalent in the Sunyani Municipality predominantly among private school children. Sex, age, mother's education, number of times of eating breakfast in a week, consumption of snack per day, time spent playing digital games and watching TV were significantly associated with overweight and obesity.

All schools had a policy relating to food but not all of those schools had a policy on physical education. A greater number of them constituting about two-thirds of them had. The policy on food covered either the provision of food through the canteen system or the school feeding program and the method of promoting healthy eating is by caterers varying the content of the food. Half of the responses that came said the policy of physical activity covers physical education which is through school sports. Most schools do not have a designated physical education teacher though the period allocated for PE was one to two hours a week.

6.2 Recommendations

Based on the findings of the study I recommend the following.

Policy Development/ Planning

Government/MOE/GES

There should be a review and development of a comprehensive policy on healthy eating and physical activity for schools.

Healthy living should be incorporated in the curricular for the student to learn about the body during PE and healthy eating and cooking

Practice

School authorities should ensure that existing policies on food and physical education be well implemented within the Sunyani Municipality and Ghana at large.

Facilities should be available and accessible to students for physical activity Sufficient time should be provided for children during school days to take physical exercise

Education and Training

MOH/GHS

Should collaborate with GES to organize and training teachers and caterers on healthy eating. Community sensitizations on healthy living should be extended to the schools as well.

Further Research

Interventional studies in other countries can be implemented but since it will be a new project in Ghana, a pilot study can be done to see the success and roll into a full-scale program.

REFERENCE

Abedi, H., Abbaszadeh, A., and Motaghi, M. (2016). Factors Influencing School Health in Elementary Schools in Isfahan, Iran: A Qualitative Study. International Journal of Community Based Nursing and Midwifery, 4(4), 352 – 362.

Adom, T., Puoane, T., De Villiers, A. and Kengne, C. (2017). Prevalence of obesity and overweight in African learners: a protocol for systematic review and metaanalysis. BMJ Open 2017; 7:e013538. Doi: 10.1136

African, T. and Policy, C. (2013) _Compiled by The African Child Policy Forum (ACPF) http://www.africanchildforum.org (December 2013). Please note that for all documents originally available in French, Portuguese and Spanish the translation in this table is not the official translation', (December).

Al-Dalaeen, A. M., and Al-Domi, H. A. (2017). Factors associated with obesity among school children Amman, Jordan. Malaysian Journal of Nutrition, 23(2), 211 – 218.

Al-Hazzaa, H.M., Abahussain, N.A., Al-Sobayel, H.I., Qahwaji, D.M. and Musaiger, A.O., 2012. Lifestyle factors associated with overweight and obesity among Saudi adolescents. *BMC public health*, *12*(1), p.354.

Arenz, S., Rückerl, R., Koletzko, B. and Von Kries, R. (2004). Breast-feeding and childhood obesity—a systematic review. International Journal of Obesity, 28(10), 1247–1256

Aryeetey, R., Lartey, A., Marquis, G.S., Nti, H., Colecraft, E. and Brown, P., (2017). Prevalence and predictors of OWB among school-aged children in urban Ghana. BMC obesity, 4(1), p.38.

Bales CW and Buhr G. (2008). Is obesity bad for older persons? A systematic review of the pros and cons of weight reduction in later life. Journal of the American Medical Directors Association, 9(5), 302-312.

Barkhru, H. K. (2006). Naturecure for children's diseases. Retrieved from http://www.HealthyLibrary.com

Beck, A. R. (2016). Psychosocial aspects of Obesity. NASN School Nurse, 31(1), 2327, doi: 10.1177/1942 602X15619756.

Bergstrom, H., Haggard, U., Norman, A., Sundblom, A., Elinder, L. S., and Nyberg, G. (2015). Factors influencing the implementation of a school-based parental support programme to promote health-related behaviours—interviews with teachers and parents. BMC Public Health, 15(541), 1 – 9.

Bhuiyan, M. U., Zaman, S., and Ahmed, T. (2013). Risk factors associated with OWB among urban school children and adolescents in Bangladesh: a case-control study. BMC Pediatrics, 13(72), 1 – 6.

Cyril, S., Green, J., Nicholson, J.M., Agho, K. and Renzaho, A.M., (2016). Exploring service providers' perspectives in improving childhood obesity prevention among CALD communities in Victoria, Australia. PloS one, 11(10), p.e0162184.Lanari, D. and Bussini, O. (no date) _International migration and health inequalities in later life'.

Duncan, S., Duncan, E.K., Fernandes, R.A., Buonani, C., Bastos, K.D., Segatto, A.F., Codogno, J.S., Gomes, I.C. and Freitas, I.F., 2011. Modifiable risk factors for

overweight and obesity in children and adolescents from São Paulo, Brazil. *BMC Public Health*, *11*(1), p.585.

Gupta, R. K. (2009). Nutrition and Diseases of Lifestyle. In R. J Bhalwar (Ed.), Text Book of Public health and Community Medicine (p. 1199). Pune: Department of community medicine AFMC, New Delhi.

Kambondo, G., and Sartorius, B. (2018). Risk Factors for Obesity and Overfat among Primary School Children in Mashonaland West Province, Zimbabwe. International Journal of Environmental Research and Public Health, 15(249), 1 – 24.

Karki, A., Shrestha, A. and Subedi, N. (2019) _Prevalence and associated factors of childhood overweight / obesity among primary school children in urban Nepal'. BMC Public Health, pp. 1–12.

Khan, A., Khan, S., Marwat, M. K., Ul-Islam, S., Khan, M. and Shah, A. J. (2017). Causes and Complication of Obesity among the Children. International Journal of Nutrition and Health Sciences, 2(1), 02-05.

Kimani-Murage, E., Kahn, K., Pettifor, J. Tollman, S. Kipstein,-Grobusch, K. and Norris, S. (2011). Predictors of adolescent weight status and central obesity in rural South Africa. Public Health Nutrition, 14, 1114 – 1122.

NCD Risk Factor Collaboration, 2016. Trends in adult body-mass index in 200 countries from 1975 to 2014: a pooled analysis of 1698 population-based measurement studies with 19· 2 million participants. *The Lancet*, *387*(10026), pp.1377-1396.

Lewis, S., Holmes, S. and Morris, S., (2018). Obesity, healthy eating and physical activity in primary schools.

Lobstein T, Baur L, and Uauy R, IASO International Obesity Task Force. Obesity in children and young people: a crisis in public health. Obesity Review, 5(1), 4–85

Manyanga, T., El-Sayed, H., Doku, D.T. and Randall, J.R., (2014). The prevalence of underweight, overweight, obesity and associated risk factors among schoolgoing adolescents in seven African countries. *BMC public health*, *14*(1), p.887.

Mbanya, J. & Ramiaya, K. (2006). Disease and Mortality in Sub-Saharan Africa: 2nd Edition, Washington, DC, The World Bank.

Mohammed, H. and Vuvor, F. (2012). Prevalence of childhood overweight/obesity in basic school in Accra. Ghana Medical Journal, 46(3), 124 - 127

Nowicka P, and Flodmark CE. Family in pediatric obesity management: a literature review. International Journal of Pediatric Obesity, 3(1), 44–50. doi: 10.1080/174 771608 018 96 994.

Ofori-Asenso, R., Agyeman, A. A., Laar, A. and Boateng, D. (2016). OWB epidemic in Ghana—a systematic review and meta-analysis. BMC Public Health, 16(1), 1239.

Ogden, C.L., Carroll, M.D., Curtin, L.R., Lamb, M.M. and Flegal, K.M., 2010. Prevalence of high body mass index in US children and adolescents, 20072008. *Jama*, *303*(3), pp.242-249.

Programs, O. P. and Sharma, M. (2011) _Dietary Education in School-Based Childhood‘. doi: 10.3945/an.111.000315.shaped.

Puoane, T., Steyn, K., Bradshaw, D., Laubscher, R. Fourie, J. and Lambert, V. (2002). Obesity in South Africa. The South African Demographic and Health Survey, Obesity Research, 10, 1038-1048.

Rome, E. S. (2011). Obesity prevention and treatment. Pediatric Review, 32, 363– 372. doi: 10.1542/pir.32-9-363.

Saha, M., Adhikary, D. K., Parvin, I., Shama, Y. R., Akhter, F., and Majumder, M. (2018). Obesity and Its Risk Factors among School Children in Sylhet, Bangladesh. Journal of Nepal Health Research Council, 16(39), 205 – 208.

Sahoo, K., Sahoo, B., Choudhury, A. K., Sofi, N. Y., Kumar, R., and Bhadoria, A. S. (2015). Childhood Obesity: causes and consequences. Journal of Family Medicine and Primary Care, 4(2), 187 – 192.

Scott, A., Ejikeme, C. S., Clottey, E. N. and Thomas, J. G. (2012). Obesity in SubSaharan: development of an ecological theoretical framework. Health Promotion International, 28(1), 4 -16,

SHAN, X.Y., Xi, B., Cheng, H., HOU, D.Q., Wang, Y. and Mi, J., 2010. Prevalence and behavioral risk factors of overweight and obesity among children aged 2–18 in Beijing, China. *International Journal of Pediatric Obesity*, *5*(5), pp.383389.

Thibault, H., Contrand, B., Saubusse, E., Baine, M. and Maurice-Tison, S., 2010. Risk factors for overweight and obesity in French adolescents: physical activity, sedentary behavior and parental characteristics. *Nutrition*, *26*(2), pp.192-200.

Wang, Y., Lim, H. and Program, N. , (2015) _HHS Public Access‘, 24(3), pp. 176–188. doi: 10.3109/09540261.2012.688195.The.

Wang, Y., Min, J., Khuri, J. and Li, M., (2017). A systematic examination of the association between parental and child obesity across countries. Advances in Nutrition, 8(3), pp.436-448.

Wieting, J. M. (2008). Cause and effect in childhood obesity: Solutions for a National Epidemic. The Journal of American Osteopathic Association, 108, 545 – 552
Wijnhoven, T.M., van Raaij, J.M., Spinelli, A., Starc, G., Hassapidou, M., Spiroski, I., Rutter, H., Martos, É., Rito, A.I., Hovengen, R. and Pérez-Farinós, N., (2014). WHO European Childhood Obesity Surveillance Initiative: body mass index and level of overweight among 6–9-year-old children from school year 2007/2008 to school year 2009/2010. *BMC public health*, *14*(1), p.806.

Wills, M. (2004). Orthopedic complications of childhood obesity. Pediatric Physician Therapy, 16, 230-235

Wolfenden, L., Wiggers, J., d'Espaignet, E.T. and Bell, A.C., 2010. How useful are systematic reviews of child obesity interventions?. *obesity reviews*, *11*(2), pp.159-165.

World Health Organization (2018). Obesity and Overweight. Retrieved from: https://www.who .int/news-room/fact-sheets/detail/obesity-and-overweight

Wright, S. M. Aronne, L. J. (2012). Causes of obesity. Abdominal Radiology, 37(5), 730-732.

Xu, H., Wen, L. M. & Rissel, C. (2015). Associations of parental influences with physical activity and screen time among young children: a systematic review. Journal of Obesity, Retrieved from http://dx.doi.org/10/1155/2015/546925

Yanovski, J. A. (2016) _HHS Public Access', 000641, pp. 3–12. doi: 10.1016/j.appet.2015.03.028.Pediatric.

Yardim, M.S., Özcebe, L.H., Araz, O.M., Uner, S., Li, S., Unlu, H.K., Arslan, U.E., Bilir, N. and Huang, T.T., (2019). Prevalence of childhood obesity and related parental factors across socioeconomic strata in Ankara, Turkey. *Eastern Mediterranean Health Journal*, *25*(6), pp.374-384.

Ziraba, A. K. Fotso, J. C., Ochako, R. (2009). OWB in Urban Africa: a problem of the rich or the poor*? BMC Public Health,* 9, 465

APPENDICES

APPENDIX 1 QUESTIONNAIRE

Participant Information Leaflet and Consent Form Title of Research:

ASSESSING THE PREVALENCE AND DETERMINANTS OF CHILDHOOD OWB IN SUNYANI MUNICIPALITY

Name(s) and affiliation(s) of researcher(s):

This study is being conducted by Miss Rosemary Braimah of the School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi.

Background (Please explain simply and briefly what the study is about): The study seeks to find the widespread of childhood obesity and the factors that account for it.

Purpose(s) of research:

The purpose of the research is for academic and policy development for the school on healthy life style for students .

Procedure of the research, what shall be required of each participant and approximate total number of participants that would be involved in the research:

Routine examination will be conducted where the children's height and weight will be measured. Body mass index will be calculated as weight (kg)/(height (m)2). The age specific and sex specific distribution of the body mass index using specific international classification BMI standards. Questionnaires will be administered individually to the school children and in some instances their parents or caregivers. A total of 423 participants will be involved in the study.

Risk(s): Some students may experience fear and anxiety because they are not familiar with the research assistants. The class involved may miss some periods for the day

Benefit(s): Every student will know the BMI and they will have first aid information to maintain a normal weight
It will give a situation assessment on childhood obesity in the municipality. It will help inform policy on school screening exercise.

Confidentiality: All information collected in this study will be given code numbers. No name will be recorded. Data collected cannot be linked to you in anyway. No name or identifier will be used in any publication or reports from this study.

Voluntariness: Taking part in this study should be out of your own free will. You are not under obligation to. Research is entirely voluntary.

Withdrawal from the research: You may choose to withdraw from the research at anytime without having to explain yourself. You may also choose not to answer any question you find uncomfortable or private.
Consequence of Withdrawal: There will be no consequence, loss of benefit or care to you if you choose to withdraw from the study. Please note however, that some of the information that may have been obtained from you without identifiers (name etc), before you chose to withdraw, may have been modified or used in analysis reports and publications. These cannot be removed anymore. We do promise to make good faith effort to comply with your wishes as much as practicable.

Costs/Compensation: The students will be given a present

Contacts: If you have any further information or questions about the study, you may contact the principal investigator, Rosemary Braimah, on phone number: 024 218 2304 or email: romabah@gmail.com

Further, if you have any concern about the conduct of this study, your welfare or your rights as a research participant, you may contact:

The Office of the Chairman
Committee on Human Research and Publication Ethics
Kumasi
Tel: 03220 63248 or 020 5453785

KNUST

CONSENT FORM

Statement of person obtaining informed consent:
I have fully explained this research to _____ and have given sufficient information about the study, including that on procedures, risks and benefits, to enable the prospective participant make an informed decision to or not to participate.

DATE: _____ NAME: _____

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Statement of person giving consent:
I have read the information on this study/research or have had it translated into a language I understand. I have also talked it over with the interviewer to my satisfaction.

I understand that my participation is voluntary (not compulsory).

I know enough about the purpose, methods, risks and benefits of the research study to decide that I want to take part in it.

I understand that I may freely stop being part of this study at any time without having to explain myself.

I have received a copy of this information leaflet and consent form to keep for myself.

NAME:_____
___

DATE: _____ SIGNATURE/THUMB PRINT: _____
Type of school: a. Public ☐ b. Private ☐

Location of school: a. urban ☐ b. Public ☐

DEMOGRAPHIC CHARACTERISTICS

Q1.	What is your sex?	Male……1 Female ……...2
Q2.	What is your age?	|__|__|
Q3	Which grade are you?	Primary 1……1 Primary 2 ……...2 Primary 3 ……...3 Primary 4 ……...4 Primary 5 ……...5 Primary 6 ……...6

Q4	Religion	Christianity……1 Islam……...2 Traditional…….....3 Others..……...4
Q5	Place of Residence	|_____|
SOCIOECONOMIC STATUS		
Q6	Fathers Highest Educational level	None……...1 Primary……...2 JHS/Middle sch……..3 SHS ……...4 Technical/Diploma…….....5 Tertiary (Bachelors/Masters/ Ph.D……6
Q7	Fathers Occupation	Professional……1 Artisan……2 Formal..……..3 Self-employed……4 Not……..5
Q8	Mothers Highest Educational level	None……...1 Primary……...2 JHS/Middle sch……..3 SHS ……...4 Technical/Diploma…….....5 Tertiary (Bachelors/Masters/ Ph.D……6
Q9	Mothers Occupation	Professional……1 Artisan……2 Formal..……..3 Self-employed……4 Not……..5
Q10	Who is most responsible for taking care of your	Parents……...1 Mother Only……...2 Father Only……..3
	needs? SELECT ONLY ONE RESPONSE.	Aunt/Uncle……4 Grandparent……5 Siblings (Sister or Brother)……....6 Some other person…….....7

Q11	With whom do you live? (Guardian) Relationship to Guardian	Parents……....1 Mother Only……...2 Father Only……3 Aunt/Uncle……4 Grandparent……5 Siblings (Sister or Brother)……....6 Some other person…….....7
If 1, 2 or 3 skip to Question14		
Q12	Guardians Highest Educational level	None……...1 Primary……...2 JHS/Middle sch……..3 SHS ……...4 Technical/Diploma…….....5 Tertiary (Bachelors/Masters/ Ph.D……6
Q13	Guardians Occupation	Professional……1 Artisan……2 Formal..……..3 Self-employed……4 Not……..5
Q14	Type of Residence	Owned by parents/guardian……....1 Family house……..2 Rented……3 Others……4 (Please specify)_____
Q15	Do you own any of the following in your house? (Circle as many as possible select item only if it is functioning)	DVD player……1 TV……..2 Refrigerator……3 Microwave……4 Generator…….....5 Car……6 Motorbike……..7 Computer/laptop……8 Electric or gas cooker……9 Electric iron……..10 Please specify number |__|__|
SECTION C: DIETARY PATTERN / HABIT The next questions ask about what you might eat and drink		
Q16	How many main meals do you eat in a day?	One……..…1 Two…….....2 Three……..3 More than 3 times……..4

Q17	How many times do	Daily……..……1
	you eat breakfast in a week?	1-3 Days/Week ……2 4-6 Days/Week ……3 None……..4
Q18	How many times do you eat lunch in a week?	Daily……..……1 1-3 Days/Week ……2 4-6 Days/Week ……3 None……..4
Q19	How many times do you eat supper in a week?	Daily……..……1 1-3 Days/Week ……2 4-6 Days/Week ……3 None……..4
Q20	Do you patronise any of the following foods? Please circle all that apply.	Fried rice [ ] Fried chicken [ ] Burger [ ] Potato chips [ ] Pizza [ ] Fried turkey tail(chofi) [ ] Fried doughnuts Hamburgers Fried yams or potatoes or plantains
Q21	How often do patronise these foods (in Q20)	Rarely Often Very Often
Q22	How many times do you eat snacks in a day?	One……..……1 Two……...2 Three……..3 More than 3 times……..….4 None……..5
Q23	Types of snacks usually consumed?	
Tick the frequency of consumption of the following foods		

Q24		**Never**	**Daily**	**2-3 times a week**	**4-6 times a week**
	Fresh, tinned or powdered milk or yogurt				

	Liquids (fresh fruit juice or juice concentrate)				
	Beverages like milo, tea, carbonated/fizzy drinks				
	Foods				
	Starchy foods (Cassava, yams, sweet potatoes, Irish potatoes or other roots and tubers)				
	Cereals and grains (Rice, porridge/koko, bread, pasta/macaroni, or other foods made from maize, millet, sorghum or other grains)				
	Legumes/Nuts (Beans, peas, cow peas, groundnuts, seeds, oil seeds soya beans or other legumes or seeds)				
	Meat (beef, pork, goat, lamb, chicken, duck) or other meat				
	Organ meats (liver, kidney, heart etc)				
	Eggs (chicken eggs, duck eggs etc)				
	Fresh fish, dry fish or shell fish				
	Vegetables (spinach, bitter leaf, ayoyo, nkontomire pumpkins, carrots, orange fleshed sweet potatoes)				
	Other fruits or vegetables (passion fruit, jack fruit, pineapples, oranges, water melon, mangoes, pawpaw etc)				
	Fat/ oils (Cooking oil, palm oil, shear butter, margarine, butter or other oils/fats)				
	Confectionary/ Sugary foods (chocolate, sweets, candies, pastries, cakes or biscuits, ice cream)				

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Q25	How many cups of water do you consume on an average day?	0-1…….……1 2-3 …….2 4-5 …….3 6-7 …….4 8 or more ……...5
PHYSICAL ACTIVITY (any activity that increases your heart rate and makes you get out of breath some of the time. Physical activity can be done in sports, playing with friends, or walking to school. Some examples of physical activity are running, fast walking, biking, dancing, football, ampe, skipping, and hop scotch)		
Q26 Do you consciously engage in any physical activity		Yes…….……1 No…..……..2
If No to Q26, skip to Q 28		
Q27	If yes to Q26, state what type of activity you engage in.	
Q28	What is your means of transport to school?	School bus …..……...1 Public transport…..……....2 Bicycle……..……..…3 Motor bike……..……...4 Walking……..……...5
Q29	During the past 7 days, on how many days did you walk or ride a bicycle to or from school?	Daily…….……1 1-3 Days/Week …….2 4-6 Days/Week …….3 None……..4
Q30	How many times were you involved in physical activity (sports, running, riding, climbing, etc) in your free time in the last 7 days?	Never…….……...1 Once a week…….…….2 Twice a week……....3 Three times a week…….....4 More than three times a week……...5 Other ……6 Specify_____
Q31	Is Physical Education part of your school curriculum?	Yes…….……1 No…..……..2

Q32	How often do you have physical education periods at school?	Never……....1 Once a week…….…2 Twice a week……....3 Three times a week…….....4 More than three times a week……...5 Other ……6 Specify_____
Q33	How long are those periods?	< 1 hour……..1 1-2 hours…….....2 2-3 hours……...3 4-5 hours……4 >5 hours…….5
Q34	How often do you take part in those periods?	Never…….....1 Once a week…….…2 Twice a week……....3 Three times a week…….....4 More than three times a week……...5 Other ……6 Specify_____
Q35	During PE periods, you	Sit down (talking, doing school work, reading)…1 Stand or walk around……2 Run or play a little bit……3 Run around and play quite a bit……4 Run and play hard most of the time……...5
Screen Time		
Q36	How much time do you spend on the Internet or on a cell phone not doing school work?	< 1 hour……..1 1-2 hours…….....2 2-3 hours……...3 4-5 hours……4 >5 hours…….5
Q37	Do you have their own cell phone or tablet?	Yes……1 No…….2
Q38	How much time do you spend playing digital games (video games, computer games, apps) that do not require physical activity?	< 1 hour……1 1-2 hours……...2 2-3 hours……...3 4-5 hours……..….4 >5 hours……....5

Q39	How much time do you spend on the Internet a day for fun?	< 1 hour……1 1-2 hours…….....2 2-3 hours…….....3 4-5 hours……4 >5 hours…….5
Q40	How much time do you spend watching TV	< 1 hour……..1 1-2 hours…….....2 2-3 hours…….....3 4-5 hours……4 >5 hours…….5
Sleep		
Q41	How many hours do you sleep per day?	less than 4……...1 4-5……..2
		6-7……..3 8-9……..4 10- 11……..5 more than 12……..6
General knowledge		
Q42	Should schools have a greater role in combating childhood obesity?	Yes……1 No…….....2
Q43	Does your school have periods when you are taught nutrition and healthy eating habits?	Yes……....1 No…….....2
Q44	If yes, how often?	Never ☐ b. Weekly ☐ c. Twice weekly ☐ d. Monthly ☐ e. Other ☐ Specify……

ANTHROPOMETRIC MEASUREMENTS

Measurements	**1st Reading**	**2nd Reading**	**AVERAGE of both Readings**

Weight (kg)			
Height (cm)			
BMI (kg/ m2)			

BMI STATUS	UNDERWIGHT NORMAL OVERWEIGHT OBESE

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APPENDIX 2

SCHOOLS QUESTIONNAIRE

This questionnaire is designed to explore the facilities, initiatives and general environment relating to food, physical activity and health in the schools. It is really important that this questionnaire is completed by all schools who have agreed to take part in the study, and I would greatly appreciate it if you could take the time to complete this questionnaire.

Most questions require ticking a box □, but some ask for further comments or information. We would be grateful if you could answer ***all*** of the questions. You may need to consult with other members of staff in order to answer some of the questions.

Your answers will remain confidential and you will not be identifiable as an individual in any reports arising from this questionnaire.

If you have any questions please contact **Rosemary Braimah**, on phone number: **024 218 2304** or email: romabah@gmail.com. **Section 1: Healthy eating in school**

1. School name_____
2. Type of school: □□□□Public □□□□□□Private □
3. Your role within the school_____
4. Does your school have a policy relating to food? A. □ Yes B. □ No

If No to question 4, move to question 7

5. Which of the following does your school's policy relating to food cover? (please tick all that apply) A.
   - □Buy from food vendors
   - □School feeding program
   - □Provision of food by the school
   - □Students are required to bring food from home
   - □Other (please specify)

   B.
   C.
   D.
   E.

   _____

6. If your school has a policy relating to food, how effective do you believe the policy has been in promoting healthy eating? A.
   - □Very effective
   - □Moderately effective
   - □Has had no effect

   B.
   C.

7. Please rate the following statement by ticking one of the boxes below "Healthy eating is high on our list of priorities in this school"

A. □Strongly agree B. □ Agree C. □ Neutral D. □ Disagree E. □ Strongly disagree

8. How is healthy eating promoted in your school? (please tick all that apply)

A. □Not actively promoted
B. □Curricular sessions
C. □Activities involving parents
D. □School garden
E. □Posters/media
F. Caterers vary the content of the food
G. □Other (please specify) _____

9. In your opinion, to what extent do you think that healthy eating is supported by:

	Strongly supported	Supported	Weakly supported	Not supported
School leadership/management				
Teachers				
Non-teaching staff				
Catering & kitchen staff				
Pupils				
Parents				

10. Does your school provide water throughout the day to pupils? A. □ Yes B. □ No

If Yes to question 10, answer question 11. If No move to question 12

11. Please describe how water is provided to pupils

A. Providing water in a container
B. Pupils bring their own
C. Student buy their own water
D. Other (please specify

_____

12. How is lunch provided in schools? (please tick all that apply) A.
    - □School meals
    - □Pupils can bring lunch from home
    - □Pupils can go home for lunch
    - □Other (please specify)

B.
C.
D.

_____ **Skip question 13 and 14 if school does not provide meals**

13. For school provided meals, do pupils have a choice of what they can eat (other than provisions for dietary requirements?) A□. Yes B. □No
    - □Brought in ready prepared
    - □Prepared/Cooked on site
    - □Other (please specify) _____

14. How are school meals provided? A.
B.
C.

15. How frequent do you inspect the health cards of food providers at the school canteen/vendors
    A. <6 months
    B. 7 to 12 months
    C. >12months
    D. Never
    E. Others (please specify)_____

Section 2: Physical activity in school

16. Do you have a school policy relating to physical education? A. ☐ Yes B. ☐ No

17. Which of the following does your school's policy relating to physical activity cover? (please tick all that apply) A.
    - □School does not have a policy relating to physical activity
    - □Having a designated physical education teacher
    - □Playtime activity
    - □Curricular physical activity
    - □School sports

B.
C.
D.
E.
    - □Physical activities for staff
    - □Other (please

F.
G. specify)_____

18. If your school has a policy relating to physical activity, how effective has the policy been in increasing participation in physical activity in the school?
A. □Very effective B. □Moderately effective C. □Has had no effect

19. Please rate the following statement by ticking one of the boxes below. "Physical activity is high on our list of priorities in this school"
A. □Strongly agree B. □Agree C. □Neutral D. □Disagree E. □Strongly disagree

20. How is physical activity promoted in your school? (Please tick all that apply) A.
□Not actively promoted
□Curricular sessions
□Posters/media
□School sports/games
□Other (please specify)
B.
C.
D.
E.

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21. What is the total curriculum time (hours) allocated to physical education for pupils per week, (excluding changing time, time to arrive at venue etc.)?
A. □< 1 hour
B. □1 hours C. □2 -3hours
D. □4-5 hours
E. □>5 hours

22. Who teaches physical education in the school? (Please tick all that apply) A.
□PE teacher
□Teacher who is not a specialist in PE
□Specialist from outside of the school
□Other (please specify)
B.
C.
D.

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23. Which sports/physical activities shown below are students engaged in during PE? (please tick all that apply)
A. □Walking
B. □Jogging / running
C. □Skipping/jumping/ampe
D. □Dancing
E. □Swimming
F. □Swinging / climbing
G. □Football
H. □Basket ball
I. □Volley / Handball
J. □Athletics (e.g. running, jumping, field games)
K. □Chaskele
L. Other (please specify)

24. What facilities/equipment are available for physical activities during breaks and lunchtimes, and how often are they used? (please tick all that apply)

	Always	Usually	Occasionally	Never
Playground				
Balls				
Courts				
Jump ropes				
Coordination activities				
Other				

25. To what extent is there room for improvement in relation to promoting ***physical activity*** within each of the following areas? (In your opinion)

	None	Little	Some	Substantial
School curriculum				
Extracurricular activities				
School as medium for family education				
School as medium for community education				
School sports/physical activity facilities				

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