SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCE

UNIVERSITY OF GHANA

PREVALENCE OF OVERWEIGHT AND OBESITY IN PRE-SCHOOL CHILDREN AT LA NKWANTANANG-MADINA MUNICIPALITY

BY

OKYERE SENYO

(10204764)

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH DEGREE

JULY, 2018

DECLARATION

I, Okyere Senyo, hereby declare that with the exception of cited references, all the information in this document is a presentation of my original work. This dissertation have never been presented in part or in whole to any institution for the award of any degree.

_____
Okyere Senyo

(Student)

Date:

_____
Dr. Pricillia Nortey

(Supervisor)

Date:

DEDICATION

This thesis is dedicated to Elohim and Yo'el. To my niece and nephews; Jewayne, Jein, Jaiye, Selorm, Skyla, Regan and, finally to UNICEF and WHO for their continual effort to help and support mothers and children.

ACKNOWLEDGEMENT

My foremost gratitude goes to the almighty God for the gift of life and favour to complete this dissertation.

Completing this work would have been all the more difficult and not seen the light of day without the parental tutelage, patient and professional guidance of Dr. Pricillia Nortey. I am colossally indebted to your warmth encouragement, prompt response to my questions and queries.

My heartfelt gratitude to my mother Regina Ntumy, my aunt Sucy Kuma and her husband, Mrs Habib-Nyandi and Joycelyn Armah for their prayers, support and well wishes.

Completing this Masters would have been all the more difficult was it not for the substantial financial support from Dr. Samuel Ato Duncan and Mrs Joana Opare. You have been a true blessing, thank you.

A special thanks to the respective heads of University of Ghana Primary School, and Baby Nest School for their openness and allowing me to use their schools as a study site. I also want to extend appreciation to all parents and caregivers who granted me permission to engage their children in the schools and, who also took the time and pain to fill the questionnaires.

I wish to acknowledge the invaluable support of my research assistants, specialists and teachers of the school who coordinated the research data collection.

Finally, I would like to recognize all lecturers of the School of Public Health, your invaluable knowledge and thought-provoking lectures have helped finalize this thesis.

God is able family, Thank you.

ABSTRACT

Background

Overweight and obesity epidemic has become one of the most urgent global health challenges of the 21st century. Studies have shown that over ten times more children and adolescents were obese in the year 2016; 124 million compared to the year 1975; 11 million, according to findings by (WHO, 2017). Overweight and obesity is understood to be imminent before reception year at school thus at 8 months prevalence could be determined (Perry, Thurston, & Arch, 2016). Currently the rate of overweight and obesity is not only related to develop industrialized countries but also to developing countries as well. This study was conducted to determine the prevalence of overweight and obesity in preschool children at the University of Ghana Basic School, Legon and Baby Nest School, Legon.

Methods

A cross-sectional study was carried out from 1st June to 6th July, 2018 at University of Ghana Basic School (public) and Baby Nest, Legon (private) in the La Nkwantanang-Madina Municipality. Random sampling was used to select 201 pre-schoolers out of a population of 332. Children were at exact age 2, 3, 4, and 5 years at last birthday. A combination of self and interviewer administered questionnaire was used to collect data on food frequency and 24 hour recall; WHO Global Physical Activity Questionnaire (G-PAQ); Child Eating Behaviour Questionnaire (CEBQ) and Anthropometric measurement (weight and height). Data obtained from the structured questionnaire; food frequency and child eating behaviour questionnaire (CEBQ) was analysed using Stata statistical package version 15.0 StataCorp LLC to generate frequencies, percentages and means (standard deviations). The child eating behaviour questionnaire was analysed by using a five-point Likert scale.

Anthropometric measurement – weight (kg) and height (cm) was classified using the WHO Child Growth Chart cut-off point for age-and-sex (WHO, 2007). Assessment of 24-hour recall was done using the nutritional guidelines of WHO healthy diet fact sheet (2015). Associations between dietary habits, physical activity, sociodemographic characteristics and, overweight and obesity was tested using bivariate and multiple logistic regression model. Statistically significant p-values; $p<0.001$ and $p< 0.05$ was noted in the final regression model. Informed consent was sought from the caregivers of the children whilst ethical clearance was taken from the Ghana Health Service (reference number GHS-ERC: 039/01/18).

Results

The study revealed an overall prevalence of normal weight, overweight and obesity respectively 90.1%, 1.5% and 8.4%. Overweight and obesity was higher in private schools than public schools. The prevalence of overweight was 3% and obese children was 11% respectively. None of the selected participants at the public School was overweight however, the prevalence of obesity was 6% and normal weight was 94%. Girls reported a higher overweight and obesity prevalence 11.7% than boys 7.8%.

The study showed that children in nursery two had 70% less likelihood of being overweight or obese compared to preschool children in nursery one (OR = 0.3; 95% CI = 0.1 – 0.8). Consequently, children who ate fruits in between meals instead of snack showed an 80% reduction in the odds of being overweight or obese compared to children who took in snack. (OR = 0.2; 95% CI 0.04 - 0.8). Children found overeating even when full had an increased odds of being overweight or obese [(OR = 3.9; 95% CI = 1.3 - 11.3), p = 0.01]. In the same vein, care givers who preferred their children to be eating all the time had significantly 9 times the odds of being overweight or obese [(OR = 9.0; 95% CI = 1.8 - 45.9), p = 0.008].

Finally, slightly over 38% children engaged in moderate physical activity for at least thirty (30) minutes, a minimum of one to two times a week whilst nearly 40% of children engaged in vigorous physical activity for at least sixty (60) minutes, a minimum one to two times a week.

Conclusion

At the end of the study, it was found that overweight and obesity persist in public and private school at Legon; 1.5%, and 8.4% respectively. The study further revealed that there was a higher prevalence of overweight and obesity in private schools than in public schools and that sex difference in prevalence was higher in girls than in boys. This indicated on the one hand that there are contemporary changes in the Ghanaian food system, the social environment, and the consequent dietary and lifestyle practices therein contributing to increasing obesity and diet-related NCDs in vulnerable groups. It further suggested that child and adolescent risk of developing NCDs is worsened by malnutrition, often beginning from early childhood years. These prevalence rate could also be explained by the higher socioeconomic status of parents and the urban lifestyle along with parent-child dietary lifestyle.

Ghana Education Service should collaborate with Ghana Health Service in ensuring that schools engage the services of nutritionist or dietician to assist in promoting nutritional knowledge among care givers to entail addressing the poor dietary practices. This could be done during Parent Teacher Association Meetings (PTA) and organizing periodic educational training sessions for parents, care givers and staff. Care-givers and schools should be responsible for determining the activities that children engage in during their free time, and to create an active lifestyle in the home and at school that will minimize sedentary behaviours. Schools should provide display learning materials on healthy living on classroom walls and canteens to inculcate early behaviour modification to promote healthy lifestyle.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AHF	–	American Heart Foundation
BMI	–	Body Mass Index
CDC	–	Centre for Disease Control
CEBQ	–	Child Eating Behaviour Questionnaire
CT	–	Computerized Tomography
DHE	–	Department of Health in England
EUFIC	–	European Food Information Council
FFQ	–	Food frequency questionnaire
GPAQ	–	Global Physical Activity Questionnaire
IOTF	–	The International Obesity Task Force
LaNMMA	–	La Nkwantanang-Madina Municipal Assembly
MRI	–	Magnetic Resonance Imaging
NCD	–	Non-communicable disease
NCMP	–	National Child Measurement Programme
NHANES	–	National Health and Nutrition Examination Survey
NOO	–	National Obesity Observatory
NRCC	–	National Research Council Committee (US)
OECD	–	Organisation for Economic Co-operation & Development
WHO	–	World Health Organization
WHTFCO	–	White House Task Force on Childhood Obesity

DEFINITION OF TERMS

Adipose tissue: Tissue in which fat is stored and which has the cells distended by droplets of fat. They expand or contract depending on how people use this energy.

Anthropometric: Measurements used to assess the size, shape and composition of the human body

Energy balance: Refers to the relationship of energy intake to energy expenditure and energy storage. Less energy expenditure than energy intake results in a positive energy balance and storage of energy primarily as body fat. When energy expenditure exceeds energy intake, energy balance is negative and leads to weight loss. When intake equals expenditure, equilibrium results and body fat is maintained, regardless of whether the body weight is at, above, or below normal. Even at stable body weight, however, the percentage of body fat frequently increases with age unless regular physical activity is maintained. At the same body weight, some sedentary people have relatively more body fat than those who exercise. Thus even at normal weights, these individuals may have more adiposity than desirable

Metabolic syndrome: Is a cluster of conditions — increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol or triglyceride levels — that occur together, increasing your risk of heart disease, stroke and diabetes.

Nutrition transition: The study of the dynamic shifts in dietary intake and physical activity patterns and trends in obesity and diet-related non-communicable diseases.

Obesogenic environment: Refers to "an environment that promotes gaining weight and one that is not conducive to weight loss" within the home or workplace

Obesogenic behavior: Includes the consumption of larger portions of food, particularly high-fat, high-sugar foods, often combined with greater time spent in passive or sedentary activity

Pre-schoolers: These could be children who are no longer babies but are not yet old enough to attend formal school and those who are old enough to attend formal school.

Physical activity: Any bodily activity that enhances or maintains physical fitness and overall health and wellness.

Sedentary: involving little exercise or physical activity

CHAPTER ONE

1.0. INTRODUCTION

1.1. Background

In the 21st century, obesity epidemic has become one of the greatest challenges and pressing concerns of public health. Studies have shown that over ten times more children and adolescents were obese in the year 2016; 124 million compared to the year 1975; 11 million, according to findings by WHO (2017). Overweight and obesity "have both been described as abnormal accumulation of excessive body fat which may be harmful to health" (WHO 2009).

Several studies over the years have not attributed a single cause to explain the prevalent rate of overweight and obesity. However, and in most circumstances, onset could begin from the womb and from pre-pregnancy lifestyle of parents – particularly mothers. The amounts of calories consumed and the breakdown of energy less than energy build are factors that could lead to overweight and obesity (WHO, 2009). Finally, pre-schoolers and adolescent preferences for food due to psycho-visual exposures also influence the risk of developing overweight and obesity (Gborzekowski & Robinson Thomas .N., 2001). Studies by (Harris, Bargh, & Brownell, 2009); (Carter, Patterson, Donovan, Ewing, & Roberts, 2011); Harris & Graff (2012) have noted that "young children do not have the cognitive ability to understand or recognize the enticement of advertisement and thus may be highly susceptible to food industry marketing tactics".

Some public health experts also associate the development of overweight and obesity with socioeconomic status, urban lifestyle, family size, physical inactivity, educational status, cultural factors, and poor eating habits (Al-nuaim et al., 2012; Fazah et al., 2010).

Analysis conducted on 144 different countries from the WHO database survey in 2010 showed overweight and obesity prevalence of pre-schoolers as follows; overweight or obese 43 million. Out of a prevalence of 43 million, 35 million pre-schoolers were in developing countries whilst 92 million pre-schoolers were projected of becoming overweight. Overweight and obesity in preschool children is rising rapidly, so that it increased from 4.2% in 1990 to 6.7% in 2010 (Onis, Blo, & Borghi, 2010). With this continuous trend, overweight or obese children globally will increase to 70 million by 2025 (WHO, 2016). By 2010, studies have showed that preschool children overweight and obesity in Asia was 4.9%, representing 18 million children.

Obesity across age range is a current and major health concern as non-communicable disease burden is strongly becoming prevalent in developing countries. The prevalence of overweight and obesity in developing countries particularly in the WHO Africa Region suggest that the number of pre-schoolers who are overweight have increased by nearly 50% since 2000 (WHO, 2017b). Prevalence in Africa is projected to hit 12.7% by 2020 (Onis et al., 2010). The Ghanaian child and adolescent through their daily social activities are influenced by the "obesogenic environment" that they find themselves in to consume more. According to previous studies "obesogenic behaviour includes the consumption of larger portions of food, particularly high-fat, high-sugar foods, often combined with greater time spent in passive or sedentary activity" (Corsica & Hood, 2011; Brownell, 1996; Kant, 2000).

It has been demonstrated by (Johnson & Birch, 1994 and Heelan, Bartee, Nihiser, & Sherry, 2015) that one of the optimal intervention means in overweight and obesity management and prevention is parental control and healthier school environment. Pre-schoolers do not have the ability to regulate their food consumption in feeding situation as compared to the control their parents have in such situations.

The 1992 Framingham study that was conducted showed that there was a significant association between nutritional intake of pre-schoolers and their parent's dietary habits. This have been identified with a particular relationship to saturated fat and calorie levels (Oliveria et al., 1992). According to figures by WHO (2012), approximately 2.8 million deaths was related to overweight and obesity each year. Overweight and obesity increases the risk for NCDs and other risks for developing socio-pathological conditions that increases socioeconomic burden on families and the nation. A previous study suggests that children who are overweight and obese are likely to become obese adults and increase the risks for developing chronic diseases (Guo, Zeng, Zhuang, Zheng, & Chen, 2015). Scientific evidence have provided an understanding to the fact that the consequences and complications of overweight and obesity in pre-schoolers are comparable to that of adults. Thereof, there is the growing need to provide strategic interventions and implementation plan.

1.2. Problem Statement

WHO data on Africa reports that the number of pre-schoolers who are overweight have increased by nearly 50% since 2000 (WHO, 2017b). Over ten times more children and adolescents were obese (124 million) in the year 2016 compared to the year 1975 (11 million), according to findings by WHO (2017). This continuously increasing trend poses threats to increased NCD mortality related to overweight and obesity.

Currently in Ghana, overweight and obesity in children is on the rise due to several factors, however most parents do not report on them. Obesity conditions from infancy could develop in the later years of the child thereby increasing morbidity and mortality.

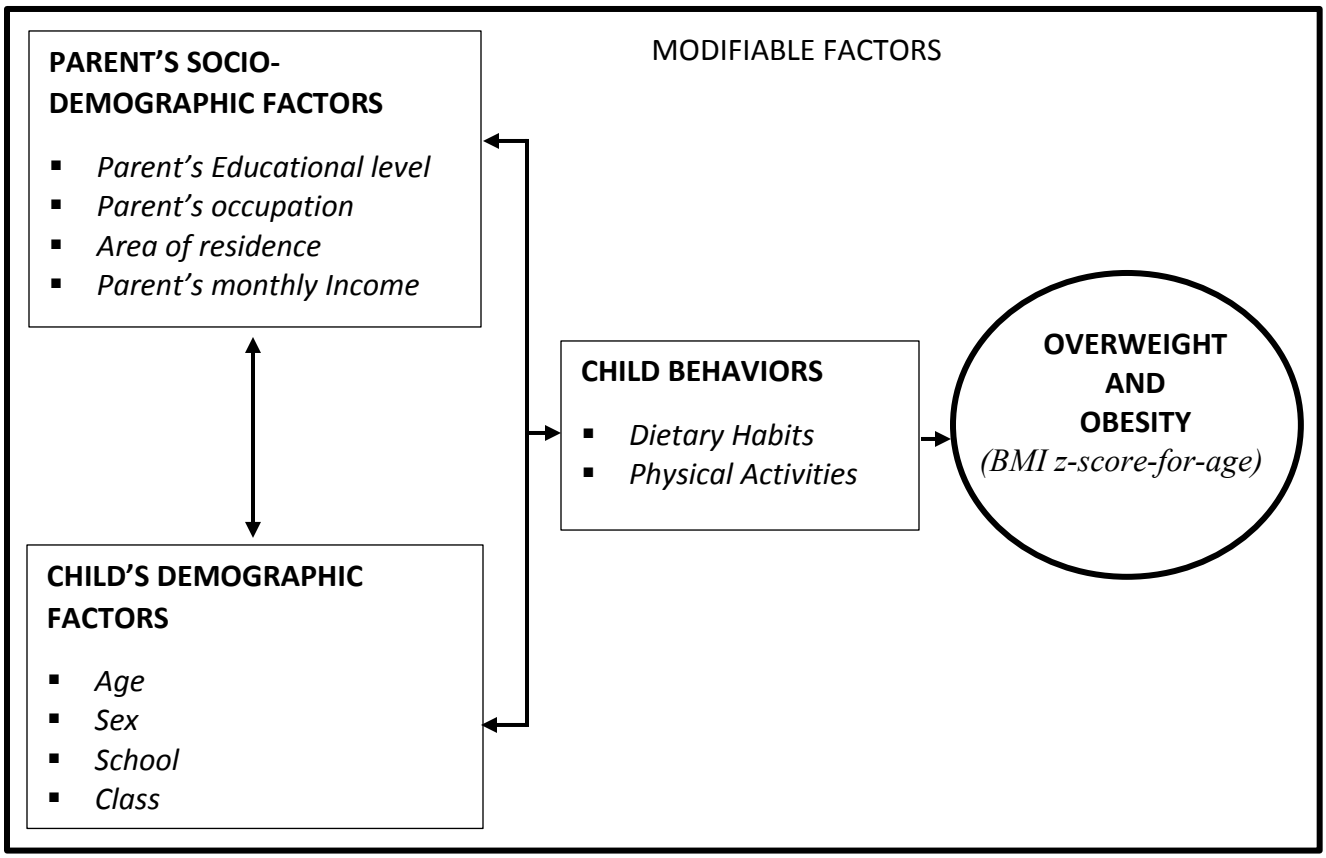
Evidence suggests that the risk of developing overweight and obesity in private and public schools in Ghana is high and complications of non-communicable disease in pre-schoolers are not comparable to that of adults. Preschool overweight and obesity increases the risks for developing socio-pathological conditions that increases socioeconomic burden on families and the nation.

There is the need to institute primordial and primary preventive strategies right from preschool which will focus on their dietary habits as well as physical activity levels and patterns. Preventive treatment is however very difficult to plan in Ghana as data available on pre-school overweight and obesity prevalence is insufficient. There is scarce data on pre-school overweight and obesity in Ghana with relatively small sample sizes. This research is herein purposed to investigate the prevalence of overweight and obesity in preschool children.

1.3. Justification

This study was relevant due to an observed increase in the prevalence of non-communicable disease which are propelled by overweight and obesity. The common understanding is that the risk of developing NCDs increases among adults who were overweight or obese as children. Due to the difficulty in treating childhood overweight and obesity and the permanent health damage associated with it, it has become needed to take measures to avoid the development of obesity at its onset rather than allowing it to develop and look for a lifelong treatment. The findings and recommendations of the study will inform policy makers at the national level to make pragmatic policies and inform the development and implementation of programmes to mitigate the insidious impact of obesity and overweight not only in the selected schools but the whole of Ghana. The study will therefore be highly relevant to policy makers and organizations such as the Ghana Education Service, Ministry of Health and its agencies, WHO and UNICEF. It will also stimulate further research.

Figure 1. Conceptual Framework on prevalence of pre-schoolers overweight and obesity



This conceptual framework attempts to explain the influence of various potential factors of pre-schoolers' overweight and obesity. The estimation of overweight and obesity is seen to be shaped directly and indirectly by parenting style and children behaviour, community and demographic characteristics of the parents.

The framework demonstrates how obesity can be influenced by the lifestyle changes that strongly hinges on socio-demographic factors and parenting style. The influence of dietary pattern on a child could be argued in two directions. Dietary pattern on one hand may be seen as an accumulation of consumption style of the parents who will in turn model this pattern to the child thereby leading to risk. On the other hand, pre-schooler's overweight and obesity may be linked to sedentary behaviour.

1.4. Research question

1. What are the dietary habits and patterns in pre-schoolers in the Legon community?
2. What is the prevalence of overweight and obesity in pre-schoolers at Legon?
3. Are there differences in overweight and obesity prevalence in private and public preschool children at Legon?
4. Are preferences in food choice contributing to overweight and obesity?

1.5. OBJECTIVES

1.5.1. Main Objective

To determine the prevalence of overweight and obesity in children aged 2-5 years at the University of Ghana Basic School and the Baby Nest School.

1.5.2. Specific objectives

1. To assess the prevalence of dietary habits of children at the two schools.
2. To assess the type and physical activity levels of the children.
3. To assess the snack and food preference in children aged 2-5 years at the two schools.

CHAPTER TWO

2.0. LITERATURE REVIEW

2.1. Background / Introduction

This literature review is intended to share a common understanding that the risk of developing non-communicable diseases is increasing among adults who were overweight or obese as children. Also within the child population there is an increase of NCDs as observed which is believed to be associated with overweight and obesity. The literatures seek to contribute to the risk concerns arising currently in low and middle income countries, more particularly in urban and peri-urban settings.

2.2. Definition and concept of overweight/obesity

A person is considered to be overweight and obese when their weight is examined to be higher than the medically required healthy weight for that given height of the person WHO (2017). In a laypersons understanding, to be overweight or obese is to be fat or "big" regardless of any measure or factor.

Barkhru (2006) states that "obesity may be described as a physical condition characterized by excessive deposition or storage of fats in adipose tissues". Such conditions are also understood to impair health as a result of fat accumulation. Adipose tissue in this understanding is a kind of body cell (tissue) that contains stored fat which serve as a source of energy – this functions as cushion and insulate for certain vital human organs. (Kopelman, Caterson, & Dietz, 2010; Rössner, 2002) believe that when excess adipose tissue in the body rises to a level that is considered hazardous to one's health then that individual could be referred to as being overweight or obese.

When a person's consumption of food exceeds their energy expenditure needed for "metabolism and physical activity, the body stores excess calories in the cells present in the adipose tissue" (NRCC on Diet and Health, 1989). When energy intake and output is not 'balanced well' by adopting healthy dietary lifestyle and regular physical activity, the body will build up fat that may lead to overweight and eventually obesity. However, a person will experience weight changes when the energy intake and output balance change.

Findings from Schlenker & Long (2011) suggests that there is a rapid increase in the amount of fat cells during the late transition years to early puberty years of children. Conversely positive energy balance increases the amount of fat cells in the body, even when growth ceases. Obese people are considered to have larger and more fat cells compared to healthy weight people. Schlenker et al., shares that "When food consumption exceeds energy expenditure, the fat cells expand in size. When the cells enlarge, they stimulate cell proliferation so that their numbers increase again. The timing of the onset of obesity is important as it determines the possibility of weight gain as well as the ease of losing the extra weight" (ibid).

2.3. Pre-school overweight and obesity

2.3.1. Prevalence rate

WHOs' data on Africa suggests that the number of pre-schoolers who are overweight have increased by nearly 50% since 2000 (WHO, 2017b). Over ten times more children and adolescents were obese (124 million) in the year 2016 compared to the year 1975 (11 million), according to findings by WHO (2017). There is strong evidence from WHO (2015) on the prevalence of childhood obesity worldwide. The number of overweight and obese children who are under 5 years old are estimated to rise to 70 million by 2025 from 42 million in 2013.

This evidence suggests about 67% prevalent increase (Perry et al., 2016). This finding demonstrates that "[uncontrolled] weight gain is [imminent], at least for children before the age of 4 – 5years". By 2010, studies showed that pre-school children's overweight and obesity in Asia was 4.9%, representing 18 million children. Estimated prevalence in Africa is expected to reach 12.7% by 2020 (Onis et al., 2010). A retrospective cohort study in Greece recorded an overall estimate of risk of overweight in 1 - 5 year-old children at 31.9% (Manios et al., 2007). Vietnamese urban study showed 20.5% overweight and 16.3% obesity in preschool children (Dieu, Dibley, Sibbritt, & Hanh, 2007).

Further studies in Canada have reported 15.2% overweight and 6.3% obese 2 - 5 year-olds (Olstad & Mccargar, 2009). In Italy, 2 – 6 year-olds recorded 16.6% overweight and 8% obesity in 2006 (Maffeis et al., 2006). The Australian national population study among 4 – 5 year-olds presented overweight and obesity prevalence accordingly 15% and 5% (Wake, Nicholson, Hardy, & Smith, 2007). Also, estimated overweight and obesity prevalence in Bahrain was 12.3% and 8.4% respectively in 2 – 5 year-olds (Ghada et al., 2009). The overall prevalence of overweight and obesity was 13.8% in children aged 2 -19 years (Júlíusson et al., 2010). Obesity status by 2006 in obese children 2 - 6 years was reported as 14.1% (Jiang et al., 2006). Further studies on pre-schoolers born in the Province of Newfoundland (1984) and Labrador (1997) Canada, estimated overweight and obesity as 25.1% and 36% respectively (Canning, Courage, Frizzell, & Seifert, 2007). The proportion of 2 - 5 year-old overweight and obese children in India (Amritsar city of Punjab), was 6.42% and 2% (Kaur, Sidhu, & Sidhu, 2010). Increasing trend of obesity was recorded in a National Health examination surveys in Thailand from 1997 to 2001, Obesity 5.8% to 7.9% (Aekplakorn, 2009). Finally, obesity prevalence has been recorded in East Mediterranean pre-schoolers; UEA, Iran, and Pakistani prevalence was 3% and 8.6% in Egypt (Africa, 2000).

The National Child Measurement Programme in Halton, England have revealed that, "By the time children reach reception year at school, 28.9% of males and 24.0% of females are overweight or obese. Their data indicate that similar proportions are overweight or obese earlier, at 40 months of age, with evidence of the development of overweight already discernible at 8 months". The NHANES III data showed the percentile of children around the age range of 2-3 and 4-5years, having their weight-for-stature above the 95th percentile to increase – for boys; from 2.1% to 5.0% and for girls; from 4.8% to 10.8%. Accordingly, a Jiaxing birth cohort also shown a steadily increase in the prevalence of pre-school overweight/obesity from 11.8% (boy: 14.8%; girl: 9%) between 2004 - 2005 to 18% (boy: 21.4%; girl: 15%) between 2012-2013 (Liu et al., 2017). Another study that was conducted in Mexico for pre-schoolers ranging from 24 – 60 months showed that the burden of overweight and obesity was 20% in all children (Fernald & Neufeld, 2007).

2.4. Overweight and obesity in Ghana

Data on overweight and obesity prevalence and intervention in Ghanaian pre-school children are scarce, nevertheless studies have been conducted in adolescent and adults in certain parts of the country. Abachinga (2001) reported 19.3% prevalence in his study of school aged children in the suburbs of Achimota and Legon. Watara et al. (2008) also indicated obesity prevalence of 4% among adolescents of the University of Ghana Staff Village School and University of Ghana Basic Schools. Mogre et al. (2013), in a study in the Northern region of Ghana estimated a combined prevalence of 8.5% overweight and obesity in school aged children.

A comparative study of overweight and obesity in public and private school pupils in the Asante Akim central municipality by (Opuni-Frimpong, 2015) revealed a combined prevalence of overweight and obesity of 26.7% in pupils between 9 and 15 years.

Another study by (Kumah, Akuffo, Abaka-Cann, Affram, & Osae, 2015) revealed that among students aged 10 -20 years in the Kumasi metropolis there was 12.20%, and 0.80% prevalence of overweight, and obesity, respectively. However, a study conducted among pupil in Sekondi-Takoradi metropolis by Amoh-Yeboah (2017) found a higher prevalence of overweight and obesity (44.5%) and (13.9%) in private and public schools respectively. These findings confirm the existence of obesity in Ghanaian school children and thus the need for intervention by stakeholders.

The Ghana Demographic and Health Surveys (GDHS) from 1993 to 2014 reported an increasing prevalence of obesity among Ghanaian women (15 - 49 years) from 3.4% to 15.3% (GSS, GDHS, 1989; GSS, GHS, & ICF International, 2015; GSS, NMIMR, ORC Macro, 2003; GSS, NMIMR, and ORC Macro, 2004). The WHO (2016) estimated that in 2008, around 7.5% of Ghanaians were obese with higher prevalence in women (10.9%) than men (4.1%). While the 2013 global burden of disease study have also reported overweight and obesity prevalence in Ghanaian adult (>20 years) males (overweight = 15.4%; obesity = 2.5%) and females (overweight = 29.1%, obesity = 9.8%), these estimates were based on data selected from only nine survey reports (Ng, Fleming, Robinson, Thomson, & Graetz, 2014).

Ofori-Asenso, Agyeman, Laar, & Boateng (2016) sampled a total population of 48,966 across all the ten (10) regions of Ghana in a systematic review and meta-analysis studies. Their analysis indicated that nearly 43% of Ghanaian adults were either overweight or obese. The study also estimated a national prevalence of overweight and obesity as 25.4% and 17.1% respectively. Prevalence of overweight (27.8% vs 21.8%) and obesity (21.9% vs 6.0%) was also significantly higher in women than men whilst about 45.6% of adult diabetes patients in Ghana were either overweight or obese (Ofori-Asenso et al., 2016).

Obesity is of significant importance, especially to developing countries such as Ghana, because of its association with morbidities such as diabetes, hypertension, hyperlipidemia, renal, liver diseases and certain cancers and the stress on public budget to meet the treatment cost of such diseases (Gupta et al., 2012). However, there is need to understand predisposing factors as overweight and obesity in adolescents and adults appears to have its origin in infancy.

2.5. Overweight and obesity in Sub-Saharan Africa

In South Africa sex difference in BMI is –22.9 kg/m^2 in men and 27.1 kg/m^2 in women. The estimated obesity in women was 42%. (Jamison et al., 2006) have reported that obesity in South African women is nearly twice the rate found in urban Tanzanian and Gambian women. Women over 35 years in urban Cameroon are affected with high overweight/obesity; 19.5% of the women have been categorized to suffer this problem (Kamadjeu et al., 2006) whilst the men have a prevalence of 25%. A national population based-survey in Libya revealed an overweight prevalence of 16.2% in a nutritional status for children under 5years (Adel et al., 2008)

2.6. Global knowledge on overweight/obesity

There is a clear indication on the tremendous prevalence of the disease burden on the global scale. In due part this is reflective of changes in urban-rural lifestyles and bio-physiological predisposition. This is however compounded by somewhat reduced physical activity levels in people. The International Obesity Task Force suggests that the risk of exposure to weight related health issues may be estimated to 1.7 billion people (IOTF, 2003). This projection takes into consideration the Asian population who have a BMI of 23 kg/m^2 and above. Their finding is further emphatic that over 2.5 million mortality cases are attributed to higher BMI yearly, to which the numbers are projected to double by 2030 (IOTF, 2003). Dating back to 1995, 18 million pre-schoolers have been classified as overweight.

There is equally an adult obesity of 200 million worldwide. Interestingly these figures in adults increased magnificently in the year 2000 to over 300 million (WHO, 2016). Currently the global alarming rate of overweight or obesity is not only related to industrialized countries but developing countries as well. The prevalence is lower in Asia than in Africa 4.9% in 2010, but the number of affected children - 18 million is higher in Asia (de Onis, Blössner, Borghi, Blossner, & Borghi, 2010).

It is noteworthy to state here that developing countries are still struggling with health issues of under nutrition as they are equally plagued with infectious diseases, neglected tropical diseases and over nutrition health challenges. Ghana is no different from the rest of the developing world in due reason that the country has to reconcile between this "triple burden" state that is complicating health interventions in the country. In determining the disease prevalence, the research data could be used to recommend or reinforce existing policies that will affect lives positively.

2.6.1. Prevalence in Europe and the West

Greece, Italy, New Zealand and Slovenia have obesity prevalence rates among children aged 5 – 17 years higher than United States of America. In 2014, boys were recorded to be 44% overweight and obese in comparison to 38% of girls in Greece. The case is slightly different in Italy in terms of proportion but not gender, boys: 36% and girls: 34%. New Zealand and Slovenia have all recorded childhood overweight and obesity prevalence rates above 32% (OECD, 2014). The United Kingdom, Finland and Germany have obesity rates more than 20% (Stamatakis, Wardle, & Cole, 2010). Findings in Canada suggest that there is no percentage difference across age groups who are overweight and obese. With the country using WHO cut of points, age range 5 – 17 years recorded a prevalence of 31.5%.

In the United States children between the ages of 2 – 19 years were estimated from 2011 – 2012 to be 16.9% obese while the population that was either overweight or obese was 31.8%. Similarly, a polish national representative data on school-aged children have estimated that obesity in 2 – 6 year olds have reached 21 – 22% in 2010 (Kułaga et al., 2016).

2.6.2. The prevalence in some Eastern Mediterranean and Middle Eastern countries

Kuwait, United Arab Emirates and Bahrain have recorded obesity prevalence ranging from 25 - 30% and above. According to the (IOTF, 2003), Northern Africa has a higher overweight and obesity prevalence in women (about half have BMI >25). Tunisia recorded: 50.9%, Morocco recorded: 51.3% overweight. For obesity rates with (BMI>30) in women, Tunisia recorded 23% whilst Morocco recorded 18%.

According to the IOTF these suggests a threefold rise across 20 years. A study conducted on 500 preschool children in Birjand, Iran concluded that prevalence was more in children 2 – 5 years than 7–18 year-old group in Birjand. Prevalence was estimated to be 10.6% (11.7% in females and 9.6% in males) and obesity 7.6% (6.3% in females and 9.6% in males) (Fatemeh, Toba, & Afsaneh, 2012).

2.7. Comorbidities of overweight and obesity - NCDs

WHO regards childhood overweight and obesity conditions as life-threatening and its burden is viewed as a serious public health concern. "…extra fat puts a strain on the heart, kidneys and liver as well as the large weight bearing joints such as the hips, knees and ankles, which ultimately shortens the life span" (Barkhru, 2006). Considering these health complications (González Jiménez, 2013) shares a notion on the pathophysiology effect of overweight and obesity.

It can be noted therein that pathophysiology component or some "metabolic syndrome" conditions are pre-existing in obese children who are six years as well as adolescents – a study by (Juonala et al., 2012).

A randomized-control trial that aimed at providing strategies towards a programme to prevent diabetes selected samples that were clinically tested to be at risk of developing diabetes. The individuals were randomized and engaged in moderate-to-vigorous physical activity of 150 minutes per-week. Their dietary habits was intensively regulated to encourage calorie control along with given metformin. The findings revealed that 50% of the intensive lifestyle intervention group lost 7% body weight and reduced their risk of developing diabetes over 3 years by nearly 60%, which surpassed the findings in the metformin group (Knowler et al., 2002). Children and adolescent who are known to spend lengthy time in sedentary behaviour are worse off in cognitive development, social and physical academic abilities (Hinkley et al. 2014, Okely et al. 2013). These prolonged states are largely linked with developing risk of overweight or obesity, and other non-communicable diseases.

In Ghana there is an increasing prevalence of chronic non-communicable diseases (NCD) and the battle to deal with infectious diseases. Hypertension is increasing rapidly because of the rapid population growth, increased life expectancy and lifestyle factors. The prevalence of NCDs such as obesity, hypertension, diabetes and heart diseases have been rising in Ghana (Agyemang et al., 2015; Dake et al., 2010; Dake et al., 2015). In 2013, NCDs contributed 22.2% of deaths at the Korle-Bu Teaching Hospital (Sanuade et al., 2014). The Ghana Ministry of Health (MOH) annual report indicated that hypertension was the second leading cause of outpatient morbidity in adults 45 years and above (MOH, dietary and physical activity guidelines for Ghana, 2010).

The MOH's National Policy for Prevention and Control of Chronic Non-Communicable Disease have given an unhealthy statistics that 48% of Ghanaian adults had hypertension and 9% had diabetes. The national policy plan further reported that outpatient cases of hypertension in public and mission facilities other than teaching hospitals increased from about 60,000 cases in 1990 to about 700,000 cases in 2010. It was further stated that hypertension ranked on the top five outpatient diseases for more than 15 years, accounting for 3.0% – 5.0% of all new outpatient disease across all ages. It was ranked as the third most common newly diagnosed outpatient diseases among adults. (MOH, 2012). Cardiovascular diseases (CVD) accounted for 8.9% of institutional death (excluding teaching hospitals) in 2003 compared to malaria 17.1% deaths. In 2008, CVD became the leading cause of reported intuitional death 14.5% compared to malaria 13.4% (GHS, 2009).

Most of the increasing prevalence of NCDs can be attributed to inequalities in the diagnosis and treatment of NCDs compared to infectious diseases. More so, there is evidence to suggest that there are inequalities in the allocation of health resources for the management of NCDs in Ghana. A Study by Kushitor & Boatemaa (2018) reported that a higher proportion of health facilities provided malaria diagnosis and treatment services compared to hypertension and diabetes care. Thus diabetes treatment was the least provided for amongst the health facilities across the country. In terms of treatment, 78% and 87% of health facilities had two of the recommended malaria drugs while less than 35% had essential diabetes and hypertension drugs (Kushitor & Boatemaa, 2018).

A cross-sectional survey was conducted on acute non-communicable diseases in Children by Abuosi et al., (2016). In the three out of the ten regions of Ghana, interview responses from caregivers of the children with NCDs indicated that the incidence of NCDs among children is on the increase.

The caregivers also indicated that NCDs have a negative effect on the physical and mental development of the children as well as their school performance and, caring for children with NCDs also poses material, emotional and financial burden to them (Abuosi et al., 2016 p 290 – 291).

Until recently (2011- 2012) there was no conscious policy directed towards the prevention, control and management of NCDs in Ghana. Amoah et al., (2002) indicated that prior to 2005 the health care policy in Ghana placed very little emphasis on the control and prevention of diabetes, mainly because of the dogma that such diseases are rare among Ghanaians. Neither did the child health policy and strategy (2017 – 2025) highlighted any peculiar interest to NCDs (CHPS, 2017). Meanwhile, the high cost of treatment of NCDs makes them a threat to the lives of those who suffer from NCDs as the average Ghanaian may not be able to pay the medical cost for treatment. The absence of coverage of NCDs under the Ghana national health insurance scheme also compounds the problems associated with their treatment. Even where health insurance schemes are available, treatment of some aspects of or all NCDs are excluded under the scheme.

Abuosi et al., reported that over 30 % of caregivers spend more than Gh¢50 ($25) as cost of treatment for hospitalized NCD children and, over 40 % of caregivers face financial difficulties in providing health care to their children. Their study reported that even though many children hospitalized with NCDs had been covered by the NHIS, and that the NHIS indeed, provides significant financial relief to parents in the care of children with NCDs, children who are insured still pay out-of-pocket for health care, in spite of their insurance status (Abuosi et al., 2015).

This apathy on the part of national policy makers on NCDs and childhood overweight and obesity among many others has necessitated this study for early detection and intervention of pre-school children.

2.8. Component of overweight and obesity development

Overweight and obesity is a multi-factorial condition, this then makes the subject area a complex one when considering the causes. A few associations identified to this condition are genetics, child eating behaviours, demographic and environmental factors, parenting style, dietary habits, cultural and educational factors. A few of these factors are unmodifiable – maternal obesity, gestational weight gain/diabetes and genetics. Whilst the modifiable factors are amongst the majority that are associated to strongly influence overweight and obesity. Physical activity levels that seem to have a major impact in balancing the energy consumption in the body (EUFIC, 2006; WHO, 2000) when not balanced well by adopting healthy dietary habits and regular physical activity could build up fat that may lead to obesity. This is so because consumption is imbalanced for growth utilization. However, a person will experience weight changes when the energy intake and output balance changes (CDC, 2009).

2.8.1. Sedentary lifestyle

There is evidence that suggests that sedentary lifestyles and obesity coexist. Sedentary lifestyle and other related factors are associated with comorbid conditions. The risk of raised sugar levels and hypertension are linked with obesity prevalence. In the same vein, it is known that weight loss and physical activity levels directly and indirectly alleviate the risk of comorbid conditions.

2.8.2. Nutrition transition - Malnutrition

Malnutrition could be looked at as a condition that result in insufficient, excessive or an imbalanced intake of dietary energy and nutrients. These conditions manifest as; under nutrition, over nutrition and micronutrients malnutrition (Smith & Haddad, 1999; Arthur & Stevens, 2003).

According to UNICEF, WHO & World Bank's (2016) joint child malnutrition estimates, about 32% of children in Africa was stunted (too short for their age) whilst another 8% was found to be wasted (too thin for their height). Malnutrition at the early stages of life does not only affect health outcomes of the child, but it also has a serious adverse impact on the determinants of their livelihoods, such as physical and intellectual growth, poor school performance and eventual future earnings and productivity (Hoddinott et al., 2008; Strauss & Thomas,1998).

A study by Appoh & Krekling (2005) have demonstrated a strong association between maternal nutritional knowledge and socio-economic status as a major influence of nutritional status of children. Malnutrition among children under five in Ghana is a major concern. Malnourished children tend to have increased risk of NCD morbidity and mortality. According to the last Multiple Indicator Cluster Survey (MICS4) by the Ghana Statistical Service (GSS), 13% of children in Ghana were moderately or severely underweight, 23% were stunted and 6% were wasted (GSS, 2011).

A study by Frempong & Annim revealed that child wasting and overweight rose between 2003 and 2008. Both indicators increased by 1 percent between 2003 and 2008 (Frempong et al., 2017).

Miah (2014) has revealed that some of the risk factors for malnutrition in children under five years in Ghana was diet intake and diseases, parity, size of child at birth and many others.

Consequently, Takyi (1999) conducted a study on the nutritional status and nutrient intake of pre-school children in northern Ghana in order to determine whether the nutrient intake among the pre-school children in Saboba, has met the acceptable standards.

The study results confirmed that the nutritional status of children within the Saboba community was generally poor, with 27% stunted, 4.4% wasted and 1.9% underweight. Although statistical reports show that children nutritional status in Ghana (stunting and underweight) has reduced since 2003 (UNICEF, 2013), the country is burden with increasing NCDs.

Hasnain & Hashmi (2009) have pointed out that adequate nutrition is necessary for appropriate growth and physical development from conception to adulthood. They further emphasized that this is essential to enhance optimal working competence, standard reproductive performance and sufficiency of immune mechanism which present resistance to infections. literature suggest that deficiency in the adequate nutrition required at the early life for optimum growth and development may lead to malnutrition in infant,s and pre-school children are most vulnerable (Hasnain et al., 2009; Darteh et al., 2014; Gulati, 2010). This however is seen to be posing an emerging challenge of over nutrition across all demographic groups in Ghana and particularly pre-school children.

Reports in the Ghana National Nutrition Policy has shown that in 2008 GDHS estimated that 30% of Ghanaian women were either overweight or obese and greater rates (45%) of overweight have been observed in urban communities (GNNP, 2013).

Increased availability and access to low-cost and often imported energy-dense, nutrient-deficient foods partly explain this growing challenge. The increasing overweight prevalence is paralleled by increasing risk of nutrition-related non-communicable diseases including cardiovascular disease, diabetes mellitus, cancers, and hypertensive diseases.

In 1993, Popkin Barry proposed a 'nutrition transition' framework that seems to emphasize the changes in dietary habits of developing countries that is accompanied by biopsychosocial forces – in this context obesogenic environment and behaviours. These obesogenic environment that seems to be promoting changes in dietary lifestyles has been rightly observed by studies of (Jalkanen et al., 2017; Elmadfa et al., 2009; Hoppu et al., 2010; Lambert et al., 2004). These studies suggests that "[pre-school] children in the developing countries commonly consume much food containing lots of saturated fat, and salt, such as sugar-sweetened beverages, candies, and meat, and too little foods high in vitamins, minerals, fibre, and other nutrients that are essential for growth, development, and health, such as vegetables, fruit, high-fibre grain products, and fish". The above is suggestive of how dietary habits and nutrition intake is heavily influenced by parents dietary lifestyles, food advertisement and the relationship that it has on pre-school children's food preference and consumption and, how that becomes a potential risk for overweight and obesity.

Whilst considering the singularity of risk factors related to malnutrition, it is appropriate to appreciate the compounding modalities that pose as potential risk factors thus "[Pre-school] obesity can also be brought on by a range of factors which often act in combination (Ebbeling, Pawlak, & Ludwig, 2002)". Some of these range of combination include lifestyles such as screen time, less physical activity, shorter sleep duration, snacking, unhealthy dietary habit" (Zhang, Wu, Zhou, Lu, & Mao, 2016); Obesogenic environment (Corsica & Hood, 2011); food marketing (Robinson et al,2007).

2.9. Measurement of overweight/obesity

Depending on the age, different methods can be considered to measure the composition of the body and its adipose fat distribution to determine overweight and obesity. Direct measure of anthropometric characteristics such as weight, height, MUAC, waist circumference are amongst a

few measurement methods. Some instrument include: stadiometer, weighing scale (SECA), clippers, MUAC, computerized tomography (CT) (World Obesity, Ojwang, 2005). Methods such as underwater weighing have also been tested on body adiposity (Reinehr & Wabitsch, 2011).

The discourse revolving around using BMI has been critiqued in literature partly due to the fact that it "is a measure of weight adjusted for height, and although it is often considered an indicator of body fatness, it is a surrogate measure of body fat because it measures excess weight rather than excess fat" (CDC, 2009). Many of the studies (De Schutter, Lavie, Arce, Menendez, & Milani, 2013; Flegal, Carroll, Kit, & Ogden, 2012) accentuate the inability of the BMI. This is argued out because they posit that the BMI scale does not differentiate between lean and adipose tissue leading to inaccurate results due to total body weight concentration. Martorell (2002) argued that, athletes could be wrongly classified as being overweight or obese due to their built muscles. He again noted that populations with predominantly "high sitting height to stature proportions" due to early childhood stunted growth develop faster extremities to their trunk as a result. Thus BMI scale measurement that ignores or overestimate such malnutrition characteristics in people for the first two years of their lives risk accuracy of data.

Nevertheless, (Reilly et al, 2003; Lobstein & Dibb, 2005)) argued that although "BMI is largely associated with relative fatness in children, it is the most convenient way to measure adiposity in children". The Department of Health in England have equally recommended the use of BMI z-score as convenient means to analyse weight status of children (National Obesity Observatory, 2009). The observatory believes that BMI z-score is a good indicator of fat levels in the body. Ogden et al. (2014) explained that a cut off value is arrived at from an angle of statistics rather than its relationship with health risk or degree of fatness making it a screening tool rather than a diagnostic one. Several countries have developed their own cut off points based on certain criteria.

The British 1990 growth reference is normally used in population studies in the UK (NOO, 2011) while in United States the 2000 growth reference – for the Centre for Disease Control and Prevention (CDC) is used according to (Kuczmarski et al., 2002). There are some international cut offs reference, notable are The International Obesity Task Force (IOTF) who have growth cut-offs developed from nationally representative cross sectional surveys in 6 countries. The WHO also has a growth reference data (2007) for ages ranging from 5 -19 years that was developed from some developed and developing country characteristic – this includes Ghana. (Dinsdale H, Ridler C, 2011) thus suggests that prevalence rates should be compared in cases where similar cut offs were used.

CHAPTER THREE

3.0. METHODS

3.0. Introduction

This chapter describes the study design, study area, study population, sample size, sample procedure, inclusion and exclusion criteria, data collection technique and process, data analysis, ethical considerations, confidentiality and consent approval.

3.1. Study design

This was a quantitative cross-sectional study. The approach used was descriptive and analytic.

3.2. Study Area

La-Nkwantantanang Madina Municipal Assembly (LANMMA) is one of the newly created administrative districts in the sixteen (16) Metropolitan/Municipal/District Assemblies in the Greater Accra Region. The Municipal have three (3) Administrative sub-districts namely; Madina, Danfa and Pantang. There are twenty-three (23) communities comprising of mixed settlements of urban, peri-urban and rural areas with the capital being Madina. The Legon community is under this municipality.

The population according to Ghana Population and Housing Census 2010, is 111,926 representing 2.8 percent of the Greater Accra Region's total population. Females constitute 51.5 percent. About 84.0 percent of the population in the Municipality reside in urban localities. The total urban population is 93,987 and the rural is 17,939. A total of 9,790 make up the children under 4 years in the urban area and a total of 2,211 make up the children under 4 years in the rural areas. Children between the ages 5-9 constitute an urban population of 8,032 and 1,802 constitute the age range population in the rural areas.

Legon is home to the main campus of the University of Ghana. It has a student population of over 38,000 (UG fact & figures report 2016). The University has its own public elementary school known as the University Basic School. The basic school has a total population of 1,581. The Legon community is also the home to Baby Nest preschool (private). This school has a total population of 210 pre-schoolers.

3.3. Study Population

The study population was all the children between the ages of 2 - 5 years at the University of Ghana Basic School and Baby Nest School. The formal age range for children in preschool in Ghana according to Ghana Education Service is 2 to 5 years. Before 2 years the study children will be toddlers and after 5 years they will be primary school pupil thus the age rage 2-5 was sampled.

The Legon-Madina community is an urban and cosmopolitan settlement. Therefore, children recruited for the study came from diverse ethnic backgrounds. The study respondents were largely from middle class homes. Parents of the recruited children have had tertiary education and are formally employed.

3.3.1 Sample Size

Yamane (1967) simplified formula to calculate sample sizes for finite population correction for proportions was used to draw a sample size of - Two hundred and One (201) pre-schoolers. A 95% confidence level and P = 0.5 was used;

Sample formula: $n = \frac{N}{1 + N(e)^2}$

n = sample size

N = population size

e = level of precision (or margin of error) is **(0.05)**

Where public school total population = 167 and private school total population = 165,

N = 332,

$$n = \frac{332}{1 + 332(0.05)^2}$$

n = 181.42

Therein

Approximated to 182

Adjusting for 10% non-response rate,

n = 1.1 * 182

= **200.2**

Approximated to 201

Total sample size = 201

Thus sample allocation for Public and Private School based on the population proportion =

- University of Ghana Basic School sample size allocation

= 167 / 332 * 201

= 101.105 approximated to 101

- Baby Nest School sample size allocation

= 165 / 332 * 201

= 99.894 approximated to 100

3.3.2 Sampling Procedure

The two schools – University of Ghana Basic School and Baby Nest School was selected from the University of Ghana campus. The two schools were categorized into public and private owned from the educational heads.

A sample frame was developed using a random sample of Two hundred and One (201) children who were at exact age 2, 3, 4, and 5 years at last birthday. The Two hundred and One children were generated out of the total population of Three Hundred Thirty Two (332) children using Stata statistical package version 15.0 StataCorp LLC. The command "sample n, count" was entered. This command randomly generated the number of children to be selected from a class list.

Random sampling - A Hundred and One (101) children at the University of Ghana Basic School was selected out of a total number of One hundred, Sixty-Seven pre-school children (167) to participate in the study. One hundred (100) children at Baby Nest School Legon was selected out of a total number of One Hundred, Sixty Five (165) to participate in the study

3.4. Inclusion and Exclusion Criteria

3.4.1. Inclusion criteria

- Children 2 -5 years old at last birthday
- Child/children whose parent/guardian permits their child to participate in the study.

3.4.2. Exclusion criteria

- Any child taken to be ill.

- Child/children whose parents/guardian decline the informed consent form.

- Any child absent from school

3.5. Data collection techniques and processing

Four data collection instruments was used to collect the research data.

3.5.1. Structured questionnaire

Interviews on Food frequency (FFQ), physical activity level and child's eating behaviour was gathered using a forty (40) item questionnaire. Eight (8) - item food frequency questionnaire (FFQ); eighteen (18) – item child eating behaviour and fourteen (14) - item physical activity levels questionnaire **(Appendix IV).**

A combination of self and interviewer administered questionnaires was used to collect data on the caregiver's socioeconomic and socio-demographic background. Child's dietary habits, physical activity levels and anthropometric measurements was also taken. The questionnaire adapted the physical activity levels and child eating behaviour section used in studies in Europe (Carnell & Wardle, 2007; Wardle et al., 2001) - Child Eating Behaviour Questionnaire (CEBQ) and the Global Physical Activity Questionnaire (G-PAQ) from the WHO. The modification or adaptation was done to suit the Ghanaian setting. Validation and further modification was made on the questionnaire during the pre-test process.

3.6.1. Dietary Habits

Information about the food and snack consumption of the children and their caregivers – putting into consideration the place and location of consumption (home, outside the home other than school and school) as well as the meal time of consumption – breakfast, lunch, in between lunch and dinner, and dinner. Data on 24-hour recall on food, drink, snack and vegetable consumption of the previous day was also collected. **(Appendix IV).**

3.6.2. The physical activity for pre-schoolers

Data was collected on the physical activity type at home, the frequency and duration of activity in a typical week. The Global Physical Activity Questionnaire was adapted - instrument developed by WHO for physical activity surveillance in countries (particularly for low-middle-high income countries). GPAQ by WHO was used to assess sample physical activity (PA) levels like: 30-minute moderate (PA) a day and at least 60 minutes vigorous (PA) a day. According to (Armstrong and Bull, 2006), the instrument (GPAQ) have been tried and tested to authenticate its reliability, validity and adaptability in nine different cultural settings globally. **(Appendix IV).**

Figure 2. Interview Plan

Interviewee	**Place**	**Possible Process**
Caregiver / Parent *(Food Frequency questionnaire and physical activity level)*	- School premise - Home	Self or interviewer administered questionnaire at - School premise or - Taken-home or - Over a phone interview
Kitchen Matron or Cook *(24 hour recall and Food frequency questionnaire)*	School premise	Interviewer administered questionnaire at school premise

3.6.3. Anthropometric measurements

Height and weight was measured using the standardized protocols of WHO (2007). The anthropometric protocols was taken by a professional public health nurse. The measurements was taken under the observation of the researcher and teachers at the school. **(Appendix IV).**

All anthropometric measurement was taken in an allocated classroom at the school premise. This classroom hosted the public health nurse, investigator, the four research assistants and a coordinating teacher to organize the children. A free period from the school's teaching schedule was allotted during the research time to carry out the anthropometry.

Height

The use of anthropometric measurement for height (cm) was measured with a stadiometer – to the nearest 0.5cm. The process had the children stand upright (with a relaxed shoulder) against the wall and had any form of heavy clothing removed, i.e. shoes. The children were assisted to keep their chin on a 90-degree level plane and, to keep their arms besides their body.

Weight

An electronic weight scale measuring to the nearest 100 grams (0.1kg) and, calibrating to zero was used to check the weight. Any form of heavy clothing and shoes was removed as the children were directed and assisted to stand still on the scale, keeping their feet position slightly apart and their chin kept at a 90 degrees angle. Weight and height were taken twice.

3.7. Training of Research Assistants

A two-day training session was organized for four research assistants, in collaboration with a dietician and a public health nurse who knew how to use anthropometric instruments. The training was purposed at equipping the research assistants with the pre-requisite skills needed to perform the data collection. Topics discussed were;

- Study objectives
- Ethical issues
- Knowledge and application on the use of anthropometric instruments.

- Interpretative, coding and analysis of the physical activity and dietary assessment questionnaire.

3.8. Data Quality Control

A pre-test of the instruments for the data collection was carried out at Achimota Primary School and Brainy Brain School, West Legon, using a total of ten pre-schoolers from the public and private school. The research questionnaire was administered to parents or guardians of the pre-schoolers who were 2 – 5 years to allow for modification in order to clear any actual ambiguity and reliability response.

3.9. Privacy and Confidentiality

- The questionnaire did not bear the name of the participant but rather the participant's data was coded (number and letter codes).

3.10. Data Security and Storage

- Participant soft copy files or data was saved on a hard drive and encrypted.
- Printed copies of data was secured in a lock cabinet in a locked room.

3.11. Actual Data Collection

The process began with an initial contact to prospective school heads. Through the school heads, contact was made with the children's parents, class teachers, cook and finally the children. School heads and parents were given sufficient time to make a decision to become part of the study. This was done in order to prevent coercion or influence the participants.

Data collection was carried out in the selected schools, University of Ghana Basic School and Baby Nest School from 1st June to 6th July, 2018. Interviewer administered questionnaires was carried out at the school premise. Anthropometry measurement was taken at the school premise. **(Appendix II).**

3.12. Study variables

3.12.1. Dependent Variables

The main outcome variable for this study was BMI z-score-for-age (proxies: weight and height).

3.12.2. Operational definition and level of measurement

Variables	Type of variable	Description	Scale of measurement	Measurement
BMI z-score (weight and height)	Dependent	weight for age, weight for height of the respondent	Continuous	Weight in Kg
	Dependent	respondent height-for-age,	Continuous	Height in centimetres
Age	Independent	respondent age at last birthday	Continuous	Number of years
Sex	Independent	sex of respondent	Categorical	❖ Male ❖ Female
School Type	Independent	respondent school type attended	Categorical	❖ Public ❖ Private
Marital status	Independent	parent's marital status	Categorical	❖ Never married ❖ Currently married ❖ Cohabitating ❖ Divorced ❖ Widowed
Level of Education	Independent	Parent's highest level of education	Categorical	❖ None ❖ Less than Junior High ❖ Junior High ❖ Senior High ❖ National vocational training institute (NVTI)/Apprenticeship ❖ University/Tertiary
Occupation	Independent	Parents type of work done	Categorical	❖ Self employed ❖ Formal employment ❖ Unemployed

Variables	Type of variable	Description	Scale of measurement	Measurement
Area of residence	Independent	type of residential area	Categorical	❖ Rural ❖ Urban ❖ Peri-Urban
Monthly income	Independent	Average monthly income	Categorical	❖ ≤ Gh₵500 ❖ Gh₵500 - Gh₵1,000 ❖ Gh₵1,000 - Gh₵1,500 ❖ ≥ Gh₵1,500
Child eating behaviour	Independent	respondent's enjoyment of food; food responsiveness; emotional overeating and, desire to drink	Categorical	❖ Never ❖ Rarely ❖ Sometimes ❖ Often ❖ Always
Physical activity	Independent	physical/sporting activities done by children 7 days prior to the study, frequency and duration	Categorical	❖ Below moderate physical activity ❖ Moderate physical activity ❖ Vigorous physical activity
FFQ	Independent	respondent food choices, frequency of snack and consumption	Categorical	❖ Low Consumers ❖ Moderate Consumers ❖ Higher Consumers

3.13. Data Processing and Analysis

3.13.1 Data Processing

The data set was entered into excel spreadsheet and then transferred and analysed using Stata statistical package version 15.0 StataCorp LLC.

3.13.2. Data Analysis

Socio-demographic characteristics of care givers and children was presented as descriptive statistics. Categorical variables such as child eating behaviour, snack preference and physical activity was described as frequencies and percentages whilst continuous variables such as weight and height was expressed as means standard deviations.

Bivariate analysis was done to look at whether a relationship exists between the outcome variable (continuous) and the categorical independent variables using fisher exact test.

Due to the continuous nature of the outcome variable BMI-z-score-for age (weight and height), multiple logistic regression model was used to determine the effect of the predictive variables on the prevalence of overweight and obesity among the children.

The multiple logistic regression measured the strength (of association) of dietary habits and physical activity levels to the risk of developing overweight and obesity while adjusting for socio-demographic and socioeconomic status. Statistically significant p-values; $p<0.001$ and $p< 0.05$ was noted in the final logistic regression module.

Anthropometric Analysis

Anthropometric measurement – weight (kg) and height (cm) was analysed using the WHO Child Growth Chart cut-off point (using BMI for age and sex z-scores. BMI of each child was calculated as - weight in kilograms divided by height in meters squared (mean ± SD). BMI z-score was defined as;

Normal weight ($-3SD < BMI\ z\text{-}score \leq 2SD$) for age and sex

Overweight ($2SD < BMI\ z\text{-}score \leq 3SD$) for age and sex

Obesity ($> 3SD$) for age and sex

Food Frequency Questionnaire (FFQ)

The FFQ was analysed based on the number of times in a week that certain snacks and vegetables was taken. Frequencies and percentages was used to present food intake in the order of the least preferred to the most preferred.

Child Eating Behaviour Questionnaire (CEBQ)

Logistic regression was used to assess the child eating behaviour. CEBQ assessed four different features of eating behaviour - enjoyment of food, food responsiveness, emotional overeating and, desire to drink along with four corresponding subscales. Each subscale consisted of statements that had response options given as a five-point Likert scale (never = 1, rarely = 2, sometimes = 3, often = 4, and always = 5). The mean ± SD of each subscale was provided in the analysis. Prevalence was recorded to be significant if the mean value was greater in any of the feature of the child's eating behaviour.

Physical Activity

The physical activity levels was analysed using the recommended WHO categorization. The mean of the selected response was used to fit into the classification index – below moderate physical activity – less than 30 minutes/ per day; moderate physical activity – 30 minutes/ per day and vigorous physical activity – 60 minutes/ per day.

3.14. Ethical Consideration

Privacy and Confidentiality

- The questionnaire did not bear the name of the participant. The participant's data was coded (number and letter codes).
- Printed copies of data was secured in a lock cabinet in a locked room.

Consent

An informed written letter of consent was given to the caregivers of the children (2 – 5 years) to request for their participation in the survey. Caregivers were informed of the voluntariness and freedom to withdraw at any time from the research. Caregivers were informed of their right to answer a question or not.

Description of Consenting Process

- This process begin with initial contact to prospective school heads and continued throughout the course of the study. Through the school heads, contact was made with the children's parents, class teachers, cook and finally the children.
- School heads and parents were given sufficient time to consider whether or not to participate in the study thus to minimize the possibility of coercion or undue influence.
- Presentation or communication on the research content was conveyed in a clear and sequential dialogue – using an understandable language of expression. This was achieved by continuous explanation and answering of questions as they came up.
- School heads and teachers were given as much time to prepare the children.
- The Principal Investigator was responsible for the informed consent signatory and documentation. This was done in the presence of the school heads and parents.
- Finally, School heads and parents were informed of changes or new development in the research as a process of ongoing consent.

Ethical approval was granted for this stud by the Ghana Health Service review committee (**reference number GHS-ERC: 039/01/18**) **- Appendix I** participant information sheet explaining the study objectives, procedures, potential risk and benefit, privacy and confidentiality and the voluntary and withdrawal nature of study.

CHAPTER FOUR

RESULTS

4.0. Sample Description

A total of 201 children between the ages of 2 – 5 years was used in this study. The girls represented 55.2% and the boys represented (44.8%).

4.1 Descriptive Table

Table 4.1.1 Socio-demographic characteristics of children

Variables	Baby Nest school n (%)	UG Basic school n (%)	Total n (%)
Sex			
Male	46 (46.5)	44 (43.1)	90 (44.8)
Female	53 (53.5)	58 (56.9)	111 (55.2)
Class			
Nursery 1	41 (41.4)	0 (0.0)	41 (20.4)
Nursery 2	33 (33.3)	89 (87.3)	122 (60.7)
KG 1	25 (25.3)	13 (12.8)	38 (18.9)

From the study, girls were the majority. This could be due to issues bothering on education inequality and the advocacy to promote girl child education as well as women empowerment over the years. Additionally, biological sex ratio could be a factor. This could lead to school heads giving more opportunity to girls over boys. Children in Nursery two were in the majority 60.7% compared to the other classes.

As shown in Table 4.1.2 below, the majority of children's care givers were married 88.6% (178/201), 88.1% had tertiary education. Majority of care givers were employed 99.0% (199/201) but there was no major difference between parents who had formal employment and self-employed in the respective schools. Most caregivers and children reside in urban areas 87.1%.

Table 4.1.2 Socio-demographic characteristics of care givers

Variables	Baby Nest school n (%)	UG Basic school n (%)	Total n (%)
Care giver's Marital Status			
Never Married	4 (4.0)	8 (7.8)	12 (5.9)
Divorced	0 (0.0)	9 (8.8)	9 (4.4)
Married	94 (95.0)	84 (82.4)	178 (88.6)
Widowed	1 (1.0)	1 (1.0)	2 (1.0)
Care giver's Educational Level			
None	1 (1.0)	0 (0.0)	1 (0.5)
Primary	1 (1.0)	1 (1.0)	2 (1.0)
Junior High	0 (0.0)	1 (1.0)	1 (0.5)
Senior High	6 (6.1)	14 (13.7)	20 (9.9)
Tertiary	91 (91.9)	86 (84.3)	177 (88.1)
Care giver's Occupation			
Formal Employment	70 (70.7)	71 (69.6)	141 (70.1)
Self-Employed	28 (28.3)	30 (29.4)	58 (28.9)
Unemployed	1 (1.0)	1 (1.0)	2 (1.0)
Residence			
Peri-Urban	14 (14.1)	12 (11.8)	26 (12.9)
Urban	85 (85.9)	90 (88.2)	175 (87.1)
Monthly Income			
Less Than 500	3 (3.0)	7 (6.9)	10 (5.0)
Between 500 And 1000	16 (16.2)	31 (30.4)	47 (23.4)
Above 1000	80 (80.8)	64 (62.7)	144 (71.6)

4.2. Univariate Analysis

4.2.1. Prevalence of Overweight and Obesity

Table 4.2.1. Overweight and obesity in children at schools

BMI - for - age z-scores	Baby Nest school n (%)	UG Basic School n (%)
Normal weight (BMI ≤ 2SD)	(85.9)	(94.1)
Overweight (+2SD < BMI z-score ≤ +3SD)	(3.0)	(0)
Obese (BMI ≥ + 3SD)	(11.1)	(5.9)

In both schools, majority of children had normal weight. The prevalence of overweight was 3% and 11% respectively. None of the children was overweight at the University of Ghana School however, the prevalence of obesity was found to be 6%. The overall prevalence of overweight in both schools was 1.5%, obesity 8.4% and normal weight 90.1%. This report showed a significant higher overweight and obese status in preschool children at the private school than the public school.

Table 4.2.2. Child anthropometry and BMI-z-score-for-age and sex

Variables	Baby Nest school n (%)	UG Basic school n (%)	Total n (%)
Child age (Mean ± SD) in years	2.9 ± 1.0	4.8 ± 0.4	3.9 ± 1.2
Weight (Mean ± SD) in kg	16.9 ± 3.9	19.4 ± 3.8	18.2 ± 4.1
Height (Mean ± SD) in cm	100.2 ± 9.4	114.5 ± 4.9	107.5 ± 15.7
BMI (Mean ± SD) in kg/m^2	16.7 ± 2.1	14.8 ± 2.2	15.7 ± 2.3

The overall mean age was (3.9 ± 1.2 years) with children in University of Ghana being older. Pre-schoolers at the University of Ghana were older, heavier and taller than children at Baby Nest. An independent sample t-test revealed that the younger cohort of children at the private school had significantly higher BMI (16.7 ± 2.1) than children in the public school ($t = 6.59$, $df = 199$, $p < 0.002$).

This is significant in due reason that the children's weight examined is higher than the medically required healthy weight for their given height and could be precursor to risk of developing overweight and obesity and subsequently NCDs.

4.3. Child's Physical Activity

Slightly over 38% children engaged in moderate physical activity (digging in sand, sea-saw, jumping and, or kicking or throwing a ball) for at least thirty (30) minutes, a minimum of one to two times a week. Nearly 40% of children engaged in vigorous physical activity (running, cycling, aerobics, skipping, football, swimming, bouncy castle and, or rough & tumble play) for at least sixty (60) minutes, a minimum one to two times a week.

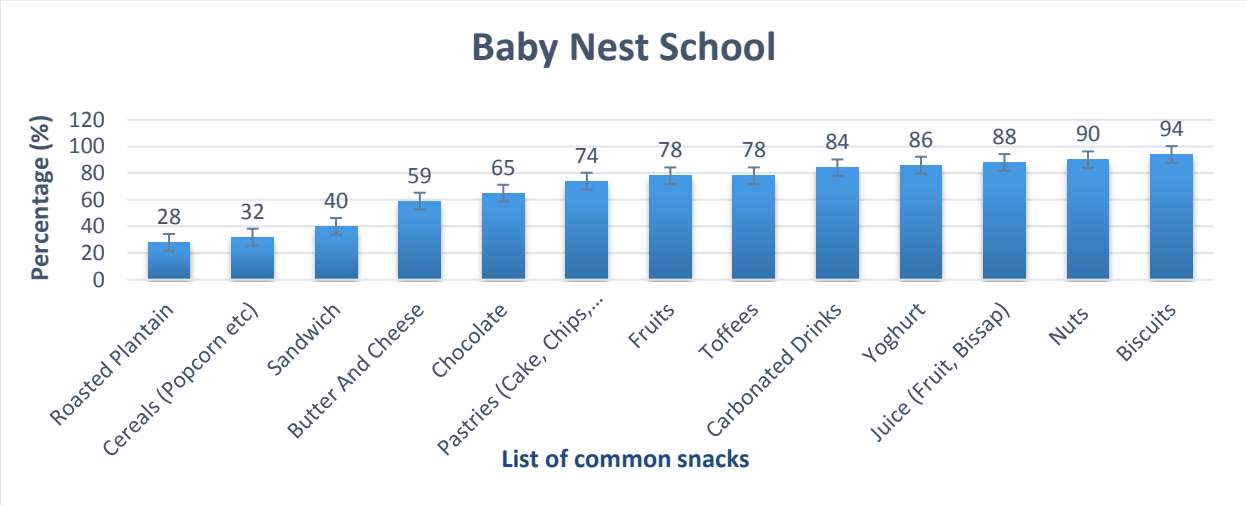
Table 4.3.1. Child's Physical Activity

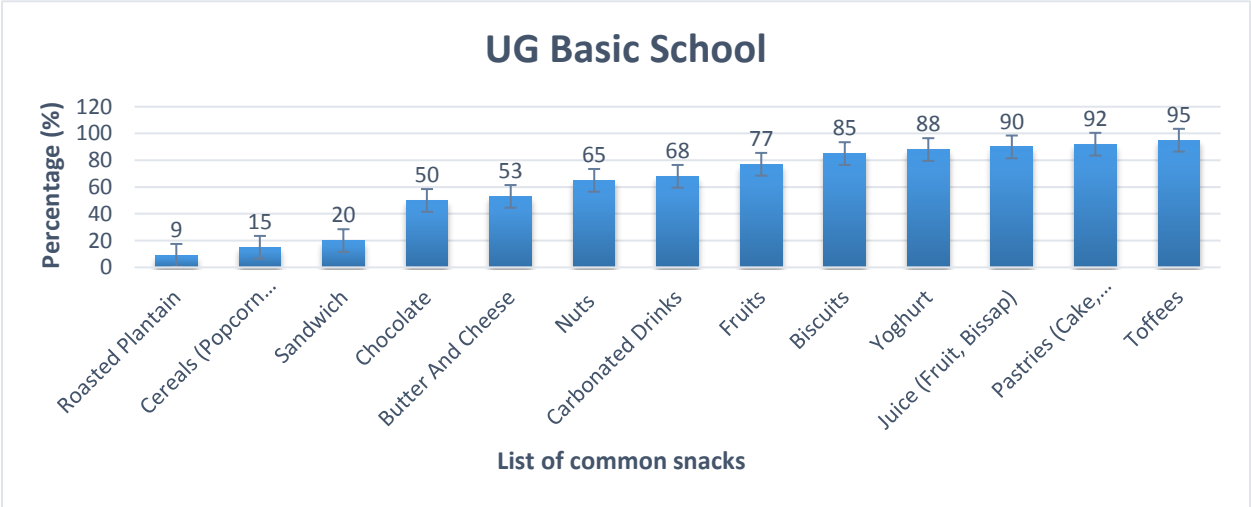
Variables	Baby Nest School n (%)	UG Basic School n (%)	Total n (%)
Moderate physical activity for at least 30 minutes/ per day			
Not at all	4 (4.0)	11 (10.8)	15 (7.5)
1-2 times	44 (44.5)	33 (32.4)	77 (38.3)
3-5 times	15 (15.2)	20 (19.6)	35 (17.4)
All week	36 (36.4)	38 (37.2)	74 (36.8)
Vigorous physical activity for at least 60 minutes/ per day			
Not at all	9 (9.1)	15 (14.7)	24 (11.9)
1-2 times	41 (41.4)	39 (38.2)	80 (39.8)
3-5 times	22 (22.2)	28 (27.5)	50 (24.9)
All week	27 (27.3)	20 (19.6)	47 (23.4)

4.4. Snack preference in children

Figure 1, below shows the common snack preference given to the children by their caregivers and arranged in the order of the least preferred to the most preferred in both schools. Most children preferred biscuits, toffees, pastries, juice, and etcetera. Nearly 95% of pre-schoolers preferred biscuits in Baby Nest School whilst about 93% of the children preferred toffees in the UG Basic. The least preferred snack in both schools was 28.3% and 9% respectively.

Figure 1. Snack preference in children aged 2 – 5 years in schools





Note: Multiple answer options

4.5. Socio – demographic characteristics of care givers

After running the chi-squared test to determine association between each independent variable, the socio-demographic characteristics of care givers which was statistically different was care giver's marital status and monthly income. Other socio-demographic characteristics of care givers did not show significant difference between preschoolers of the Baby Nest School and UG basic school. This possibly could suggest that caregiver's marital status and income levels could be a considerable factor to overweight and obesity risk in preschooler at schools.

Table 4.5.1 Socio – demographic characteristics of care givers

Variables	Baby Nest school n (%)	UG basic school n (%)	Total Frequency n (%)	**p-value**
Care giver's Marital Status				**+0.004***
Never married	4 (4.0)	8 (7.8)	12 (5.9)	
Divorced	0 (0.0)	9 (8.8)	9 (4.4)	
Married	94 (95.0)	84 (82.4)	178 (88.6)	
Widowed	1 (1.0)	1 (1.0)	2 (1.0)	
Care giver's Educational Level				+0.139
None	1 (1.0)	0 (0.0)	1 (0.5)	
Primary	1 (1.0)	1 (1.0)	2 (1.0)	
Junior high	0 (0.0)	1 (1.0)	1 (0.5)	
Senior high	6 (6.1)	14 (13.7)	20 (9.9)	
Tertiary	91 (91.9)	86 (84.3)	177 (88.1)	
Care giver's Occupation				+0.938
Formal employment	70 (70.7)	71 (69.6)	141 (70.1)	
Self-employed	28 (28.3)	30 (29.4)	58 (28.9)	
Unemployed	1 (1.0)	1 (1.0)	2 (1.0)	
Residence				0.616
Peri-urban	14 (14.1)	12 (11.8)	26 (12.9)	
Urban	85 (85.9)	90 (88.2)	175 (87.1)	
Monthly Income				**+0.015***
Less than 500	3 (3.0)	7 (6.9)	10 (5.0)	
Between 500 and 1000	16 (16.2)	31 (30.4)	47 (23.4)	
Above 1000	80 (80.8)	64 (62.7)	144 (71.6)	

***statistically significant (p<0.05)** **+ Fisher's exact**

4.6. Bivariate Analysis

Table 4.6.1. Socio – demographic characteristics of children, anthropometry and BMI-z-score

Variables	Baby Nest school n (%)	UG basic school n (%)	Total Frequency n (%)	p-value
Sex				0.635
Male	46 (46.5)	44 (43.1)	90 (44.8)	
Female	53 (53.5)	58 (56.9)	111 (55.2)	
Class				<0.001*
Nursery 1	41 (41.4)	0 (0.0)	41 (20.4)	
Nursery 2	33 (33.3)	89 (87.3)	122 (60.7)	
KG 1	25 (25.3)	13 (12.8)	38 (18.9)	
Child age (Mean ± SD) in years	2.9 ± 1.0	4.8 ± 0.4	3.9 ± 1.2	<0.001*
Weight (Mean ± SD) in kg	16.9 ± 3.9	19.4 ± 3.8	18.2 ± 4.1	<0.001*
Height (Mean ± SD) in cm	100.2 ± 9.4	114.5 ± 4.9	107.5 ± 15.7	<0.001*
BMI (Mean ± SD) in kg/m^2	16.7 ± 2.1	14.8 ± 2.2	15.7 ± 2.3	0.002*

***statistically significant (p<0.05)** **[+]Fisher's exact**

The results of the bivariate analysis (Chi Square) shows the socio-demographic characteristics that was statistically significant to the study. The children BMI-z-score and class was statistically different ($p = 0.002$ and $p < 0.001$) in the two schools. However, the sex of the child did not show any statistical difference.

4.6. Socio – demographic characteristics associated with BMI-for-age

In order to investigate the strength of association between the socio-demographic characteristics and the BMI-for-age, a simple logistic regression was fitted. The results of the logistic regression is shown below in Table 4.5.2 below. Children in nursery two had 70% less likelihood of being overweight or obese compared to preschool children in nursery one (OR = 0.3; 95% CI = 0.1 – 0.8, $p < 0.001$).

Table 4.6.2. Socio – demographic characteristics associated with BMI-for-age

Variables	BMI - for - age		COR (95% CI)
	Overweight/obese (BAZ ≥ 2SD) n (%)	Normal weight (BAZ < 2SD) n (%)	
Sex of Children			
Male	7 (7.8)	83 (92.2)	Reference
Female	13 (11.7)	98 (88.3)	1.2 (0.4 - 3.8)
Class of Children			
Nursery 1	8 (19.5)	33 (80.5)	Reference
Nursery 2	8 (6.6)	114 (93.4)	**0.3 (0.1 - 0.8)**
KG1	4 (10.5)	34 (89.5)	0.5 (0.1 - 1.8)
Care giver's Marital Status			
Never Married	3 (25.0)	9 (75.0)	Reference
Divorced	0 (0.0)	9 (100.0)	1
Married	17 (9.6)	16 1(90.4)	0.3 (0.08 - 1.3)
Widowed	0 (0.0)	2 (100.0)	1
Care giver's Occupation			
Formal Employment	16 (11.4)	125 (88.6)	Reference
Self-Employed	4 (6.9)	54 (93.1)	0.6 (0.2 - 1.8)
Unemployed	0 (0.0)	2 (100.0)	1
Monthly Income			
Less than 500	2 (20.0)	8 (80.0)	Reference
Between 500 - 1000	5 (10.6)	42 (89.4)	0.5 (0.08 - 2.9)
Above 1000	13 (9.0)	131 (91.0)	0.4 (0.08 - 2.1)

Abbreviation BAZ: BMI-for-age-z-score

4.7. Child's dietary pattern associated with BMI-for-age

Preschool children who ate fruits in between meals instead of snack showed an 80% reduction in the odds of being overweight or obese compared to children who took in snack. Fruits intake was protective (OR = 0.2; 95% CI 0.04 - 0.8). Majority of caregivers have home prepared meals unlike others caregivers who buy meals one or two times. Parents of obese and normal weight children who spend time once a day to eat with their children are more than parents who spend more than one meal time with their children a day. The results of the bivariate logistic regression is shown below in Table 4.6.1.

Table 4.7.1. Child's dietary pattern associated with BMI-for-age

Variables	**BMI - for - age**		**COR (95% CI)**
	Overweight/obese (BAZ ≥ 2SD) n (%)	**Normal weight (BAZ < 2SD) n (%)**	
Meals eaten each day at home			
Once A Day	0 (0.0)	0 (0.0)	Reference
Twice A Day	1 (3.6)	27 (96.4)	1
Thrice A Day	13 (11.8)	97 (88.2)	3.6 (0.5 - 28.91)
More Than Thrice A Day	6 (9.5)	57 (90.5)	2.8 (0.3 - 24.8)
Number of times snacks is given daily			
Not Applicable	0 (0.0)	1 (100.0)	1
Once A Day	8 (9.5)	76 (90.5)	0.6 (0.2 - 1.5)
Twice A Day	12 (15.2)	67 (84.8)	1
More Than Thrice A Day	0 (0.0)	37 (100.0)	1

Abbreviation: BAZ – BMI-for-age-z-score

Variables	BMI - for - age		COR (95% CI)
	Overweight/obese (BAZ ≥ 2SD) n (%)	Normal weight (BAZ < 2SD) n (%)	
Number of times snacks is given weekly			
Not Applicable	0 (0.0)	4 (100.0)	1
Once A Week	0 (0.0)	0 (0.0)	Reference
Twice A Week	1 (16.7)	5 (83.3)	1.8 (0.2 - 16.3)
More Than Thrice A Week	19 (9.9)	172 (90.1)	1
Child's fruit intake in a week			
Not Applicable	0 (0.0)	1 (100.0)	1
Once A Week	1 (4.0)	24 (96.0)	0.2 (0.03 - 1.8)
Twice A Week	2 (3.3)	59 (96.7)	**0.2 (0.04 - 0.8)**
More Than Thrice A Week	17 (15.5)	93 (84.5)	Reference
Child's vegetable intake in a week			
Not Applicable	0 (0.0)	5 (100.0)	1
Once A Week	1 (2.5)	39 (97.5)	0.2 (0.02 - 1.4)
Twice A Week	5 (11.9)	37 (88.1)	0.9 (0.3 - 2.7)
More Than Thrice A Week	14 (13.0)	94 (87.0)	1
Availability of fruits at home			
Never	0 (0.0)	0 (0.0)	Reference
Always	12 (11.2)	95 (88.8)	0.8 (0.3 - 2.0)
Sometimes	8 (8.8)	83 (91.2)	1
Rarely	0 (0.0)	3 (100.0)	1
Number of meals bought from outside			
Not Applicable	2 (7.4)	25 (92.6)	Reference
Once A Week	9 (12.3)	64 (87.7)	1.8 (0.4 - 8.7)
Twice A Week	1 (2.4)	41 (97.6)	0.3 (0.03 - 3.5)
More Than Thrice A Week	1 (7.1)	13 (92.9)	0.9 (0.08 - 11.6)
Number of times parents eat with child			
Never	2 (7.4)	25 (92.6)	Reference
Once A Day	4 (5.0)	76 (95.0)	0.7 (0.1 - 3.8)
>Once A Day	8 (22.2)	28 (77.8)	3.6 (0.7 - 18.4)
Always	6 (10.3)	52 (89.7)	1.4 (0.3 - 7.7)

4.8. Child eating behaviour associated with BMI-for-age

Table 4.7 shows the results of the logistic regression. Among all the variables, Children found overeating even when full had an increased odds of being overweight or obese [(OR = 3.9; 95% CI = 1.3 - 11.3), p = 0.01]. Care givers who preferred their children to be eating all the time had significantly 9 times the odds of being overweight or obese [(OR = 9.0; 95% CI = 1.8 - 45.9), p = 0.008].

Table 4.8.1. Child eating behaviour associated with BMI-for-age

Variables	BMI - for - age		COR (95% CI)
	Overweight/obese (BAZ ≥ 2SD) n (%)	Normal weight (BAZ < 2SD) n = (%)	
Child has a big appetite			
Never	3 (12.5)	21 (87.5)	Reference
Rarely	0 (0.0)	18 (100.0)	1
Sometimes	8 (7.6)	98 (92.4)	0.6 (0.1 - 2.3)
Often	6 (15.0)	34 (85.0)	1.2 (0.3 - 5.5)
Always	3 (23.1)	10 (76.9)	2.1 (0.4 - 12.3)
Interested in food outside home			
Never	2 (7.7)	24 (92.3)	Reference
Rarely	9 (10.8)	74 (89.2)	1.5 (0.3 - 7.2)
Sometimes	8 (9.5)	76 (90.5)	1.3 (0.3 - 6.4)
Often	1 (14.3)	6 (85.7)	2.0 (0.2 - 25.9)
Always	0 (0.0)	1 (100.0)	1
Refuses new food at first			
Never	3 (13.6)	19 (86.4)	Reference
Rarely	6 (11.5)	46 (88.5)	0.8 (0.2 - 3.6)
Sometimes	8 (9.8)	74 (90.2)	0.7 (0.2 - 2.8)
Often	1 (2.9)	33 (97.1)	0.2 (0.02 - 1.9)
Always	2 (18.2)	9 (81.8)	1.4 (0.2 - 9.9)
Enjoys tasting new food			
Never	2 (20.0)	8 (80.0)	Reference
Rarely	2 (3.9)	50 (96.1)	0.2 (0.02 - 1.3)
Sometimes	10 (10.6)	84 (89.4)	0.5 (0.09 - 2.6)
Often	2 (6.7)	28 (93.3)	0.3 (0.03 - 2.4)
Always	4 (26.7)	11 (73.3)	1.5 (0.2 - 9.9)

Variables	BMI - for - age		COR (95% CI)
	Overweight/obese (BAZ ≥ 2SD) n (%)	Normal weight (BAZ < 2SD) n = (%)	
Always asking for a snack			
Never	2 (14.3)	12 (85.7)	Reference
Rarely	1 (3.6)	27 (96.4)	0.2 (0.02 - 2.7)
Sometimes	9 (10.8)	74 (89.2)	0.7 (0.1 - 3.8)
Often	5 (8.9)	51 (91.1)	0.6 (0.1 - 3.4)
Always	3 (15.0)	17 (85.0)	1.1 (0.2 - 7.3)
Eating favourite food even when full			
Never	7 (7.5)	87 (92.5)	Reference
Rarely	3 (5.1)	56 (94.9)	0.7 (0.2 - 2.7)
Sometimes	9 (23.7)	29 (76.3)	**3.9 (1.3 - 11.3)**
Often	1 (16.7)	5 (83.3)	2.5 (0.3 - 24.3)
Always	0 (0.0)	4 (100.0)	1
Cannot eat a meal when snack is taken			
Never	1 (3.2)	30 (96.8)	Reference
Rarely	7 (14.0)	43 (86.0)	4.9 (0.6 - 41.8)
Sometimes	8 (11.3)	63 (88.7)	3.8 (0.5 - 31.9)
Often	2 (6.7)	28 (93.3)	2.1 (0.2 - 24.9)
Always	2 (10.5)	17 (89.5)	3.5 (0.3 - 41.9)
Would prefer child to always have snacks			
Never	3 (4.7)	61 (95.3)	Reference
Rarely	4 (8.7)	42 (91.3)	1.9 (0.4 - 9.1)
Sometimes	6 (16.7)	30 (83.3)	4.1 (0.9 - 17.4)
Often	3 (9.7)	28 (90.3)	2.2 (0.4 - 11.5)
Always	4 (16.7)	20 (83.3)	4.1 (0.8 - 19.7)
Child eating all the time			
Never	10 (7.7)	120 (92.3)	Reference
Rarely	4 (10.5)	34 (89.5)	1.4 (0.4 - 4.8)
Sometimes	3 (12.5)	21 (87.5)	1.7 (0.4 - 6.8)
Often	3 (42.9)	4 (57.1)	**9.0 (1.8 - 45.9)**
Always	0 (0.0)	2 (100.0)	1

4.9. Physical activity associated with BMI-for-age

The results of the bivariate analysis (Chi Square) is shown below in Table 4.4. However, none of the pre-schooler's physical activity factors was statistically different between students of the Baby Nest School and UG basic school. Furthermore, after running the logistic regression to determine association the variables, none of the physical activity factors was found to be significantly associated with the BMI-for-age.

Table 4.9.1. Child physical activity

Variables	Baby Nest school n (%)	UG basic school n (%)	Total Frequency n (%)	**p-value**
Moderate physical activity for at least 30 minutes/ per day				
Not at all	4 (4.0)	11 (10.8)	15 (7.5)	0.139
1-2 times	44 (44.5)	33 (32.4)	77 (38.3)	
3-5 times	15 (15.2)	20 (19.6)	35 (17.4)	
All week	36 (36.4)	38 (37.2)	74 (36.8)	
Vigorous physical activity for at least 60 minutes/ per day				0.404
Not at all	9 (9.1)	15 (14.7)	24 (11.9)	
1-2 times	41 (41.4)	39 (38.2)	80 (39.8)	
3-5 times	22 (22.2)	28 (27.5)	50 (24.9)	
All week	27 (27.3)	20 (19.6)	47 (23.4)	

4.10. Results from multiple logistic regression

After fitting all significant variables ($p < 0.05$) into a multiple logistic regression, the results are displayed in table 4.9.1 below. Children in nursery two had significant reduction in odds of being overweight or obese. Children who eat healthy diet by taking fruits in between meals instead of snack significantly had 80% reduction in odds of being overweight or obese compared to children who take in snacks. Nursery two children and fruit intake were protective and overeating was an enhancing factor. These factors showed to be significantly associated with overweight and obesity among the preschool going children.

Table 4.10.1. Results from multiple logistic regression

Variables	BMI - for - age		COR (95% CI)	AOR (95% CI)
	Overweight/obese (BAZ ≥ 2SD) n = 20	**Normal weight (BAZ < 2SD) n = 181**		
Class				
Nursery 1	8 (19.5)	33 (80.5)	Reference	
Nursery 2	8 (6.6)	114 (93.4)	**0.3 (0.1 - 0.8)**	**0.3 (0.09 – 0.9)**
KG 1	4 (10.5)	34 (89.5)	0.5 (0.1 - 1.8)	0.5 (0.1 – 1.9)
Child's fruit intake in a week				
Not Applicable	0 (0.0)	1 (100.0)	1	1
Once A Week	1(4.0)	24 (96.0)	0.2 (0.03 - 1.8)	0.3 (0.03 – 2.4)
Twice A Week	2 (3.3)	59 (96.7)	**0.2 (0.04 - 0.8)**	**0.2 (0.04 – 0.9)**
> Thrice A Week	17 (15.5)	93 (84.5)	Reference	Reference
Child eating all the time				
Never	10 (7.7)	120 (92.3)	Reference	
Rarely	4 (10.5)	34 (89.5)	1.4 (0.4 - 4.8)	1.0 (0.3 – 3.7)
Sometimes	3 (12.5)	21 (87.5)	1.7 (0.4 - 6.8)	1.4 (0.3 – 6.1)
Often	3 (42.9)	4 (57.1)	**9.0 (1.8 - 45.9)**	**8.9 (1.5 – 52.0)**
Always	0 (0.0)	2 (100.0)	1	1
Eating favourite food even when full				
Never	7 (7.5)	87 (92.5)	Reference	
Rarely	3 (5.1)	56 (94.9)	0.7 (0.2 - 2.7)	
Sometimes	9 (23.7)	29 (76.3)	**3.9 (1.3 - 11.3)**	
Often	1 (16.7)	5 (83.3)	2.5 (0.3 - 24.3)	
Always	0 (0.0)	4 (100.0)	1	

Abbreviation: BAZ – BMI-for-age-z-score

CHAPTER FIVE

5.0 DISCUSSION

5.1. Key findings

In the present study on pre-schoolers overweight and obesity in one private and one public school, the combined prevalence of overweight and obesity was 1.5% and 8.4%, respectively. There was a higher overweight and obesity prevalence among girls 11.7% than in boys 7.8%. The prevalence of overweight and obesity was higher in the private school (3% and 11%) compared to the public school (6%).

The study also showed that children in nursery two had 70% less likelihood of being overweight or obese compared to preschool children in nursery one (OR = 0.3; 95% CI = 0.1 – 0.8, $p < 0.001$). Consequently, children who ate fruits in between meals instead of snack showed an 80% reduction in the odds of being overweight or obese compared to children who took in snack. (OR = 0.2; 95% CI 0.04 - 0.8).

Children found overeating even when full had an increased odds of being overweight or obese [(OR = 3.9; 95% CI = 1.3 - 11.3), p = 0.01]. In the same vein, care givers who preferred their children to be eating all the time had significantly 9 times the odds of being overweight or obese [(OR = 9.0; 95% CI = 1.8 - 45.9), p = 0.008].

Finally, slightly over 38% children engaged in moderate physical activity for at least thirty (30) minutes, a minimum of one to two times a week whilst nearly 40% of children engaged in vigorous physical activity for at least sixty (60) minutes, a minimum one to two times a week.

5.1. Prevalence of Overweight and Obesity

Children in private schools tend to be in privileged environment and tend to be more overweight or obese. Implying that private school children are most vulnerable to malnutrition which could lead to risk in developing NCDs. This current study is comparable to findings by Amoh-Yeboah in 2017, that reported a higher overweight and obesity prevalence respectively in private (44.5%) and public (13.9%) schools at Sekondi-Takoradi. The higher overweight and obesity sex difference in girls than boys seen in the present study is comparable to findings by (Mohammed et al., 2012), who reported a high proportion in girls 15.0% and boys 7.2%. The Ghana Demographic and Health Surveys from 1993 to 2014 have reported an increasing prevalence among Ghanaian women (15 - 49 years) from 3.4% to 15.3% (GSS, GDHS, 1989; GSS, GHS, & ICF International, 2015; GSS, NMIMR, ORC Macro, 2003; GSS, NMIMR, and ORC Macro, 2004). The findings from the study is also consistent with the WHO reports on the higher obesity prevalence particularly in Ghanaian women estimated to be nearly 11% than men 4.1% (WHO, 2016). Causal relationships are unknown but possible sex differences in food consumption behaviour, and physical activity could contribute to this phenomenon.

The obesity status in preschool children could worsen in later years of life. Ofori-Asenso et. al., have indicated that nearly 43% of Ghanaian adults were either overweight or obese. The study further estimated a national prevalence of overweight and obesity as 25.4% and 17.1% respectively. Finally, the study reported that about 45.6% of adult diabetes patients in Ghana were either overweight or obese (Ofori-Asenso et al., 2016). Other studies have also reported on the increasing prevalence in children that could worsen in later years (Ghada et al., 2009, Júlíusson et al., 2010, Jiang et al., 2006; Canning et al., 2007; Aekplakorn, 2009).

These prevalence rate could be explained by the higher socioeconomic status of parents and urban lifestyle (Al-nuaim et al., 2012; Fazah et al., 2010). Another factor that can be attributed to this situation is the obesogenic environment that influence parent-child dietary lifestyle. Overweight and obesity is of significant importance, especially to Ghana because of its association with morbidities such as diabetes, hypertension, hyperlipidaemia, renal, liver diseases and certain cancers and the stress on public budget to meet the treatment cost of such diseases (Gupta et al., 2012).

However, children in nursery two in this study showed a 70% less likelihood of being overweight or obese compared to the other classes. This therein implies that children in these class have some level of protectiveness thus when adequate and proper nutrition that is required at each developmental stage of the child is maintain it may reduce overweight and obesity prevalence in subsequent growth years.

5.2. Assessment of dietary habits

Most children from the study preferred biscuits, nuts, juice, yoghurt, toffees, pastries and carbonated drinks as snacks. These are unhealthy food choices and may set a pattern for such choices in life. The meals provided to these children through their dietary patterns showed that vegetable and fruit intake was virtually absent in their breakfast. Lunch and supper were better as some of the children got some servings of vegetables from some vegetable stews added to their meals. This trend was similar in almost all the schools with school lunches doing better with vegetable intake. Preschool children who ate fruits in between meals instead of snack showed 80% reduction in odds of being overweight or obese compared to children who took in snacks.

Consumption of the recommended amounts of fruits and vegetables and balance diet in children was found to improve healthy dietary habits (Jarpe-Ratner, Folkens, Sharma, Daro, & Edens, 2016; Departments of Agriculture and Health and Human Services, USA, 2015).

The study showed that homes that always provided fruits and vegetables had a 20% reduced odds of overweight and obesity compared to homes that did not provide fruits and vegetables. This means that fruit and vegetable availability is an influencing factor to developing children's interest in healthy eating behaviour. Homes that make provision and easy to get fruits and vegetables to children address poor dietary practices and inappropriate choices that could lead to malnutrition and nutrition-related disorders, along the life cycle. Modifiable factors such as family behaviour habits, as determined by fruits and vegetable availability and accessibility predicts the diet quality of children and the family household (Trofholz et al., 2016; Couch et al., 2014).

Furthermore, the present study showed that majority of care givers had home prepared meals. Parents of obese and normal weight children who spent time once a day to eat with their children were more than parents who spent more than one meal time with their children a day. (Kunin-batson et al., 2015), supports this study's findings by indicating that when conscious efforts are made to make fruits and vegetables available and accessible at home together with voicing support and modelling consumption, children's healthy eating is promoted. This equally means that healthy eating can be promoted based on what is available and accessible in the home.

The current study reported that children found to continue eating favourite food even when full had an increased odds of being overweight or obese. Care givers who allowed their children to be eating all the time, had children with 9 times odds of being overweight or obese.

The choices of meals given by most caregivers was mostly refined carbohydrates. The most common forms of refined carbohydrates was; white bread, processed cereals, white rice, spaghetti, biscuits, and chips. With reference to WHO healthy diet fact sheet for children, carbohydrate intake should be focused on whole grains and instead of refined carbohydrates which are mostly high in calories (WHO healthy diet fact sheet, 2015).

Some choices of common saturated fatty and trans fatty foods in the their diet history was sausages, ice creams, Pizzas, fatty meat, meat pie, biscuits, pancakes among others. Fried food was commonly served to these children and this could lead to a positive increase in calorie consumption since most fried foods increase body fat and weight.

Evidence suggest association of child eating behaviour with food consumption and eating frequency in preschool children. Eating favourite food and eating all the time is related to increased vulnerability of overweight and obesity. These eating behaviour are aiding to the risk of excessive food consumption (Birch & Fisher, 1998; Carnell & Wardle, 2007, 2008; Fildes et al., 2015; Wardle et al., 2001; Webber et al., 2009).

Additionally, a study by (Drewnowski, 1997) has emphasized an intense preference for sweetened beverages and salty foods. One explanation for this behaviour according to (Jalkanen et al., 2017) "is that these children may not separate their feeling of hunger from their feeling of thirst and therefore they drink more energy-dense beverages since they feel hungry". This implies that care givers play a tremendous role in our contemporary food system and the social environment on child food choices and preference. When essential food needs to enhance optimal nutrition and development of children is deficient or lacking care givers risk the child to being malnourished.

5.3. Assessment of the level of physical activity

Physical activity was found to be protective of overweight and obesity. The study showed that slightly over 38% children engaged in moderate physical activity for at least thirty (30) minutes, a minimum of one to two times a week. Nearly 40% children engaged in vigorous physical activity for at least sixty (60) minutes, a minimum one to two times a week. This is suggestive that children were engaged in physical activity at home on a frequent basis. This corresponds to findings by (EUFIC, 2006; WHO, 2000) that physical activities have a major impact in balancing the energy consumption to the body. When this is further balanced by adopting healthy eating lifestyle, children tend to be less vulnerable to developing overweight and obesity and NCD mortality.

Furthermore, sedentary lifestyles such as watching television whilst eating, watching television, sat or lay still doing a puzzle or craft and playing electronic game was not found to be associated with the bmi-for-age. This report on the one had is consistent with finding of (Amoh-Yeboah, 2017) who stated that 'pupils in Sekondi-Takoradi metropolis had physical activity level average and above and, engaging in a little more sporting activities'. On the other hand, it is not consistent with other studies that found associations between physical activity, sedentary lifestyle and obesity (Steiner-Asiedu et al., 2012; (Vaida, 2013; Opuni-frimpong, 2015).

A randomized-control trial study by (Knowler et al., 2002) revealed that 50% of the intensive lifestyle intervention group lost 7% body weight and reduced their risk of developing diabetes over 3 years by nearly 60%, which surpassed the findings in the metformin group. Children and adolescent who are known to spend lengthen time in sedentary behaviour are badly off in cognitive development, social and physical academic abilities (Hinkley et al. 2014, Okely et al. 2013).

5.4 Study limitation

The study depended on anthropometric measurements to establish whether or not the preschoolers were overweight or obese. Hence, other forms of nutritional assessment was not done. The study relied on dietary habits, child eating behavior and physical activity to find out whether association existed between them and overweight and obesity. Due to the self-reported questionnaire by caregivers there could be a recall bias that may have affected information on overweight and obesity status on children. This study did not look at education, parent's marital status and family size and how they may influence overweight and obesity.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATION

The main objective of this study was to determine the prevalence of overweight and obesity in children aged 2-5 years at the University of Ghana Basic School and the Baby Nest School. Studies have investigated the prevalence of adolescent and adult overweight and obesity and its related NCDs at the regional and national level in Ghana yet little is known when it comes to preschool overweight or obesity. It was the focus of this study to fill this gap in the literature on the prevalence of this condition among children in one private and public school where the problem actually exist. The specific objectives of this study was to; assess dietary habits, assess the type and physical activity levels and, assess the snack and food preference.

At the end of the study, it was found that overweight and obesity persist in public and private school at Legon; 1.5%, and 8.4% respectively. The study further revealed that there was a higher prevalence of overweight and obesity in private schools than in public schools and that sex difference in prevalence was higher in girls than in boys.

This indicated on the one hand that there are contemporary changes in the Ghanaian food system, the social environment, and the consequent dietary and lifestyle practices therein contributing to increasing obesity and diet-related NCDs in vulnerable groups. It further suggested that child and adolescent risk of developing NCDs is worsened by malnutrition, often beginning from early childhood years. These prevalence rate could also be explained by the higher socioeconomic status of parents and the urban lifestyle along with parent-child dietary lifestyle.

On the other hand, the study interestingly reported a 70% protectiveness to being overweight or obese in nursey two children.

This is a positive indication that when proper nutrition that is required at each life stage of the child is maintain and then coupled with moderate physical activity it may be protective to overweight and obesity.

Although the study showed that there was consumption of common snack in the two schools, fruit intake in between meals was found to be protective of overweight and obesity. Consequently, the work reported that homes that always provided fruits and vegetables had a 20% reduced odds of overweight and obesity compared to homes that did not provide fruits and vegetables. This meant that healthy eating behaviour can be promoted based on what is available and accessible in the home.

Finally, the study have suggested the tremendous role that care givers play in our contemporary time and on child food choices and preference. In due reason that overeating was a significant factor associated with overweight and obesity among preschool children. In order to reduce vulnerability of overweight or obesity there is an essential need to enhance optimal nutrition and engage in physical activity for proper development.

6.1 Recommendation

Policy Recommendation

1. Ghana Education Service should collaborate with Ghana Health Service in ensuring that schools engage the services of nutritionist or dietician to assist in promoting nutritional knowledge among care givers to entail addressing the poor dietary practices. This could be done during Parent Teacher Association Meetings (PTA) and organizing periodic educational training sessions for parents, care givers and staff.
2. Ghana Education Service must ensure free periods meant for physical activity or education are strengthened and adhered to.
3. Caterers and staff working in public and private schools should be required by law to meet basic knowledge and nutritional standards in order to promote healthy eating habits.

Public Health practice recommendation

1. Schools should provide display learning materials on healthy living on classroom walls and canteens to inculcate early behaviour modification to promote healthy lifestyle.
2. Care-givers and schools should be responsible for determining the activities that children engage in during their free time, and to create an active lifestyle in the home and at school that will minimize sedentary behaviours.
3. School and home nutrition interventions should make fruit and vegetables available and accessible to children at all time.
4. Health professionals at schools should play an active role in obesity prevention, as they are ideally placed to identify young children vulnerability of morbidity.

Recommendations for further studies

1. Future research could look at food quantity and frequency of consumption and its influence on overweight and obesity.
2. Studies could also consider the role of education, residential area and sedentary behavior and how they may affect overweight and obesity.
3. Furthermore, future research could look at non-modifiable factors and early life overweight and obesity in babies and toddlers.

REFERENCE

Adel, E. T., Marie-Françoise, R.-C., Mahmud Salaheddin, M., Najeeb, E., Ahmed, A. M., Ibrahim, B., & Gerard, L. (2008). Nutritional status of under-five children in libya; a national population-based survey. *The Libyan Journal of Medicine*, *3*(1), 13–19. https://doi.org/10.4176/071006

Aekplakorn, W. (2009). National Prevalence of Obesity Prevalence of obesity in Thailand. *Obesity Reviews*, *10*(6), 589–592. https://doi.org/10.1111/j.1467-789X.2009.00626.x

Africa, N. (2000). Overweight and obesity in preschool children from developing countries. *International Journal of Obesity*, *24*, 959–967.

Al-nuaim, A. A., Al-nakeeb, Y., Lyons, M., Al-hazzaa, H. M., Nevill, A., Collins, P., & Duncan, M. J. (2012). The Prevalence of Physical Activity and Sedentary Behaviours Relative to Obesity among Adolescents from Al-Ahsa , Saudi Arabia : Rural versus Urban Variations. *Journal of Nutrition and Metabolism*, *2012*. https://doi.org/10.1155/2012/417589

Canning, P., Courage, M. L., Frizzell, L. M., & Seifert, T. I. M. (2007). Obesity in a provincial population of Canadian preschool children : Differences between 1984 and 1997 birth cohorts. *International Journal of Pediatric Obesity*, *2*(2007), 51–57. https://doi.org/10.1080/17477160601124613

Carter, O. B. J., Patterson, L. J., Donovan, R. J., Ewing, M. T., & Roberts, C. M. (2011). Children's understanding of the selling versus persuasive intent of junk food advertising: Implications for regulation. *Social Science and Medicine*, *72*(6), 962–968. https://doi.org/10.1016/j.socscimed.2011.01.018

CDC, C. F. D. C. A. P. (2009). *About BMI for Adults*. *American Journal of Clinical Nutrition*.

Corsica, J. A., & Hood, M. M. (2011). Eating disorders in an obesogenic environment. *Journal of the American Dietetic Association*, *111*(7), 996–1000. https://doi.org/10.1016/j.jada.2011.04.011

de Onis, M., Blössner, M., Borghi, E., Blossner, M., & Borghi, E. (2010). Global prevalence and trends of overweight and obesity among preschool children. *The American Journal of Clinical Nutrition*. https://doi.org/10.3945/ajcn.2010.29786.1

De Schutter, A., Lavie, C. J., Arce, K., Menendez, S. G., & Milani, R. V. (2013). Correlation and discrepancies between obesity by body mass index and body fat in patients with coronary

heart disease. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *33*(2), 77–83. https://doi.org/10.1097/HCR.0b013e31828254fc

Dieu, H. T. T., Dibley, M. J., Sibbritt, D., & Hanh, T. T. M. (2007). Prevalence of overweight and obesity in preschool children and associated socio-demographic factors in Ho Chi Minh City , Vietnam. *International Journal of Pediatric Obesity*, *2*(1), 40–50. https://doi.org/10.1080/17477160601103922

Dinsdale H, Ridler C, E. L. (2011). A simple guide to classifying body mass index in children. *National Obesity Observatory*, (June), 1–9.

Ebbeling, C. B., Pawlak, D. B., & Ludwig, D. S. (2002). Childhood obesity: public health crisis, common sense cure. *The Lancet*, *360*, 473–482.

Elmadfa, I., Meyer, A., Nowak, V., Hasenegger, V., Putz, P., Verstraeten, R., … Margetts, B. (2009). European Nutrition and Health Report 2009. *Forum of Nutrition*. https://doi.org/10.1159/000242365

Fatemeh, T., Toba, K., & Afsaneh, N. (2012). Prevalence of overweight and obesity in preschool children (2 – 5 year-olds) in Birjand , Iran. *BMC Research Notes*, *5*(1), 1. https://doi.org/10.1186/1756-0500-5-529

Fernald, L. C., & Neufeld, L. M. (2007). Overweight with concurrent stunting in very young children from rural Mexico: Prevalence and associated factors. *European Journal of Clinical Nutrition*, *61*(5), 623–632. https://doi.org/10.1038/sj.ejcn.1602558

Flegal, K. M., Carroll, M. D., Kit, B. K., & Ogden, C. L. (2012). Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA : The Journal of the American Medical Association*, *307*(5), 491–7. https://doi.org/10.1001/jama.2012.39

Gborzekowski, D. . L., & Robinson Thomas .N. (2001). The 30-Second Effect: An Experiment Revealing the Impact of Television Commercials on Food Preferences of Preschoolers. *Journal of the American Dietetic Association*, *101*(1), 42–46.

González Jiménez, E. (2013). Obesity: Etiologic and pathophysiological analysis. *Endocrinología y Nutrición (English Edition)*, *60*(1), 17–24. https://doi.org/10.1016/j.endoen.2013.01.005

Guo, H., Zeng, X., Zhuang, Q., Zheng, Y., & Chen, S. (2015). Intervention of childhood and adolescents obesity in Shantou city. *Obesity Research & Clinical Practice*, *9*(4), 357–364. https://doi.org/10.1016/j.orcp.2014.11.006

Harris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming effects of television food advertising on eating behavior. *Health Psychology : Official Journal of the Division of Health Psychology, AmericHarris, J. L., Bargh, J. A., & Brownell, K. D. (2009). Priming Effects of Television Food Advertising on Eating Behavior. Health Psychology : Official Journal of the Division*, *28*(4), 404–13. https://doi.org/10.1037/a0014399

Harris, J. L., & Graff, S. K. (2012). Protecting young people from junk food advertising: Implications of psychological research for first amendment law. *American Journal of Public Health*, *102*(2), 214–222. https://doi.org/10.2105/AJPH.2011.300328

Heelan, K. A., Bartee, R. T., Nihiser, A., & Sherry, B. (2015). Healthier School Environment Leads to Decreases in Childhood Obesity: The Kearney Nebraska Story. *Childhood Obesity*, *11*(5), 600–607. https://doi.org/10.1089/chi.2015.0005

Hoppu, U., Lehtisalo, J., Kujala, J., Keso, T., Garam, S., Tapanainen, H., … Pietinen, P. (2010). The diet of adolescents can be improved by school intervention. *Public Health Nutrition*, *13*(6A), 973–979. https://doi.org/10.1017/S1368980010001163

Jalkanen, H., Lindi, V., Schwab, U., Kiiskinen, S., Venäläinen, T., Karhunen, L., … Eloranta, A. M. (2017). Eating behaviour is associated with eating frequency and food consumption in 6–8 year-old children: The Physical Activity and Nutrition in Children (PANIC) study. *Appetite*, *114*, 28–37. https://doi.org/10.1016/j.appet.2017.03.011

Jarpe-Ratner, E., Folkens, S., Sharma, S., Daro, D., & Edens, N. K. (2016). An Experiential Cooking and Nutrition Education Program Increases Cooking Self-Efficacy and Vegetable Consumption in Children in Grades 3–8. *Journal of Nutrition Education and Behavior*, *48*(10), 697–705.e1. https://doi.org/10.1016/j.jneb.2016.07.021

Jiang, J., Rosenqvist, U., Wang, H., Greiner, T. E. D., Toschke, M., & Ma, Y. I. (2006). Risk factors for overweight in 2- to 6-year-old children in Beijing , China. *Nternational Journal of Pediatric Obesity*, *1*(March), 103–108. https://doi.org/10.1080/17477160600699391

Johnson, L., & Birch, L. (1994). Ye.. 04:, *94*(5), 653–661.

Júlíusson, P. B., Eide, G. E., Roelants, M., Waaler, P. E., Hauspie, R., & Bjerknes, R. (2010). Overweight and obesity in Norwegian children : prevalence and socio-demographic risk factors. *Acta Pædiatrica*, 1–6. https://doi.org/10.1111/j.1651-2227.2010.01730.x

Juonala, M., Magnussen, C. G., Berenson, G. S., Venn, A., Burns, T. L., Sabin, M. A., … Raitakari, O. T. (2012). Childhood Adiposity, Adult Adiposity, and Cardiovascular Risk Factors.

Obstetrical & Gynecological Survey, *67*(3), 156–158. https://doi.org/10.1097/OGX.0b013e3182483780

Kaur, N., Sidhu, S. K., & Sidhu, S. (2010). Prevalence of Overweight and Obesity in Preschool Children of Amritsar , Punjab. *Anthropologist*, *12*(3), 221–224.

Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., … Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England Journal of Medicine*, *346*(6), 393–403. https://doi.org/10.1056/NEJMoa012512

Kopelman, P. G., Caterson, I. D., & Dietz, W. H. (2010). *Clinical obesity in adults and children*. *Clinical obesity in adults and children*. Retrieved from http://ovidsp.ovid.com/ovidweb.cgi?T=JS&PAGE=reference&D=psyc6&NEWS=N&AN=2009-22152-000

Kuczmarski, R. J., Ogden, C. L., Guo, S. S., Grummer-Strawn, L. M., Flegal, K. M., Mei, Z., … Johnson, C. L. (2002). *2000 CDC growth charts for the United States: Methods and development*. *Vital and Health Statistics* (Vol. 11). https://doi.org/12043359

Kułaga, Z., Gurzkowska, B., Grajda, A., Wojtyło, M., Góźdź, M., & Litwin, M. (2016). The prevalence of overweight and obesity among polish pre-school-aged children. *Developmental Period Medicine*, *XX*(2), 143–149. https://doi.org/Article

Kumah, D. B., Akuffo, K. O., Abaka-Cann, J. E., Affram, D. E., & Osae, E. A. (2015). Prevalence of overweight and obesity among students in the Kumasi metropolis. *Journal of Nutrition and Metabolism*, *2015*. https://doi.org/10.1155/2015/613207

Kunin-batson, A. S., Seburg, E. M., Crain, A. L., Jaka, M. M., Langer, S. L., Levy, R. L., & Sherwood, N. E. (2015). Household Factors , Family Behavior Patterns , and Adherence to Dietary and Physical Activity Guidelines Among Children at Risk for Obesity. *Journal of Nutrition Education and Behavior*, *47*(3), 206–215. https://doi.org/10.1016/j.jneb.2015.01.002

Liu, H., Zheng, J. S., Li, J., Chen, Y., Zhao, W., Huang, T., … Li, D. (2017). Increased pre-school overweight and obesity prevalence between 2004 and 2013 is associated with appetite, eating frequency and supportive facilities: The Jiaxing Birth Cohort in China. *Asia Pacific Journal of Clinical Nutrition*, *26*(5), 881–887. https://doi.org/10.6133/apjcn.072017.05

Lobstein, T., & Dibb, S. (2005). Evidence of a possible link between obesogenic food advertising and child overweight. *Obesity Reviews*. https://doi.org/10.1111/j.1467-789X.2005.00191.x

Maffeis, C., Consolaro, A., Cavarzere, P., Chini, L., Banzato, C., Grezzani, A., … Tatò, L. (2006). Prevalence of Overweight and Obesity in 2- to 6-year-old Italian Children. *Obesity Society*, *14*(5), 765–769.

Manios, Y., Costarelli, V., Kolotourou, M., Kondakis, K., Tzavara, C., & Moschonis, G. (2007). parental characteristics and region of residence. *BMC Public Health*, *8*, 1–9. https://doi.org/10.1186/1471-2458-7-178

Martorell, R. (2002). Obesity in the developing world. In *The Nutrition Transition* (pp. 147–164). https://doi.org/http://dx.doi.org/10.1016/B978-012153654-1/50010-6

Michael Opuni-frimpong June, B. (2015). a Comparative Study of Overweight and Obesity Among Basic School Pupils From Selected Schools in the Asante Akim Central Municipality. This Thesis Is Submitted To the University of Ghana, Legon, in Partial Fulfilment of the Requirement for the Award of Ma. Retrieved from http://ugspace.ug.edu.gh

National Obesity Observatory, N. (2009). Body Mass Index as a measure of obesity. *National Health Service*, (June), 1–5.

National Research Council (US) Committee on Diet and Health. (1989). Diet and Health. *Diet and Health: Implications for Reducing Chronic Disease Risk*. https://doi.org/10.17226/1222

Ng, M., Fleming, T., Robinson, M., Thomson, B., & Graetz, N. (2014). Global, regional and national prevalence of overweight and obesity in children and adults 1980-2013: A systematic analysis. *Lancet*, *384*(9945), 766–781. https://doi.org/10.1016/S0140-6736(14)60460-8.Global

Ofori-Asenso, R., Agyeman, A. A., Laar, A., & Boateng, D. (2016). Overweight and obesity epidemic in Ghana—a systematic review and meta-analysis. *BMC Public Health*, *16*(1), 1239. https://doi.org/10.1186/s12889-016-3901-4

Ogden, C. L., Carroll, M. D., Kit, B. K., Flegal, K. M., LK, K., CL, O., … M, S. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA : The Journal of the American Medical Association*, *311*(8), 806–14. https://doi.org/10.1001/jama.2014.732

Oliveria, S. A., Ellison, R. C., Moore, L. L., Gillman, M. W., Garrahie, E. J., & Singer, M. R. (1992). Parent-child relationships in nutrient intake: The Framingham Children's Study. *American Journal of Clinical Nutrition*, *56*(3), 593–598.

Olstad, D. L., & Mccargar, L. (2009). ` SE REVIEW / SYNTHE Prevention of overweight and obesity in children under the age of 6 years 1. *Applied Physiology, Nutrition, and Metabolism*, *570*(34), 551–570. https://doi.org/10.1139/H09-016

Onis, M. De, Blo, M., & Borghi, E. (2010). Global prevalence and trends of overweight and obesity among preschool children. *The American Journal of Clinical Nutrition*, *92*(5), 1257–1264. https://doi.org/10.3945/ajcn.2010.29786.1

Organisation for Economic Co-operation and Development. (2014). OECD: Obestiy Update 2014. *OECD Health Statistics*, (June), 8. https://doi.org/10.1007/s11428-009-0404-2

Perry, C., Thurston, M. N., & Arch, B. N. (2016). Exploring overweight and obesity in pre-school children using routinely collected data: a case study of Halton, Northwest England. *Journal of Public Health*, *38*(3), e240–e246. https://doi.org/10.1093/pubmed/fdv154

Rd, S. C. C., Mph, K. G., Zhou, C., Sallis, J. F., & Saelens, B. E. (2014). Home Food Environment in Relation to Children's Diet Quality and Weight Status. *Journal of the Academy of Nutrition and Dietetics*, *114*(10), 1569–1579. https://doi.org/10.1016/j.jand.2014.05.015

Reinehr, T., & Wabitsch, M. (2011). Childhood obesity. *Current Opinion in Lipidology*, *22*(1), 21–25. https://doi.org/10.1097/MOL.0b013e32833f9c37

Rössner, S. (2002). Obesity: The disease of the twenty-first century. *International Journal of Obesity*, *26*, S2–S4. https://doi.org/10.1038/sj.ijo.0802209

Schlenker, E., & Long, R. S. (2011). *Williams' Essentials of Nutrition and Diet Therapy*. (A. F. . M. D. Yvonne, Ed.) (10th ed.). St. Louis, Missouri: Mosby.

Stamatakis, E., Wardle, J., & Cole, T. J. (2010). Childhood obesity and overweight prevalence trends in England: Evidence for growing socioeconomic disparities. *International Journal of Obesity*, *34*(1), 41–47. https://doi.org/10.1038/ijo.2009.217

Trofholz, A. C., Tate, A. D., Draxten, M. L., Neumark-sztainer, D., & Berge, J. M. (2016). Home food environment factors associated with the presence of fruit and vegetables at dinner : A direct observational study. *Appetite*, *96*, 526–532. https://doi.org/10.1016/j.appet.2015.10.019

Wake, M., Nicholson, J. M., Hardy, P., & Smith, K. (2007). Preschooler Obesity and Parenting Styles of Mothers and Fathers : Australian National Population Study. *Pediatrics*, *120*(6). https://doi.org/10.1542/peds.2006-3707

World Health Organisation, (WHO). (2017a). *No Title*. Retrieved from http://www.who.int/mediacentre/news/releases/2017/increase-childhood-obesity/en/

World Health Organisation, (WHO). (2017b). *No Title*. Retrieved from http://www.who.int/mediacentre/factsheets/fs311/en/

World Health Organization. (2015). Healthy Diet. *Media Centre*, (September), 1–6. Retrieved from http://www.who.int/mediacentre/factsheets/fs394/en/

Zhang, G., Wu, L., Zhou, L., Lu, W., & Mao, C. (2016). Television watching and risk of childhood obesity: A meta-analysis. *European Journal of Public Health*, *26*(1), 13–18. https://doi.org/10.1093/eurpub/ckv213

APPENDICES

Appendix I: Ethical Clearance Letter

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

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

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: ghserc@gmail.com

MyRef. GHS/RDD/ERC/Admin/App 18/220
Your Ref. No.

8th April, 2018

Okyere Senyo
University of Ghana
School of Public Health
Legon, Accra

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

GHS-ERC Number	**GHS-ERC: 039/01/18**
Project Title	Prevalence of Overweight and Obesity in Pre-School Children at Two Schools in La Nkwantanang-Madina Municipal Assembly
Approval Date	10th May, 2018
Expiry Date	9th May, 2019
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

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

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

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

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

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

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

Appendix II: Participants Information Sheet

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

For Research with Human Participants

PARTICIPANTS INFORMATION SHEET

JUNE, 2018

1.	NAME OF THE CANDIDATE AND ADDRESS	Mr. OKYERE SENYO c/o REGINA NTUMY DANGBE EAST DISTRICT HOSPITAL P.O.BOX 18 ADA-FOH TEL: 0505585060 EMAIL: sokyere013@st.ug.edu.gh
2.	NAME OF INSTITUTION	SCHOOL OF PUBLIC HEALTH UNIVERSITY OF GHANA COLLEGE OF HEALTH SCIENCES P.O. BOX LG 13 LEGON TEL: 028 910 9000 / 9001 / 9011 EMAIL: sphadmissions@ug.edu.gh
3.	PROGRAMME OF STUDY	MASTER OF PUBLIC HEALTH
4.	DATE OF ADMISSION	1ST AUGUST, 2017
5.	TITLE OF TOPIC	PREVALENCE OF OVERWEIGHT AND OBESITY IN PRE-SCHOOL CHILDREN AT UNIVERSITY OF GHANA BASIC SCHOOL, LEGON AND BABY NEST SCHOOL, LEGON
6.	NAME OF SUPERVISOR	Dr. PRISCILLA NORTEY

BACKGROUND RESEARCH

Overweight and obesity as understood is a state of a person where their weight is examined to be higher than the medically required healthy weight for that given height of the person. Such conditions are also understood to impair health as a result of fat accumulation. There is a clear indication on the tremendous increase of overweight/obesity on the global scale thus the situation is becoming a epidemic. It is noteworthy to state that low and middle income countries are currently struggling with the disease burden.

The WHO report of 2015 has confirmed a rapid worldwide increase of the rate of childhood obesity with the number of overweight and obese children under age 5 projected to rise from more than 42 million in 2013 to 70 million by 2025. This has increased the health concern in Ghana as this condition has been identified to be on the rise. In Ghana data has showed (in 2016) that an estimated 43% of adults 18 years and above have conditions of overweight and obesity whiles the rates are also increasing in school going pupil from 6 years and above, but there is little research that has investigated preschoolers overweight and obesity.

NATURE OF RESEARCH

Considering the paucity of research within this age group in Ghana this study is interested in knowing the prevalence of the overweight/obesity among preschoolers in the age range of 2-5 years who are attending University of Ghana Basic School and Baby Nest School. The study would want to know the weight and height of the child and other sociodemographic information. The study more importantly seeks to investigate other factors that are potential contributors to the child's risk of overweight/obesity.

PARTICIPANT INVOLVEMENT

What is involved / duration

The study will take the format of administering self or interviewer questionnaire to the caregiver of the child at home or in school, where you will be required to respond to a series of statements and questions on eating behaviour, physical activity levels and dietary habits.

For example, some items will ask about caregiver's education where you respond to answers provided while other statement will ask about dietary habits and the child's eating behaviour. For example "My child is always asking for food" (food responsiveness), "My child is always asking for a drink" (desire to drink), the response options are given as five-point Likert-scale (never = 1, rarely = 2, sometimes = 3, often = 4, and always = 5).

The study is for a duration of six weeks. Filling the questionnaire will take approximately 15 – 35 minutes. The informed consent and a copy of the questionnaire to complete should be returned to the school. At the school the child's height and weight will be taken by a professional public health nurse with measuring instrument.

Potential Risk and Benefit

- No physical risks will be posed to participants although the child may be discomforted by the physical process of taking their measurement.
- The physical measurement will be taken by a nutritionist, the principal investigator and the trained research assistant at the school premise in the presence of the supervising teachers.
- There will be no direct benefit of this study to the participant/parent/guardian. However, the findings from this study will be shared to parents/guardian and the school at a meeting (most likely a PTA meeting). There will also be education on lifestyle modification and increased physical activity as a means to improve health.

Privacy and Confidentiality

- The questionnaire will not bear the name of the participant but rather the participant's data will be coded (number and letter codes).
- The information that the participants provide will remain confidential.

Data Security and Storage

- Participant soft copy files or data will be saved on a hard drive and backed up on google cloud or OneDrive (encrypted on online server).
- Printed copies of data will be secured in a lock cabinet in a locked room.
- Excel and Word documents will be encrypted and password protected.
- Participant information on hard drive and server will not be talked about in public

Compensation

There will be no form of compensation but, participants will be given colour pencils for being part of the study.

Declaration of Conflict of Interest

I do not have any conflict of interest in connexion to this research topic, and participant choice. A conflict of interest may arise in particular as a result of financial interests, institutional affinities, family or emotional ties, or any other relevant connection or shared interest towards this study.

Funding Information

The principal investigator is funding this study.

Costs

Participating in this study is free and at no cost to the participant. Participation is also voluntary.

Outcome and feedback

The result of this study will be used on academic grounds – including future publications that will inform national policy formulation and intervention. In instances where a participant is found to have weight and height above the required WHO child growth standard, parents/guardian/legal representatives will be informed accordingly.

Voluntariness and withdrawal from Study

Your participation in this study is strictly voluntary and will not affect your relationship with the school or result in adverse reactions towards your child. Neither will the School of Public Health know who has or has not participated in the study. You have voluntary participation and freedom to withdraw at any time. Participants will have the right not to answer any question they want.

I have read the material above, and any questions I asked have been answered to my satisfaction. I understand a copy of this report will be made available to the school for appropriate policy structuring. I realize that I may withdraw without prejudice at any time.

Respondent's Signature Date

This study will be reviewed and approved by the Ghana Health Service Ethical Review Committee. P. O. Box MB 190 Accra-Ghana. Questions concerning this research and its participants may be addressed to the ERC Administrator (Hannah Frimpong, 0243-235-225 or 0507-041-223; Email: hannah.frimpong@ghsmail.org

Appendix III: Informed Consent

INFORMED CONSENT STATEMENT

I certify that I have read the participant information sheet or have had it read and explained to me in the language I understand. I was given the opportunity to ask questions and all my questions have been answered to my satisfaction. I understand I am free to discontinue participation at any time if I so choose. I also understand that I am not obliged to answer any question that I feel will compromise my identity. I have voluntary participation and freedom to withdraw at any time.I voluntarily agree to answer the survey questions, that the survey has been explained to me. My signature below indicates my consent.

……. ……..
Name of Participant Signature or left thumbprint

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

…… ……..
Name of Researcher Signature of Researcher

Date……

Place……...

This study will be reviewed and approved by the Ghana Health Service Ethical Review Committee. P. O. Box MB 190 Accra-Ghana. Questions concerning this research and its participants may be addressed to the ERC Administrator (Hannah Frimpong, 0243-235-225 or 0507-041-223; Email: hannah.frimpong@ghsmail.org

Appendix IV: Study Questionnaire

DEPARTMENT OF EPIDEMIOLOGY AND DISEASE CONTROL

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA, LEGON

Study Questionnaire on "Prevalence of overweight and obesity in pre-school children

---

Form ID……..

School: ……..

Class: ……..

Child's date of birth: ☐☐ ☐☐ ☐☐☐☐

(Day) (Month) (Year)

SECTION 1: Care giver / respondent demographic Information

1. Marital status? *(please tick one box)*

   a.☐ never married b.☐ divorced c.☐ currently married

   d.☐ widowed e.☐ cohabitating

2. Level of education? *(please tick one box)*

   a.☐ none b.☐ Less than Junior High c.☐ Junior High

   d.☐ Senior High e.☐ National vocational training institute (NVTI)/Apprenticeship

   f.☐ University/Tertiary

3. Respondent Occupation

   a.☐ formal employment b.☐ self-employed c.☐ unemployed

4. Area of residence

   a.☐ urban b.☐ peri-urban c.☐ rural

5. Monthly income *(Please tick a range)*

   a.☐ less than ¢500 b.☐ within ¢500 - ¢1,000 c.☐ above ¢1,500

SECTION 2: Child's dietary pattern *(Please tick for each of the option below)*

1. Number of meals eaten by child each day at home? *(please tick one box)*

   a.☐ once a day b.☐ twice a day c.☐ thrice a day d.☐ more than thrice a day

2. Do you give your child snacks?

   a.☐ home b.☐ school c.☐ both d.☐ none at all

3. How often do you give your child snacks?

   a. Daily *(please specify how many times in a day)*

   a1.☐ once a day a2.☐ twice a day a3.☐ more than three times in a day

   a4☐ not applicable

   b. Weekly *(please specify how many times in a week)*

   b1.☐ once a week b2.☐ twice a week b3.☐ three or more times a week

   b4.☐ not applicable

C. *Kindly list some of the snacks given your child*

1.	**2.**
3.	**4.**

4. How many days each week do your children usually eat fruit *(including fresh, dried & frozen)*

   a.☐ once a week b.☐ twice a week c.☐ three or more times a week d.☐ not applicable

5. How many days each week do your children eat vegetables *(including fresh & frozen)*

   a.☐ once a week b.☐ twice a week c.☐ three or more times a week d.☐ not applicable

6. How often are fruits available at home for your child to eat?

   a.☐ never b.☐ always c.☐ sometimes d.☐ rarely

7. Number of meals which are bought outside the home *(such as KFC, fried rice, pizza, kenkey, koko, banku & tilapia)*

   a.☐ once a week b.☐ twice a week c.☐ three or more times a week d. ☐ not applicable

8. How often do you eat together with your children at least 1 meal a day

   a.☐ never b.☐ more than once a day c.☐ less than once a day d.☐ always

SECTION 3: Child eating behaviour

(Please read the following statements and tick the boxes most appropriate to your child's eating behaviour)

	Never	Rarely	Some times	Often	Always
a. My child eats more when worried	☐	☐	☐	☐	☐
b. My child has a big appetite	☐	☐	☐	☐	☐
c. My child is interested in outside food	☐	☐	☐	☐	☐
d. My child is always asking for a drink (soft drinks)	☐	☐	☐	☐	☐
e. My child refuses new foods at first	☐	☐	☐	☐	☐
f. My child enjoys tasting new foods	☐	☐	☐	☐	☐
g. My child is always asking for a snack	☐	☐	☐	☐	☐
h. My child is always asking for fast food	☐	☐	☐	☐	☐
i. My child enjoys a wide variety of foods	☐	☐	☐	☐	☐
j. My child eats less when upset	☐	☐	☐	☐	☐
k. My child looks forward to mealtimes	☐	☐	☐	☐	☐
l. My child eats more when s/he is happy	☐	☐	☐	☐	☐

m. My child eats more when s/he has nothing else to do	☐	☐	☐	☐	☐
n. Given the choice, my child would eat most of the time	☐	☐	☐	☐	☐
o. Eating favourite food even when full	☐	☐	☐	☐	☐
p. My child cannot eat a meal if s/he has had a snack just before	☐	☐	☐	☐	☐
q. If given the chance, my child would always be having a snack	☐	☐	☐	☐	☐
r. Child eating all the time	☐	☐	☐	☐	☐

SECTION 4. Physical activity level

(The next questions are about any physical activities that you may have done in the last week / past seven days)

How much do you agree with the following statements *(Please tick one box for each statement)*

	Never	Rarely	Occasionally	Frequently	All the time
1. I encourage my child to play outside when the weather is suitable	☐	☐	☐	☐	☐
2. I am physically active with or in front of my child	☐	☐	☐	☐	☐
3. I limit what my child does as I worry that s/he may injury themselves	☐	☐	☐	☐	☐
4. I focus upon my child developing their basic learning skills such as numbers and letters.	☐	☐	☐	☐	☐
5. My work schedule or other commitments limit the time I have to play with my child.	☐	☐	☐	☐	☐

Do you have access to any of the following facilities within your backyard or home environment? *(please tick as many responses as apply)*

	Yes	No	Not sure
6. Play equipment (e.g. swing set, slide, sea-saws, castle climbers, bouncy castle)	☐	☐	☐
7. Public swimming pool	☐	☐	☐
8. Playground (area suitable to ride a bicycle, play football, Ampe, run around etc.	☐	☐	☐

Child's physical activity

(*The next questions are about any physical activities that you may have done in the last week / past seven days).*

1. In the last week, how often did your child do any moderate physical activities for at least 30 minutes a day (e.g. digging in a sand, sea-saw, jump, kicking or throwing a ball etc.)

   a.☐ not at all b.☐ less than 1 – 2 times c.☐ at most 3 – 5 times e.☐ all week

2. In the last week, how often did your child do any vigorous physical activity for at least 60 minutes a day which made him/her breathe harder or puff and pant? (e.g. running, cycling, aerobics, skipping, football, swimming, bouncy castle, rough & tumble play etc.)

   a.☐ not at all b.☐ less than 1 – 2 times c.☐ at most 3 – 5 times e.☐ all week

3. Does your child eat his/her meals whilst watching television?

   a.☐ not at all b.☐ rarely c.☐ daily c.☐ one meal a day d.☐ two / more meals a day e.☐ once a week

4. Which of the following did your child do during the week?

			Total time spent in activity
	Yes	**No**	**hours & minutes**
a. Sat or lay still watching TV, watching a DVD or a video	☐	☐	☐hrs ☐☐mins
b. Sat or lay still (e.g. looking at books, doing puzzles or craft)	☐	☐	☐hrs ☐☐mins
c. Played computer or electronic games	☐	☐	☐hrs ☐☐mins

SECTION 5. 24 - Hour diet recall (weekday)

Please recall and write what the child ate yesterday and how s/he ate.

TIME	TYPE OF FOOD	PORTION SIZE (USE HANDY MEASURE)
Breakfast		
In-between meal before lunch		
Lunch		
In-between meal before dinner		
Dinner		
Meal after dinner		

SECTION 6. Anthropometry Information

Anthropometry	Reading
Weight	
Height	

Appendix V: 24 hour recall on meal choices

Baby Nest School					
Breakfast	***In-between meal***	**Lunch**	***In-between meal***	**Dinner**	***Meal after dinner***
- Milo & bread - Cornflakes & milk shake, - Cereal mix - Oat and bread, - Egg sandwich & cocoa drink - Semolina-milk-sugar - Bread & Egg - Sausages, Boiled egg - Maize porridge - Bread and groundnut Paste - Doughnut - Fried egg & bread - Weanimix - Hausa koko - Pancakes - Bread & chocolate spread - Wheat porridge - Orange juice - Bofolot - Blended beans-corn dough - Beans-gari-boiled egg - Honey - Wakye	- Whole Meal - Biscuit & Juice, - Fruit Juice & Biscuit - Vita Milk & Biscuit - Yoghurt & Biscuit - Plantain Chips - Pringles - Soya Milk - Potato Chips - Orange - Hausa Koko & Koose - Watermelon Smoothy - Milo - Cerelac	- Rice-Vegetable Stew - Omo-Tuo-Groundnut Soup - Spaghetti-Mince Sauce-Veggies - Banku-Okro Stew - Beans-Plantain - Yam-Palava Sauce - Yam-Garden Egg Stew - Rice-Stew-Chicken - Rice-Beans Stew-Fruits - Boiled Plantain-Garden - Egg Stew - Jollof-Chicken - Banku-Okro Gbomaa Soup-Salmon - Wakye-Egg - Rice-Beef Stew - Plain Rice-Sausage-Fried Plantain - Sweet Potato Portage-Kontomire - Banku-Okro Garden Egg Soup-Fish-Chicken - Indomie, Yam-Pottage - Wakye-Egg	- Juice & Biscuit - Grapes - Vita Milk - Apple-Mangoes - Banana - Cerelac - Milo-Biscuit - Kalypo - Pineapple - Cereals, Water - Popcorn - Plantain Chips - Yoghurt-Bread - Spaghetti-Stew - Cornflakes - Chocolate - Ice Cream	- Yam-Garden Egg Strew - Jollof-Minced-Meat-Veggies - Yam-Kontomire Stew-Fish - Rice-Kontomire Stew - Tom-Brown & Milk - Jollof-Fish-Salad - Plain Rice-Cabbage Stew - Jollof-Salad-Chicken - Banku-Okro Stew - Egg Stew Rice - Noodles-Sausage - TZ-Dry Okro Soup - Ripe Plantain-Tomato Gravy - Fried Plantain-Sausage - Boiled Ripe Plaintain-Kontomire Egg Stew - Mpotompotor - Fufu-Soup - Rice-Fish Stew - KFC Fast Food - Yam-Palava Sauce - Banku-Pepper-Fried Fish, Banku-Okro Soup-Goat Meat-Crab-Wele-Smoked Salmon-Hearings - Omotuo-Groundnut Soup - Omotuo-Palmnut Soup-Garden Egg-Chicken - Kenkey-Fried Fish-Pepper	- Cereal-Fresh Milk - Mangoes - Milo - Vita Milk - Orange Juice - Pineapple - Orange - Milo - Chocolate - White Porridge - Cake - Water - Cerelac - Mango-Milk

UG Basic School					
Breakfast	***In-between meal***	**Lunch**	***In-between meal***	**Dinner**	***Meal after dinner***
- Milo-Bread-Egg - Milo-Bread-Margarine - Porridge-Bread - Milo-Bread-Jam-Egg - Tom brown-Bread - Pancake-Milk-Tangerine - Hausa Koko - Rice Water - Milo-Fried Egg-Bread - Weetamix-Apple - Oat-Milk-Sugar - Porridge - Cereals - Bread-Peanut Butter Spread - Beans-Frid Plantain - Cerelac-Fried Egg-Bread	- Juice-Biscuit - Kalypo - Vita Milk - Apple - Sweets - Watermelon - Bread-Jam - Fried Potato - Cookies - Bread-Blue Band - Ice Cream - Pear - Banana - Grapes - Fan Max	- Jollof-Chicken - Omotuo-Groundnut Soup - Beans-Fried Plantain - Jollof-Sausage - Wakye - Rice-Stew-Meat - Omotuo-Groundut Soup - Rice-Stew-Chicken - Fufu-Light Soup-Beef - Kenkey-Stew - Hausa Koko-Groundnut - Yam-Palava Sauce	- Fried Yam - Orange - Biscuit - Bread Butter-Drink - Popcorn - Yoghurt - Banana - Mangoes - Pineapple	- Rice-Veggie Stew-Fish - Rice-Kontomire Stew - Banku-Palmnut Soup - Kokonte -Palmnut Soup-Beef - Banku-Fried Egg-Pepper - Yam-Garden Egg Stew - Omotuo-Groundnut Soup - Kenkey-Soup - Indomie-Egg-Sausage - Water - Ripe Plaintain-Palava Sauce - Cerelac - Plain Rice-Stew-Chicken - Spaghetti-Stew-Chicken - Macroni-Cheese - Rice-Groundnut Soup - Yam-Palmnut Soup-Fish-Egg - Yam-Kontomire Stew - Banku-Groundnut Soup - Tz - Indomie-Egg-Veggies - Milo-Bread - Cocoyam-Egushi	- Ice Cream - Pizza - Yum Vita - Cereal - Popcorn - Mangoes - Cerelac - Milo - Drink - Apple - Oats