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PREVALENCE OF CHILDHOOD AND ADOLESCENT OBESITY AND ITS ASSOCIATED FACTORS AT THE LEGON STAFF VILLAGE

BY

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DECLARATION

I Betty Obeku, declare that this thesis is the product of my independent work. I further confirm that this work has neither been submitted to any university nor been published in whole or in part to any institution for any academic award. All references have been duly acknowledged.

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ABSTRACT

Childhood and adolescent overweight and obesity is a major global concern in the public health sector. Overweight, as well as obesity occurs when the rate of metabolism of calories in the body is less than the rate of caloric intake. This condition is likely to continue into adulthood if not addressed. The prevalence and conditions that determine childhood and adolescent obesity have not been widely studied in children and adolescents between the age of 5 and 17 years in Ghana. Knowing of the prevalence and determinants of childhood and adolescent obesity can contribute greatly to the design of nutrition interventions which will prevent, promote and maintain good health both in children and adolescents.

The study objective was to determine the prevalence of childhood and adolescent obesity and the various associated risk factors among children and adolescents between the ages of 5-17 years at the Legon Staff Village, Accra, Ghana.

The study was cross-sectional and involved a sample of 93 children, as well as adolescents between the ages of 5 and 17 years living in the Legon Staff Village. Data collection was achieved through caregivers, children and adolescent interviews. Data was collected on sociodemographic and behavioural factors which included diet, physical activity and screen time. Anthropometric data was obtained by measuring weight and height of study participants and BMI was calculated using age and gender specific z score values recommended by the World Health Organization (WHO). Data on socioeconomic status and demographics were collected through interviews using questionnaires. Associations between socio demographic and behavioural factors and childhood and adolescent obesity was determined using chi square statistics and logistic regressions, at 95% confidence interval.

Of the 93 children and adolescents surveyed, 50.54% were females while 76.34% were adolescents. The mean age of the study participants was 11.85±3.43 years, while the education level ranged from Basic to Senior High School, with 54.84% in basic school, 40.86% in the Junior High School and 4.30% in the Senior High School. All participants had at least two meals per day with 87.01% observing at least three meals a day and the remaining 12.90% observing two meals regularly. Skipping at least one meal in a week was prevalent in 35.48% of participants in the study, while 64.52% did not skip any of their meals weekly. Snacking was a common practice in the participants, with 77.42% reporting the consumption of at least one snack per day. The prevalence of obesity using the WHO gender specific BMI z score was 7.53% while13.98% of participants were overweight. Among the demographic factors, sex was statistically significantly associated with obesity (p=0.046) using chi square statistic. For behavioural factors, screen time (p=0.037; OR=11.6; CI (1.16-116.42) for time spent in TV viewing and (p=0.001; OR=65; CI (5.12-825.79)) for time spent playing video games, meal skipping (p=0.017; OR=8.4 CI (1.45-48.54)), frequency of consuming foods away from home (p=0.040; OR=0.19; CI (0.034-0.942)) and frequency of snacking (p=0.031; OR=0.08; CI (0.009-0.798)) were statistically significant with obesity using logistic regression. Multiple logistic regression showed that frequency of eating meals from home (p=0.019, AOR=0.455, 95%CI(0.077,0.834) and playing of video games was significantly associated (p= 0.041, AOR=0.219, 95% CI (0.009,0.429)) with obesity status although the model was not statistically significant (p=0.174, R^2=0.419 and Adjusted R^2=0.111).

Childhood and adolescent obesity is prevalent in the Legon staff village with sex, screen time, meal skipping, food away from home and snacking habits contributing significantly to this condition. Understanding the mechanism of these factors can promote effective intervention practices to combat this menace of childhood and adolescent obesity in the community.

DEDICATION

Dedicated to Keren-Happuch Obeku for all her sacrifice and support contributed to helping me complete this work.

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LIST OF ABBREVIATIONS

BMI – Body Mass Index

CVDs – Cardiovascular Diseases

GHS – Ghana Health Services

GSS – Ghana School Survey

OECD – Organization for Economic Cooperation and Development

PA – Physical Activity

PE – Physical Education

SES – Socio-economic status

WHO – World Health Organisation

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CHAPTER ONE

INTRODUCTION

1.1 Background

Over the decades, significant transitions in the ratio of the world's population who are normal weighted to those who are overweight / obese have been observed (WHO, 2000). This trend can be attributed to the changing cultural patterns in diet, physical activity and general lifestyle habits (WHO, 2000).

Obesity is a global public health concern (Veugelers and Fitzgerald, 2005; Ebbeling and Pawlak, 2002). Facts from the World Health Organization (WHO, 2000) reveal that, about one in four children who are between the ages of 2 to 9 years old are either overweight or obese. The World Health Organization (WHO) also revealed that approximately 10% of children of school going age worldwide are overweight while 3% remain obese (WHO, 2009).

Childhood and adolescent obesity and its associated disease conditions present a significant global public health challenge (WHO, 2010) which is increasingly posing challenges in the health sector. Between the year 1990 to 2010, the global prevalence of overweight / obesity among children had increased significantly to 6.7% from 4.2%, and this rise has been projected to increase to 9.1% by the year 2020 (De Onis et al., 2010). In Africa, the combined prevalence of both childhood obesity / overweight is an estimated 8.5% and projections are made to an expected 12.7% by the year 2020 (De Onis et al., 2010). Sub-Saharan Africa has not been excluded from the increasing problem of child and adolescent obesity, which has become a concern in the field of public health.

Obesity occurs because of imbalance in caloric intake and usage, which results in excess accumulation of fat, posing a health risk (WHO, 2009). Other observed factors that are said to influence the onset and development of obesity include the environment, genes, socio-demographic and certain lifestyle habits (Ebbeling and Pawlak, 2002).

Childhood and adolescent obesity is known to have adverse effects on the wellbeing of affected children / adolescents (Reilly and Kelly, 2001). Some of these effects may range from psychological, physiological and social (Reilly and Kelly, 2001). Apart from these effects that children / adolescents who are obese or overweight are predisposed to, studies have shown that there is an increase in the risk of developing non-communicable diseases, for example diabetes, high blood pressure and cardiovascular diseases among obese children / adolescents, compared with those who are of normal weight (Gupta et al., 2012); Lobstein et al., 2004). Therefore, long term childhood and adolescent obesity, translating into adulthood may increase morbidity and mortality in adults (Reilly & Kelly, 2011).

1.2 Problem Statement

In Ghana, childhood and adolescent obesity is becoming an emerging problem. The dramatic increase in obesity, as well as overweight prevalence rates across the child and adolescent population in Ghana is alarming. Review studies by de Onis & Blossner, (2000) has shown that childhood obesity has increased more than two-fold in the past thirty years among Ghanaian preschool children, which lingers on into childhood and adolescence in most cases. Currently, Ghana is estimated to have about 15% of her adolescents and children, aged 9 to 15 years overweight / obese (Ghana School Survey, 2012). A study on school adolescents aged 13-15 in Uganda and Ghana revealed an overweight prevalence of 3.2% for males and 10.4% for females (Peltzer & Pengpid, 2011). A study by Mohammed & Vuvor in 2012 among school aged children

in the University of Ghana Primary School in Accra showed a prevalence of 10.9% and 19.3% among school children in Achimota, a suburb of Accra (Abachinga, 2001). Similar studies in the Tamale Metropolis among school aged children between 6-12 years reported that 9.8% of them were overweight while 7.5% of them were obese (Amidu et al., 2013).

The condition of being overweight or obese during childhood and adolescence is likely to persist into adult life in later years (Reilly & Kelly, 2011). Having an overweight or obese child may have a profound effect on the child's physiological, physical, mental and social health. Apart from these effects, obese youth have an increased predisposition to cardiovascular diseases, high blood pressure, joint and bone disorders, as well as diabetes (Gupta et al., 2012).

Behavioral and socio-demographic factors contribute to the obesity prevalence rates among children and adolescents (Gupta et al., 2012). For example, non-adherence to basic nutrition requirements and balances, reduction of physical activity, excess intake of calories and unhealthy nutrition are certain types of behavioral factors which contribute to the problem of obesity in children/adolescents. In Ghana, the typical local, lean and leafy diets are gradually being replaced with fatty and energy dense foods. Physical activity among children / adolescents has declined and children's screen time has also increased. (Ghana School Survey, 2012).

In Ghana, extensive studies concerning the relationship between these factors and childhood and adolescent obesity have not been adequately explored (Amidu et al, 2013). Adequate data on the prevalence of obesity among children and adolescents will provide specific areas which need to be addressed by stakeholders in drawing interventions for promoting, maintaining and improving child and adolescent health. This research therefore seeks to determine the prevalence of childhood and adolescent obesity and its associated risk factors among adolescents and children at the Legon

Staff Village to help stake holders like the Ghana Health Service (GHS) make informed choices on behaviors that will help prevent childhood obesity.

1.3 Conceptual Framework

The modified framework from Scott et al., (2012) show the various socio-demographic and behavioural factors that influence childhood and adolescent obesity. Figure 1 relates how some known factors affect obesity in children and adolescents. These predisposal factors of obesity are divided into two groups; behavioral factors and socio-demographic factors.

Obesity and overweight in children and adolescents is influenced directly and indirectly by certain behavioral factors. In this study, these behavioral factors are categorized into dieting and snacking habits, physical activity, watching of television, means of transport to school, and playing of computer games. Systematic review studies in several developing countries among children have shown that unwholesome dieting and sedentary life style as a habit tend to contribute to childhood obesity (Gupta et al., 2012).

Review studies from around the globe have shown that several socio-demographic characteristics influence to a large extent the prevalence of obesity in children worldwide (McAllister et. al, 2009). This conceptual framework shows how a child's (or adolescent's) age, weight, height, gender, educational level of parents, socioeconomic status of parents, could influence his / her physiological characteristics and social habits to contribute to childhood / adolescent obesity. It also shows are interactions between behavioral and socio-demographic factors which may influence obesity in children and adolescents.

In summary, this conceptual framework seeks to relate how the outcome variable, childhood and adolescent obesity is influenced by two main independent variables identified as behavioral and

socio-demographic factors. It also shows that both behavioral and socio-demographic factors may interact with each other to influence childhood / adolescent obesity.

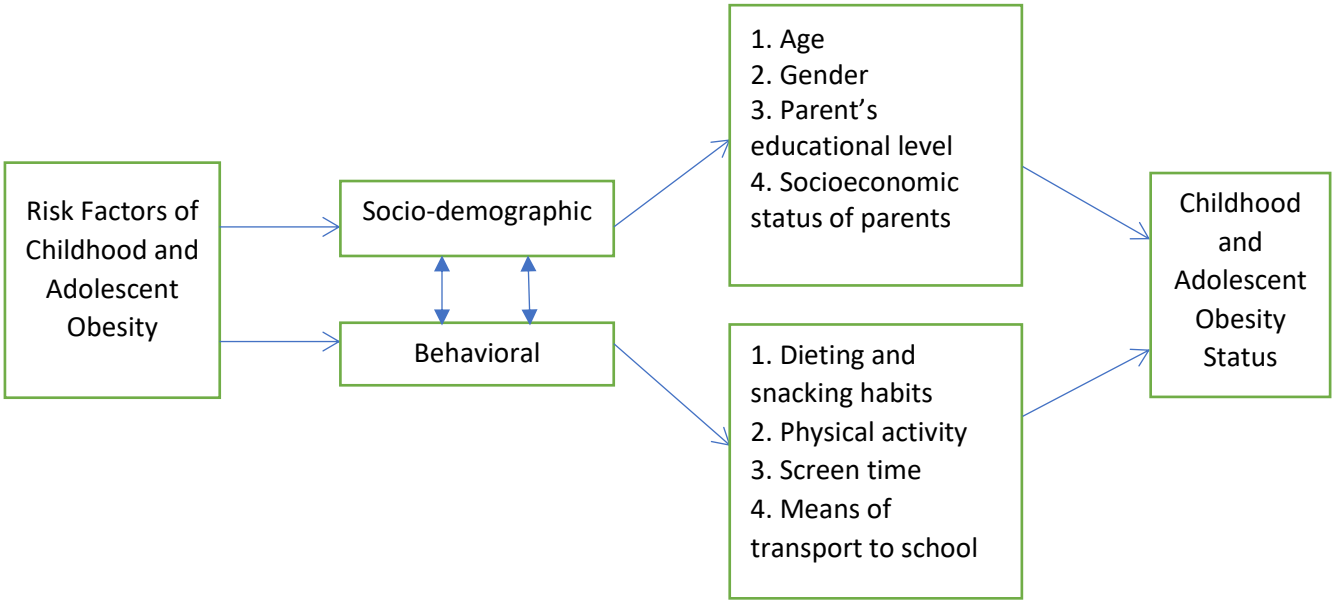

Figure 1: Conceptual framework for factors contributing to childhood and adolescent obesity (Modified from Scott et al, (2012)).

1.3.1 Definition of Terms Under Conceptual Framework

The dieting and snacking habits compasses activities which directly or indirectly affect diet patterns of study participants. These include frequency of meal skipping, number of meals eaten daily, number of meals prepared at home and daily frequency of snacking.

Physical activity includes the assessment of school PE periods and frequency, personal physical activity outside PE periods, vigorous and moderate sporting activity levels and activities involved in during PE periods and school break periods.

Screen time is a combination of time (in hours) spent in the watching of television, as well as playing any form of video game, usually outside school hours. This is categorized into weekdays and weekends.

Means of transport to school includes weekly frequency of walking to school and the time spent walking to and from school.

Socio economic status of parents, measured categorically by the professional status of both father and mother (professional, artisan, self-employed, informal and not employed). Food money given to children on a daily basis is also an approximate measure of parent socioeconomic status.

Educational level of parents (post tertiary, tertiary, vocational/ secondary, basic and none).

1.4 Justification

The rising rate of obesity and overweight among adolescents and children worldwide has been the cause of the onset of non-communicable disease conditions such as cardiovascular diseases, high blood pressure, diabetes and cancer. These non-communicable diseases present economic and health challenges to individuals and communities as a whole. One common risk factor of developing a non-communicable disease is overweight and obesity. The impact of these conditions on the psychological and physical health of children and adolescents are disturbing and there is the need for effective intervention procedures to combat this menace. These interventions can only be effective when current data is available through adequate research into the current situation of childhood / adolescent obesity in the various regions.

Certain behavioral and sociodemographic factors such as physical inactivity, diet, watching of television, socioeconomic status, educational level and family history contribute to childhood and adolescent obesity. Before an intervention can be effectively applied, data on the relationship

between these determinants and obesity must be adequately known. There is inadequate data in Ghana on childhood and adolescent obesity prevalence especially in school children (Amidu et al., 2013). This study seeks to identify some of the behavioral and socio-demographic factors which influence the onset of obesity in children / adolescents. Results and findings from the study will contribute to knowledge in this field and will suggest possible interventions to curb obesity and overweight among children ages 5-17 at the Legon Staff Village and similar communities facing similar challenges

1.5 General Objective

1. To determine the prevalence of childhood and adolescent obesity and its associated factors among children and adolescents aged 5-17 years at the Legon Staff Village.

1.6 Specific Objectives

1. To determine the prevalence of childhood and adolescent obesity among children and adolescents aged 5-17 years at the Legon Staff Village.
2. To determine the socio-demographic characteristics that influence childhood and adolescent obesity among children aged 5-17 years at the Legon Staff Village.
3. To assess the behavioral factors that influence childhood and adolescent obesity among children and adolescents aged 5-17 years at the Legon Staff Village.

CHAPTER TWO

LITERATURE REVIEW

The literature review will cover the following sub headings:

1. Prevalence of Childhood and Adolescent Obesity
2. Factors Influencing Childhood and Adolescent Obesity
3. Socio-Demographic Factors
4. Behavioral Factors
5. Effects of Childhood and Adolescent Obesity
6. Obesity Management and Interventions

2.1 Prevalence of Childhood and Adolescent Obesity

Globally, obesity has been rising in alarming rates both in developed and under-developed countries (de Onis & Blossner, 2000), posing a public health concern (Wang, 2001). It is estimated that 43 million children and adolescents aged 5-17 years are either overweight or obese (Lobstein et al., 2004). While the prevalence rates of overweight / obesity in children and adolescents is relatively higher in developed regions, it has been observed that in recent times, this prevalence is rising steadily in under-developed countries as well (Lobstein et al, 2004). This rising pattern in the prevalence of childhood and adolescent obesity can be attributed to the shifting dietary patterns owing to changes in the world food economy. The increase in high fat and energy dense food consumption, coupled with increased sedentary lifestyle and reduced physical activity have led to a decrease in energy expenditure, hence the observed increase in the prevalence of obesity (WHO, 2010). This increasing prevalence in obesity has resulted in an additional public health burden to

most developing countries as they must battle with obesity and malnutrition which are both extremes of the result of the energy imbalance, i.e. caloric intake and energy use.

According to the WHO (2000), an estimated 20% of children are obese. An estimated 10% of children who are aged 5 to 17 years worldwide are either obese or overweight, while 2-3% of the same age group are categorized as obese (Lobstein et al.,2004; WHO, 2010) while a review conducted by McAllister et al., (2009) reported the global childhood obesity/overweight rate as 25%. Childhood obesity is prevalent in 8.5% of children in Africa (de Onis & Blossner M, 2010).

2.1.1 Prevalence in Developed Countries

Obesity remains a rising public health concern in developed regions. An estimated 5% of school age children (5-17 years) in Europe are classified as obese while North America has 15% obese children of school going age (WHO, 2010). In the USA, about 16.9% of children who are between the ages of 2 to 19 years are obese while 31.8% are both obese and overweight (Ogden et al., 2014). This prevalence exceeds that of 5-17-year olds among the Organization for Economic Cooperation and Development (OECD), a 35-member state community that discuss and develop policies in relation to the society and economics (Ogden et al., 2014). In Canada between 2009-2011, the percentage of children and adolescents who are 5-17 years old and classified as overweight and obese was 19.8% and 11.7% respectively. Out of this same age group, 31.5% were either overweight or obese (Roberts et al., 2014). Spain reports a prevalence of 26% and 12.6% among children and adolescents in the 8-17-year age bracket for overweight and obese cases respectively, and an overall prevalence of about 40% among youths (Sánchez-Cruz, et al., 2012).

Obesity among children and adolescents between the ages of 3 to 17 years in Greece, Italy and the USA are above 30% (OECD, 2014). The International Association for the Study of Obesity in 2013 reported the prevalence of overweight and obesity among 5-17-year olds to be 20% in

Germany, 15% in Netherlands, 24% in Spain, 30% in the USA and 44% in Greece. New Zealand and Slovenia have obesity prevalence rates among children aged 5-17years that is higher than that of the USA (OECD, 2014).

The aggregate prevalence of childhood and adolescent obesity and overweight in developed countries was 23.8% in boys and 22.6% in girls as of 2013 (Ng et al., 2013).

2.1.2 Prevalence in Developing Countries

Developing countries have also experienced a substantial surge in childhood and adolescent overweight and obesity in recent times, and this may be as a result of the transition in dietary patterns and physical activity patterns (Gupta et al., 2012). The adoption of western diet, culture and lifestyle which usually comprises of energy dense fast foods, coupled with the mechanization of several activities, have contributed to reduced frequency in physical activity. These practices have substantially contributed to the gradual rise in the prevalence of obesity in developing countries both in children and adults (Gupta et al., 2012).

In 2013, a systematic review study among selected developing countries worldwide reported an increase in the prevalence of childhood and adolescent obesity to 12.9% from 8.1% in boys, while girls had an increase to 13.4% from 8.4% from 1980-2013 (Ng et al., 2014). School survey among children of school going age in India and Kuwait in 2003 reported an obesity and overweight prevalence of 45% and 14% respectively ((Langendijk et al., 2003). As at 2007 in South Africa, 17% of children between ages 8 and 11 were obese (Snell et al., 2007).

Studies among 24 countries in Sub Saharan Africa reports a combined prevalence of both child overweight and obesity as less than 10% (Lobstein et al., 2004). A study by Mohammed and Vuvor in 2012, among school aged children in the University of Ghana Primary School, Legon showed a

prevalence of 10.9% and 19.3% among school children in Achimota and Legon, suburbs of Accra (Abachinga, 2001). The findings of the Ghana School Survey (GSS) conducted in 2012 reported an overall prevalence of both obesity and overweight in children of school going age to be 15% (GSS, 2012).

2.2 Factors Influencing Childhood and Adolescent Obesity

Several factors affect childhood and adolescent obesity. These factors play vital roles in helping design intervention tools for the prevention and management of childhood and adolescent obesity when they are identified (Dietz, 2000). Factors include genetic determinants, individual behavioral determinants, environmental determinants and social determinants (Raine, 2012). Other factors can be categorized into political (regulations and policies influencing food choices and recreation), economic (purchasing power of food, recreation, health and other factors which influence obesity status) and cultural factors (values, practices and beliefs relating to food, environment, gender and physical activity). This study is focused on the sociodemographic and behavioral factors that influence childhood obesity

2.2.1 Socio-Demographic Factors

2.2.1.1 Socioeconomic status of Parents

Socioeconomic status (SES) of parents and caregivers significantly influence the prevalence of obesity in adolescents and children. Systematic review in multi developing countries including Sub-Saharan Africa among children, men and women support the fact that high socioeconomic status contributes to high body composition measures (Dinsa et al., 2012). Scaling this trend down to neighbourhoods show that children resident in neighbourhoods with high income are one-half times more likely to be obese compared with their age mates who reside neighbourhoods characterized with low income (Veugelers & Fitzgerald, 2005). Studies by Robert & Reither,

(2004) reported a positive association between relatively high socioeconomic status in adults and overweight and obesity prevalence in their children. (Scott et al., 2012). This trend is so because the socioeconomic status of parents affects the choice and frequency of food procured for home use. Foods which contribute to body composition are usually rich in protein and essential nutrients and are relatively expensive as compared with foods which are energy dense and relatively poor in diet quality. Naturally, the choice of food will be determined by the house hold income, compelling households with lower income to settle for foods with low diet quality, resulting in poorer health outcomes and reducing body mass composition for its occupants. Therefore, foods attitudes, behavior and level of exposure to childhood and adolescent obesity is significantly influenced by the SES of a household (Pulsford et al., 2013).

2.2.1.2 Cultural and social factors

Society and culture play a significant role in determining the prevalence of obesity and overweight among children in a population. Apart from genetic influences which can affect a child's obesity status, the environment contributes to this status through the opportunities it provides to promote or reduce the chances of obesity. This implies that, the availability of less optimal social and physical environments to enhance healthy dieting significantly increases the Body Mass Index (BMI) of children (Krishnaswami, et al., 2012). Healthy practices at home by family units inspire children and adolescents to make healthy dietary choices. This association was observed in studies by Neumark - Sztainer et al. (2010) and Berge, et al. (2010). Environments have been found to be associated with more healthful dietary composition and intakes of adolescents (Neumark-Sztainer et al., 2010, Berge et al., 2010). Culture may allow males to engage in more physical activities as compared to females, making more females to be more obese as compared with their male counterparts for the same age groups (Vu et al., 2006). In addition to this, the perception of

physically active girls by both sexes, influenced by culture may account for the varying differences in the levels of physical activity between the sexes (Vu et al., 2006).

2.2.1.3 Educational level of Parents

The role of education in influencing obesity in children usually depends on increased mother's level of education more than the father (Lazzeri et al., (2011). Generally, maternal education is associated with better child growth, nutrition and lowered obesity rates (Lazzeri et al., (2011). Saxton et al. (2009), after studying 4 year olds in the United Kingdom (UK) concluded that relatively low educated mothers were more likely to use emotional feeding to control the behavior of their children as compared with mothers with higher educational status. Also, survey on aged 5 children in the UK reported a positive relationship between low education and childhood obesity and implies that higher parental education is associated with a reduction in the risk of childhood obesity (Brophy et.al, 2009). Thus, in an attempt to decrease the burden of obesity in children in a community, the mothers' education must be improved and promoted (Moradi et al, 2016). In contrast to this, a study in China suggests that the likelihood of overweight or obesity increased with increasing parental education, independent of household income (Johnson et al., 2016).

2.2.2 Behavioral Factors

2.2.2.1 Diet

Since obesity and overweight are determined largely by the imbalance between the intake of energy and its expenditure, dietary intake plays a vital role in the determination of the state of obesity in an individual. Due to an increase in affordability and availability of food to a relatively larger number of people, overweight and obesity has increased in prevalence over the years. The increase in consumption of foods which are energy dense and carbonated beverages among children are associated with the obesity menace (Ludwig et al., 2001). Apart from the kind of food

choices households and individuals make daily, the frequency and pattern of food consumed plays a significant role in influencing the prevalence of obesity and overweight in a population. Studies among grade 5 school children in Nova Scotia have shown that children who skip breakfast pose a 50% more likelihood of overweight while those who buy lunch at school pose a 47% more likelihood of being overweight (Veugelers & Fitzgerald, 2005). During a cross-sectional survey in the United States (US), it was observed that children and adolescents who ate breakfast in their homes acquire a protective effect on their BMI and further reduce their risk of getting obese (Deshmukh-Taskar et al., 2010). A nutritional survey targeted on children between ages 2-18 years in the US reported that children who buy lunch at school increase their risk of becoming overweight or obese because they are more likely to settle for fast foods, which are sugary and energy dense, resulting in poorer diet and weight status (Poti et al., 2014). Also, it has been shown in the US that children who eat supper at home with family decrease their risk of getting obese (Dehghan et al., 2005). This finding is because children are more prone to eating foods available at home even though they may not enjoy eating it (Holsten et al., 2012). These findings support the fact that public health interventions aiming at prevention, control and management of obesity will be more effective when schools and caregivers are targeted (Veugelers & Fitzgerald, 2005).

2.2.2.2 Physical activity

There have been a steady fall in the patronage of physical activity (PA) across the various age groups (Dehghan et al., 2005). Since physical activity is influenced by weight gain (Ekelund et al., 2012), it has contributed to increasing prevalence of obesity worldwide. The invent of technology has resulted in the mechanization of several previously manual activities. The percentage of children who are driven to school daily have increased (Swinburn & Egger, 2002). Economic shift of most regions from industrialization to information has resulted in a change in direction of

physical involvement. Increasing the rate and frequency of physical activity in schools have shown to be positively correlated with BMI and negatively correlated with obesity prevalence in children (Metcalf et al., 2011; Ness et al., 2007). A survey conducted by Veugelers, & Fitzgerald (2005) showed that children who participate in significant physical activity seven times or more weekly had a decreased probability of becoming overweight.

2.2.2.3 Screen time

The trend of entertainment has evolved since the advent of technology. Vigorous physical activities for entertainment have been replaced with sedentary forms such as Television (TV) watching and the playing of computer games. A number of studies have reported that there is a positive association between obesity in children and sedentary lifestyles such as watching TV and playing of computer games (Chaput et al., 2014; Rey - Lopez et al., 2008; Borghese et al., 2014). Obesity can therefore be prevented through cutting down on the hours invested in watching TV or playing computer games (Chaput et al., 2014).

Advertisement of unhealthy food which flood the screens further influences food choices, especially in children. As a result of this, there has been action taken by some countries such as Greece, Austrialia, Ireland and Norway to reduce commercial advertisements of unhealthy foods which target children (Swinbum & Egger, 2002). Some studies have shown that eating in front of a TV increases the of risk becoming of obese or overweight because it promotes mindless eating and higher energy intake (Robinson, 2001; Caroli et al., 2004).

2.4 Effects of Childhood and Adolescent Obesity

Childhood obesity is likely to linger into adulthood. The Center for Disease Control and Prevention in 2009 reported that an estimated 80% of adolescents between 10-15 years who are obese become obese adults at 25 years. This comes with various complications and health challenges such as

early onset of chronic diseases which may be managed for a life time. Apart from this challenge, research has shown that, obesity and overweight at a young age could result in health, social, psychological and economic challenges (Gupta et al., 2012), which tend to have negative impacts on the holistic development of these youths.

2.4.1 Health Consequences of Childhood and Adolescent Obesity

From research findings, it has been observed that obese youths are more prone to chronic diseases and hospital visits as compared with normal weight children (Bessesen, 2008). Chronic diseases such diabetes (type 1 and type 2), high blood pressure, respiratory disease and other cardiovascular diseases are among the health challenges more pronounced in obese youths (Ogden et al., 2010). Studies involving 2-17-year-old children and adolescents in The Netherlands show that obese youths are about two times more prone to develop musculoskeletal disorders as compared with those of the same age group who have normal weights. (Krul et al., 2009).

2.4.2 Social Consequences of Childhood and Adolescent Obesity

Children and more especially adolescents, are more sensitive to their body image in their developmental stages. Overweight and obese teens are therefore more likely to feel unaccepted and stigmatized, and this could lead to a negative body image, depression, stress and low self-esteem (Gupta et al., 2012). Obese children have more likelihood of becoming victims of social; stigmatization and name calling unlike those of normal weight. A survey in Canada among children aged 11-16 years, reported that increasing BMI category had a positive correlation with bullying. In this same study, it was found out that children who were reported to be obese were more prone to become bullies (8.8%) than those who were of normal weight (3.1%) in the same age group, who were usually victims of bullying (Janssen et al., 2004).

2.4.3 Psychological Challenges of Childhood and Adolescent Obesity

Apart from the social, economic and health challenges of childhood and adolescent obesity, overweight and obese youths face psychological problems which leave them isolated, depressed and anxious. These are able to make them undergo a great deal of psychological stress especially when separated from the protection of their parents. According to Goodman and Whitaker (2002), depression resulting from being overweight or obese in these youths are able to manifest in conduct problems such as bullying, gross misconduct and resentment. Obesity and overweight in African and Mexican children in the USA have shown to have a positive correlation with low cognitive abilities (Li et al., 2008).

2.5 Obesity Management and Interventions

The rate of childhood obesity implies that there will be young cases of diabetes, cardiovascular diseases, high blood pressure and other chronic conditions which is likely to be managed for the rest of their livelihood (Lobstein et al., 2004). There is therefore a need to design public health initiatives and interventions to curb childhood and adolescent obesity and overweight.

Before interventions can be applied, experts advise that the BMI of the child is determined by a physician, and appropriately classified in order to diagnose the right type of intervention for those at risk. Dietary assessment may follow for more detailed diagnostics. Interventions for managing children who are obese or overweight are usually in the form of diet restriction, physical activity promotion and encouraging change in certain behavior which contribute positively to weight gain (Shaya et al., 2008). These interventions are usually designed to manage and control obesity through weight loss or weight management (Summerbell et al., 2005) and have been observed to be effective when targeted at parents and schools. Unfortunately, most interventions produce limited results when focused only on individual behavioral factors. While behavioural change is

important for managing and preventing obesity, failure to correspond these changes in behavior to the environment is not sustainable (Hill 2006). Interventions will be more effective when factors associated with obesity are identified and addressed (Ferreira et al., 2005).

2.6 Body Mass Index

The Body Mass Index (BMI) is an indication of the composition of fat in the body relative to height. BMI is usually calculated by dividing one's weight (in kilograms) by the square of one's height (in meters). BMI can be tracked in children and adolescents to monitor the effectiveness of intervention programs aimed at maintaining, reducing or increasing their weight. Among children and adolescents (2-19 years), BMI is categorized using the gender and age specific z score. In this study, the WHO criteria for categorizing children and adolescents into underweight, normal, overweight and obese, using age and sex specific weight for age charts was used.

2.7 Dietary Assessment

Dietary assessment is necessary in analyzing how food intake contribute to body mass. The methods usually applied in assessing the diet intake is qualitative and quantitative assessments. Quantitative assessments are used to estimate the quantity of food eaten while qualitative assessments are used to determine the kind of foods eaten, as well as its frequency over a defined time period.

The method which was used in this study was the qualitative method, through a food frequency table. A checklist of common food items and beverages consumed by children and adolescents in Ghana was used and frequency of consumption (daily, weekly, more than once weekly, monthly, quarterly, etc) recorded. It is easy and quick to administer, can be self-administered and may not put much burden on the respondents. However, the food frequency table may present some limitations such as difficulty on the part of the study participants to recall accurately the frequency

of their consumption. To address this challenge, the questionnaires used for food frequency tables should be designed to rank individuals and not for exact numeric estimation Brantsæter et al., (2014).

CHAPTER THREE

METHODS

3.1 Type of Study

The design of the study was cross-sectional and descriptive. The sample included children between ages 5-17 in the Legon Staff Village community. A quantitative method was used to determine the prevalence of obesity, as well as the behavioural and socio-demographic risk factors relating to obesity among the children and adolescents (aged 5-17) at the Legon Staff Village.

3.2 Study Area

In order to achieve a community-based study, the study location was the Legon Staff Village, a residential facility for the University of Ghana Staff, in the Accra Metropolis of Ghana. The population of the Metropolis, according to the Ghana Statistical Service is 1,665,086 per the 2010 Population and Housing Census. The population of children 5-16 is 300,417 (GSS, 2010). There are 248 well-planned housing units in the community under study.

3.3 Variables

The dependent variable for the study was childhood and adolescent obesity. Two main categories of independent variables were analyzed – sociodemographic factors and behavioral factors.

3.3.1 Independent Variables

The various independent variables which were considered in this study were

1. Dieting and snacking habits
2. Physical activity level
3. Television or video game screen time

4. Means of transport to school

These variables were categorized under behavioral factors.

Other independent variables which were of interest in this study were

1. Age
2. Gender
3. Parents' educational level
4. Socioeconomic status of parents

These variables were classified under the socio-demographic factors that influence childhood obesity.

3.3.2 Dependent Variables

The dependent variable for this study was childhood and adolescent obesity. This was measured using the WHO gender and age specific Body Mass Index z score, using values obtained from anthropometric measurement of height and weight of study participants. BMI standard deviation (z scores) was derived using the age of study participants in months, weight in kg and height in meters, and sex specific WHO growth reference chart for both children and adolescents. The WHO (2007) criteria for prevalence estimates was used to categorize the Body Mass Indices of the children into underweight, normal weight, overweight and obese.

3.4 Study Population

The study population included children and adolescents living at the Legon Staff Village and who were aged between 5 and 17 years. The study was limited to children / adolescents with their respective parents / guardians who consented to partake in the survey out of their own will.

Children outside the stated age bracket were excluded from the study, as well as children whose parents or guardians do not give accent for them to be part of the study.

3.5 Sampling

Sampling was done from random selection from the 248 housing units of the Legon Staff Village using the simple random sampling technique. The residential map of the community was used to categorize each housing unit into an ordered numbering system and housing units were randomly selected for the study. An average of one child per house was selected through balloting in cases where more than one qualified participant from one house was willing to partake in the study. A sum total of 93 children and adolescents were interviewed.

3.5.1 Sample Size

The sample size for the survey was 93 children and adolescents between ages 5-17 years based on the formula

$n = (Z\text{^}2\ (P)\ (1-P)) / d^2$

Where

n = the minimum sample size for the study

Z = Z value, which equals 1.96 for a confidence interval of 95%

p = prevalence of childhood obesity (5.7% Aryeetey et al., 2017)

d= margin of error, 0.05

To account for incomplete surveys, 15% more participants were added the minimum sample size to make a total of 93.

3.6 Data Collection Techniques

Data was collected through one-on-one interview with participants and care givers using a structured questionnaire, which was administered individually. The information was recorded immediately and transferred into Microsoft Excel 2016 software.

3.6.1 Structured questionnaire

A structured questionnaire modified from Scott et al, (2012) was used for the study. This questionnaire was divided into 4 main sections, which collected information on socio-demographic characteristics of the children, dietary habits using a developed food frequency table, physical activity and anthropometric measurements. Parents / guardians were assessed on their socio-economic and educational statuses using a categorical scale.

3.7 Quality Control

Capable research assistants were trained and oriented to understand the questionnaire, as well as the kind of answers to expect. A pre-test was done in a neighbouring community, Mempeasem prior to the study using five sets of questionnaires. The questionnaires were then reviewed to better suit the study. Instructions on procedures for taking anthropometric measurements were explained and demonstrated before the data collection process begun. To ensure consistency and accuracy of data, each questionnaire was checked for accuracy and completeness before administering to study participants. Data collected was standardized for uniformity and accuracy. All questionnaires were checked thoroughly for correctness and completeness before considered acceptable for analysis. Data entered was double checked to ensure absolute accuracy and consistency and to prevent double entries.

3.8 Analysis

Data collected from the questionnaire was entered into Microsoft Excel 2016 using pre-coded and categorical characters. Each completed questionnaire was manually verified to validate entered data. This validated data was imported into Stata version 15, a statistical analysis software for chi-square and logistic regression analyses (at 95% CI), using BMI z score as outcome variable and the various levels of sociodemographic and behavioral factors as independent variables.

3.8.1 Procedure for Data Collection

Data on behavioral and sociodemographic factors was collected using a structured questionnaire. Interviews were conducted on caregivers and children in the comfort of their homes after they had consented to be part of the study. The questionnaire collected information on socio-demographic characteristics of the children (age, weight, height, gender, educational level of parents, socioeconomic status of parents and religion) and behavioral characteristics (dieting and snacking habits, physical activity, television screen time, means of transport to school and playing of computer games).

Status of obesity was determined using the WHO BMI for sex and age specific z -scores. BMI was computed by dividing the weight of participants in kilogram by the square of their respective heights in meters. The various weights were measured in kilogram using a digital scale (Omron) to the nearest 100 grams. Participants had minimal clothing when being weighed and in standing position, bare footed and feet positioned flat. Height measurements was taken in centimeters to the nearest millimeter using a calibrated flexible tape, without shoes, feet flat and together and shoulders leveled with back against a wall. The WHO recommendation in categorising obesity and overweight was used, following the age and sex specific BMI z score which is used as a standard measure for categorizing weight status in children and adolescents between 2 to 19 years.

In this criteria, obesity ranges from the >+2 standard deviation and overweight, from +1 to +2 standard deviation. Normal weight ranges from -1 to +1 standard deviation and underweight, below -1 standard deviation (Ferreira et al., 2015).

3.8.2 Statistical Method

Data was analyzed using Stata 15 with an alpha level of 0.05 (95% confidence interval). Descriptive statistical analysis was conducted to determine the central tendency for continuous data, with standard deviations to measure the spread of data. Frequency distributions was reported in tables for ordered data.

Inferential statistical analysis approach was adopted to test for significant associations between the dependent variable (BMI gender and age specific z scores) and the various behavioral and socio-demographic variables (the independent variables) using bivariate correlations. Logistic regression analysis was used for the determination of statistical relationships between BMI z score and the various behavioral and sociodemographic factors as discussed. The chi square test statistic and Fisher's exact test was used to analyze relationships / associations, as well as differences in selected categorical variables.

3.9 Ethical Consideration

Ethical procedures considered in this research were the consent of stakeholders, which included the Ghana Health Service (GHS) Ethical Review Committee (ERC) (ERC number GHS-ERC060/01/18), the Management of the Legon Staff Village, parents / guardians of study participants and study participants. Confidentiality was assured by the research team through written and signed forms to ensure the promotion of safety, data security, as well as to satisfy social values and responsibility.

3.9.1 Consent

Consent was obtained from the GHS Ethical Review Committee, Management of the Legon Staff Village, as well as parents/guardians and study participants at the Legon Staff Village, through signed consent and accent forms. The study was optional to selected participants, who were interviewed at their own will. Choosing to withdraw from the study at any point in time or stage of study was permitted for any participant who did not wish to continue with the study.

3.9.2 Confidentiality

Participants were assured of confidentiality through a signed confidentiality form assuring them that their data will be used for academic purposed only. Data was transferred in a soft copy format and stored in a protected computer system.

3.9.3 Potential Risks / Benefits

Apart from the time spent answering the questionnaire, the study did not incur any major cost or physical, psychological or emotional harm to the participants. It rather presented an opportunity for study participants to know their weight status and be advised accordingly on how to improve or maintain a healthy body.

CHAPTER FOUR

RESULTS

4.1 Participant Characteristics

A total of 93 study participants between the ages of 5-17 took part in the study. There were 49.46% males and 50.54% females. The mean age was 11.96±3.27 years. The education level of the participants ranged between basic to Senior High School, with 54.84% in basic school, 40.86% in Junior High School and 4.30% in the Senior High School. All participants had at least two meals per day with 87.01% observing at least three meals a day and the remaining 12.90% observing two meals a day regularly. Skipping a minimum of one meal a week was prevalent in 35.48% of participants in the study, while 64.52% did not skip any of their meals weekly. Snacking was a common practice in the participants, with 77.42% reporting the consumption of at least one snack per day while a reported 22.58% did not take snacks weekly. Among study participants, daily TV viewing and video gaming on weekdays for more than an hour was 67.03% and 23.60% respectively. Daily TV viewing time on weekdays for 1 to 2 hours, 2 to 3 hours 3 to 4 hours and at least 5 hours was 30.77%, 13.19%, 7.69% and 15.38% respectively for weekdays and 10.11%, 7.87%, 1.12% and 4.49% respectively for playing video games. Physical Education (PE) periods equal to or greater than once weekly in participants' schools was reported to be 81.72%, while 18.28% had no regular physical activity periods in school. In addition, the percentage of participants who reported to having some sort of moderate or vigorous physical activity at least three times a week was 92.39% and 28.26% respectively. Walking at least three times a week to school was reported in 61.96% of participants in this study. Consumption of vegetables, as well as fruits daily was 23.91% while that of protein was 76.92%. However, consumption of fruits and

vegetables among study participants three or more times a week was 58.70% while that of protein was 20.88%.

The table below summarizes the participant's characteristics and their corresponding significant values from Fisher's exact tests.

Table 4.1: Participant Characteristics and Fisher's Exact Associations between Obesity Status and Independent Variables

Characteristics	**Percentage**	**N**	**p-value**
Sex			0.046*
Male	49.46	46	
Female	50.54	47	
Age			0.667
Child	23.66	22	
Adolescent	76.34	71	
Educational Level			0.411
Basic	54.84	51	
JHS	40.86	38	
SHS	4.30	4	
Father's Educational Level			0.691
Tertiary	58.06	54	
Vocational / Secondary	37.63	35	
Basic	2.15	2	
None	2.15	2	

Mother's Educational Level			0.285
Tertiary	18.28	17	
Vocational / Secondary	62.37	58	
Basic	15.05	14	
None	4.30	4	
Father's Occupation			1.000
Professional	57.47	50	
Artisan	19.54	17	
Informal	17.24	15	
Self-employed	4.6	4	
Not employed	1.15	1	
Mother's Occupation			0.681
Professional	18.82	16	
Artisan	10.59	9	
Informal	7.5	7	
Self-employed	50.5	47	
Not employed	6.5	6	
No. of Daily Meals			0.284
Two	12.90	12	
Three	66.67	62	
Four	16.13	15	
Five	4.30	4	
No. of Meals Skipped per Week			0.029*

None	64.52	60	
One	8.60	8	
Two	13.98	13	
Three	9.68	9	
Four	2.15	2	
Five	1.08	1	
No. of Meals eaten at Home Daily			0.170
One	32.26	30	
Two	58.06	54	
Three	8.60	8	
Four	1.08	1	
Daily Snack Frequency			0.031
None	22.58	21	
One	55.91	52	
Two	17.20	16	
Three	3.23	3	
Four	1.08	1	
TV Screen Time			0.031*
Less than one hour	32.97	30	
1-2 hours	30.77	28	
2-3 hours	13.19	12	
4-5 hours	7.69	7	
More than five hours	15.38	14	

Video Game Screen Time			0.004
Less than one hour	76.40	68	
1-2 hours	10.11	9	
2-3 hours	7.87	7	
4-5 hours	1.12	1	
More than five hours	4.49	4	
PE at School per Week			0.378
Never	18.28	17	
Once	69.89	65	
Three times	7.53	7	
Four or more	3.23	3	
Other	1.08	1	
Moderate Physical Activity per Week			1.000
Less than 3 times	7.61	7	
Three or more	92.39	85	
Vigourous Physical Activity per Week			0.096
Less than 3 times	71.74	66	
Three or more	28.26	26	
Walking to school			1.000
No	38.04	35	
Yes	61.96	57	

* values from chi square statistic

Test of association using Fisher's exact test and chi square statistic showed a significant association between participant obesity status and sex, number of meals skipped per week, daily snacking frequency, TV screen time and time spent in playing of video games.

4.2 Anthropometric Data of Study Participants

The height of participants ranged from 1.06 cm to 1.8 cm, with a mean of 1.47±0.17 cm. Weight measurements ranged from 14.90 kg to 103.10 kg. The mean weight among study participants was 43.69±18.56 kg. No statistically significant difference in mean height (p = 0.805) and weight (p=0.298) between males and females was observed using two-sample t-test and the Wilcoxon rank-sum test respectively. BMI z score measurements ranged from -3.05 standard deviation to 2.38 standard deviation. Statistically significant difference was absent between mean z scores between males and females (p=0.340) in this study. The prevalence of obesity (>+2 standard deviation), was 7.53% while a combination of obese and overweight prevalence (+1 to >+2 standard deviation) was 21.51%. The prevalence of underweight below (-1 standard deviation), normal (-1 to +1 standard deviation) and overweight (+1 to +2 standard deviation) participants was 23.66%, 54.84% and 13.98% respectively. Among those who were obese, the proportion of males was 85.7% while that of females was 14.29%. Thus, obesity prevalence was greater in the male study participants compared with the females. Among females in the study, the prevalence of obesity was 2.13%, which was significantly lower than that of their male counterparts, who had a prevalence of 13.04%

Below are tables summarizing weight status distribution in the population

Table 4.2a: Obesity Distribution by Sex

N=93	**Male (n=46)**	**Female (n=47)**
% Obese	6.45	1.08
Proportion Obese (%)	85.7	14.29

Table 4.2b: Weight Status of Study Participants

Weight Status	**% (n=93)**
Underweight	23.66
Normal	54.84
Overweight	13.98
Obese	7.53

4.3 Sociodemographic Factors

In this study, the independent variables assessed with childhood obesity (dependent variable) were grouped into socio-demographic factors and behavioral factors. Under the sociodemographic factors, the variables considered were

1. Age
2. Sex

3. Parents' educational level
4. Socio-economic status of parents

4.3.1 Age

The age of study participants ranged between 5 to 17 years (mean = 11.96 ± 3.27 years). Age was categorized into child and adolescent using the WHO age category of 5-9 years for children and 10-19 years for adolescents. The proportion of adolescents, 76.34% (n=71) in the study was greater than that of the children. Children in this study made up 23.66% of the sample size (n=22). Among children, the prevalence of obesity was 9.09% (n=2) while 7.04% (n=5) of the adolescents were obese. However, bivariate logistic regression showed no difference statistically in the risk of obesity and age (p = 0.751).

Below is a table summarizing the findings relating to age grouping of participants in the study

Table 4.3: Weight Status by Age Group

N=93	**Children (5-9 years, n=22)**	**Adolescents (10-17 years, n=71)**
Sample Size (%)	23.66	76.34
% Obese	9.09	7.04
p-value	0.751	0.751
95% CI	0.238, 7.330	0.136, 4.207

4.3.2 Sex

The proportion of males to females was approximately equal. Males in the study made up 49.46% (n=46) of the sample size while females were 50.54% (n=47). The prevalence of obesity in males

was 13.04% (n=6) while obese females were 2.13% (n=1) of the total female population. Chi square statistic showed a statistically significant difference between z score and sex (p = 0.046).

Bivariate logistic regression showed that there was no statistically significant difference between BMI z score and sex (p=0.080; OR=0.145; CI (0.017, 1.255)).

The table below summarizes the findings relating to sex of participants.

Table 4.4: Weight Status by Sex

N=93	**Males (n=46)**	**Females (n=47)**
Sample size (%)	49.46	50.54
% Obese	13.04	2.13
p-value	0.080	0.080
95% CI	(0.797, 59.770)	(0.0168, 1.256)

4.3.3 Educational Level of Parents

Bivariate logistic regression between obesity status and educational level of parents was not statistically significantly associated with obesity in this study. Almost all the parents or guardians had some form of formal education. Thus, 97.85% (n=91) of fathers had some level of formal education while 95.7% (n=89) of mothers had some level of formal education.

Below is a table summarizing the educational level of both parents.

Table 4.5: Educational Level of Parents

Educational level	**Fathers (%) n=93**	**Mothers (%) n=93**

Tertiary	58.06	18.28
Vocational / Secondary	37.63	62.37
Basic	2.15	15.05
None	2.15	4.30
p-value	0.652	0.939
95% CI	(0.265, 2.299)	(0.356, 2.600)

4.3.4 Socioeconomic Status of Parents

Majority of parents of study participants were employed, with over 98% of fathers being employed and over 92% of mothers in employment. Occupation was categorized into professional (jobs whose training is by specialized formal educational qualification such as accountant, lawyer, administrator, etc), artisan (skilled trade such as mason, electrician, hair dresser, seamstress), informal (wage paid menial jobs which are usually not on a permanent payroll, such as casual laborers, petty traders and domestic workers and self-employed (being involved in a self-owned substantial business) and not employed (not having any form of employment such as housewives). The most prevalent occupation among fathers was professional (57.47%), while that for mothers was self-employed (50.5%). Bivariate logistic regression showed no statistically significant association between the participants' age and sex specific BMI z score and the occupation of both fathers and mothers.

The table below summarizes the different forms of occupation that the male and female parents / guardians engaged in.

Table 4.6: Occupation of Participants' Parents

Occupation	Fathers (%) n=93	Mothers (%) n=93
Professional	57.47	18.82
Artisan	19.54	10.59
Informal	17.24	7.5
Self-employed	4.6	50.5
Not employed	1.15	6.5
p-value	0.414	0.874
95% CI	(0.243, 1.789)	(0.568, 1.944)

Amount of money allocated for food during school hours ranged between GHS1 and GHS11. Bivariate logistic regression showed that a statistically significant relationship between the z score of participants and the amount of food money allocated for school (p-value=0.416, CI (0.658, 2.750)) did not exist.

The table below shows the distribution of Daily allocation of money for food during school hours.

Table 4.7: Food money taken to school

Amount(GHS)	≤ 1	2-3	4-5	6-7	8-10	>10
% (n=93)	8.60	17.20	51.61	15.05	5.38	2.15

4.4 Behavioural Factors

Behavioural factors were the second group of independent variables assessed in this study. Under the behavioural factors, the variables assessed in this study were

1. Dieting and snacking habits

2. Physical activity level
3. Screen time
4. Means of transport to school

4.4.1 Dieting and Snacking Habits

Dieting and snacking habits was assessed by the number of meals eaten and meal observed daily (breakfast, lunch, supper), meals skipped daily and frequency, number of meals eaten from home, a food frequency table and daily frequency of snacking. The food frequency table however did not have any statistically significant relationship with obesity among study participants.

4.4.1.1 Daily meal frequency

The number of meals eaten daily among study participants ranged between 2-5, with the average number of meals being 3. Majority of the sample (66.67%) ate three times daily.

The table below shows the distribution of daily number of meals eaten among study participants.

Table 4.8: Meal Frequency

Daily Number of Meals Eaten	**2**	**3**	**4**	**5**
% (n=93)	12.90	66.67	16.13	4.30

A statistically significant relationship between BMI z score and the number of meals eaten per day using bivariate logistic regression analysis was absent (p-value = 0.627, CI (0.217, 2.509)).

4.4.1.2 Meal Skipping Frequency

Meal skipping was prevalent in about 35% of the children/adolescents while about 65% did not skip their meals. Among those who skipped their meals, the frequency of meal skipping ranged

between once to five times per week. The proportion of those who skipped their meals once weekly was 8.60 while 1.08% skipped meals five times weekly.

Below is a table showing the number of meals skipped per week and their frequency.

Table 4.9: Meal Skipping Frequency

Daily Number of Meals Skipped/Week	**1**	**2**	**3**	**4**	**5**
Frequency (%)	8.60	13.98	9.68	2.15	1.08

Bivariate logistic regression showed that there was a statistically significant relationship between the risk of childhood obesity and frequency of skipping meals. According to this study, those who skipped a meal at least once a week had 8.4 times the odds of developing obesity as compared with those who skipped no meals in a week (p=0.017; OR=8.4 CI (1.453-48.550)).

4.4.1.3 Food Away From Home

The number of meals prepared from home was one of the variables used to assess dietary patterns in this study. It included a section on a food frequency table. The number of meals eaten which were prepared from home ranged from one to four meals with a mean of 1.8 ± 0.64.

The table below gives a summary of this variable.

Table 4.10: Frequency of meals eaten from home

Meals prepared from home	**1**	**2**	**3**	**4**
Frequency (%)	32.26	58.06	8.60	1.08

The number of meals prepared from home had a statistical relationship with BMI z scores, which was significant using pairwise correlation (p = 0.031). An inverse relationship existed between the

number of meals eaten at home and increasing BMI, sex and age specific z score. Thus, higher frequencies of eating food prepared at home had a reducing effect on BMI z score. After bivariate logistic regression analysis, those who consumed two meals from home had 81% reduced odds of increasing their BMI for age as compared with those who usually consumed one meal from home (p=0.040; OR=0.19; CI (0.034-0.942)). However, the variations in the food frequency table did not have any statistically significant relation with the various BMI z scores.

4.4.1.4 Snacking Habits

In this study, mean number of snacks consumed daily was 1 ± 0.79, with 77.42% of participants reporting the consumption of some form of snack at least once a day.

The table below reports the summary of snacking habits of participants in the study.

Table 4.11: Frequency of Snacking

Daily Number of Snacks Consumed	**0**	**1**	**2**	**3**	**4**
Frequency (%) (n=93)	22.58	55.91	17.20	3.23	1.08

A statistically significant association existed between BMI for age z score and daily frequency of snacking after a bivariate logistic regression analysis (p=0.031; OR=0.08; CI (0.009-0.798)). This means that study participants who consumed one snack daily had 8% increased odds of having a greater BMI z score in comparison to those who had less than one snack daily. Also, from the same analysis it was seen that study participants who consumed two snacks on a daily basis increased their risk of having a higher sex and age specific BMI z score by 28% as compared with those who did not consume snacks on a daily basis. The odds of having a greater BMI z score for those who

consumed three snacks per day was more than two-fold as compared to those who did not consume snacks daily.

4.4.2 Physical Activity

The frequency of physical activity in this study was assessed using both Physical Education (PE) periods at school and personal physical activity times which may be outside school physical education periods. Over 80% of study participants had PE periods in school even though 76.34% took part during PE periods. A little over 18% had no form of PE at school. PE periods for those who had PE at school were graded on a categorical scale ranging from less than 1 hour to 3 hours. The frequency of PE periods ranged from never to 3 or more times per week.

The table below shows further details on physical activity relating to school PE periods in this study.

Table 4.12: Physical activity frequency

N=93	Never	Once weekly	Twice Weekly	> 3x weekly	Monthly
PE Periods (%)	18.28	69.89	7.53	3.23	1.08
Participation (%)	23.66	65.59	7.53	2.15	1.08

Table 4.13: Duration of physical activity

	< One hour	1 to 2 hours	2 to 3 hours
Duration (%)	36.67	58.89	4.44

Both chi square tests and bivariate logistic regression showed that there was no statistically significant association between BMI z score and school PE frequency. The same was observed for associations between BMI z score and frequency of participation during PE periods at school, as well as duration of school PE periods.

4.4.3 Screen time

Television (TV) viewing on weekends for more than an hour was prevalent among 88.89% of study participants as compared with weekdays, which was 67.03%. This trend was similar with the time spent playing video games for more than an hour on weekends (33.71%) as compared to weekdays (23.6%).

The table below summarizes the findings related to screen time in the study

Table 4.14: Screen Time Duration

	< 1 hour	**1-2 hours**	**2-3 hours**	**4-5hours**	**>5 hours**
TV hours, weekdays (%)	32.97	30.77	13.19	7.69	15.38
TV hours, weekends (%)	11.11	25.56	13.33	14.44	35.56
Game hours, weekdays (%)	76.40	10.11	7.87	1.12	4.49
Game hours, weekends (%)	66.29	15.73	10.11	4.49	3.37

Logistic regression showed significant associations between BMI z score and TV viewing time, as well as BMI z score and video game playing time. Those who spent more than 5 hours playing video games on weekdays had 65 times the odds of increased BMI z score (p=0.001; OR=65; CI (5.12-825.79)) when they were compared to participants who played video or computer games for less than one hour. Those who spent more than 5 hours watching TV had 11.6 times the odds of

increased BMI z score as compared with those who watched TV for less than one hour on weekdays (p=0.037; OR=11.6; CI (1.16-116.42)).

4.4.4 Means of transport to school

Duration spent on one school trip for those who walked to school ranged from 3 minutes to one hour with 71.26% walking for 30 minutes or less, 28.74% walking for more than 30 minutes. No statistically significant association was observed between walking to school and BMI z score using bivariate logistic regression analysis.

4.5 Determinants of Childhood and Adolescent Obesity

Running full model of multiple logistic regression at 95% confidence interval with a significant level of 0.05, with all the behavioral and sociodemographic factors assessed in this study was however not significant (p=0.174, R^2=0.419 and Adjusted R^2=0.111). Evaluation of multicollinearity reported tolerance levels of greater than 0.1, meaning there was no multicollinearity between the various independent variables. However, frequency of eating meals from home (p=0.019, AOR=0.455, 95%CI (0.077,0.834) and playing of video games was significantly associated (p= 0.041, AOR=0.219, 95% CI (0.009,0.429)) with childhood and adolescent obesity in this model.

CHAPTER FIVE

DISCUSSION

5.0 Introduction

The objectives of the study were to determine the prevalence of childhood and adolescent obesity, as well as the sociodemographic and behavioural factors which influence childhood and adolescent obesity at the Legon Staff Village.

5.1 Prevalence of Childhood and Adolescent Obesity

Out of the 93 recruited participants in this study, 7.53% were obese, while 21.51% were either obese or overweight using the WHO age and sex specific BMI z score. The obesity prevalence (7.53%) in this study is similar to a reported obesity prevalence of 7.5% by Amidu et al., (2013) in a sample of school aged children in Tamale between 6 to 12 years. However, the observed prevalence of obesity reported in this survey was lower than those reported for similar studies among school pupils aged 5-15 years in Accra (10.9%) by Mohammed and Vuvor (2012) and higher than that observed by Aryeetey et al., (2017) who reported an obesity prevalence of 5.7% in sampled private and public school children between the ages of 9 to 15 years in Accra and Kumasi. Also, relatively lower prevalence has been reported in an obesity study of 7 African countries, with Ghana reporting an adjusted obesity prevalence of 1.5% (Manyanga et al., 2014).

Among females in this study, the percentage of those who were obese was 2.13%, which was significantly lower than that of their male counterparts, who had a prevalence of 13.04%. This finding is contrasting to many studies which assert higher prevalence of obesity in females as compared with males. For example, studies among adolescents aged 13-15 years in Ghana and Uganda revealed a combined obesity prevalence of 0.9% among girls and 0.5% among boys (Peltzer & Pengpid, 2011). This trend was also consistent in childhood and adolescent obesity

studies by Mohammed & Vuvor (2012) with prevalence for girls and boys as 15% to 7.2% respectively. However global trends in obesity among 5-19 year olds report prevalence of 5.6% for girls and 7.8% in 2016 for boys with mean BMI of 18.6kg/m^2 and 18.5kg/m^2 for girls and boys respectively (Fitzsimons & Benedetta, 2017). These observations show that there are other factors such as population differences, environmental and cultural setting that may influence the sex dependent prevalence of obesity in children, as well as adolescents.

5.2 Factors associated with Childhood and Adolescent Obesity

Factors outlined in this study which had a statistical significant association with obesity in this study were frequency of meal skipping, eating of meals outside the home, frequency of snacking and time spent playing video games and watching TV on weekdays. A full model multiple logistic regression showed frequency of eating meals from home (p=0.019, AOR=0.455, 95%CI(0.077,0.834) and playing of video games (p= 0.041, AOR=0.219, 95% CI (0.009,0.429)) significantly associated with childhood and adolescent obesity in this model.

5.3 Sociodemographic Factors

5.3.1 Age

Among children, the prevalence of obesity was 9.09% while 7.04% of the adolescents were obese. However, bivariate logistic regression showed no significant difference in the risk of higher z scores and age. The proportion of body fat is known to increase with increasing age with a corresponding decrease in muscular mass (Rothman, 2008). Children who are constantly growing , resulting in changes in height and weight may therefore not reflect a corresponding change in body fat, leading to inconsistent rise in BMI as age advances (Rothman, 2008).

5.3.2 Sex

For the socio demographic factors assessed, sex had a significant association with obesity using chi square statistic (0.046). In logistic regression, female children and adolescents in the Legon Staff Village had 86% reduced odds of being obese as compared with their male counterparts this finding was not found to be significant (p=0.080; OR=0.145; CI (0.017, 1.255)). This observation differs with a study by Martin & Ferris, (2007) among a sample of 212 children, 2-12 years in Hartford, USA which reported that the risk of overweight in children doubled with being a female and having an obese parent. According to Gupta (2009), females are more likely to develop obesity as compared with males because of inherent hormonal differences. Differences in gender in relation to childhood obesity has been established both before and during the stage of puberty (Wisniewski & Chernausek, 2009). Some of these differences include hormone biology, environmental and genetic factors, body composition, metabolic processes and differences in weight gain patterns(Wisniewski & Chernausek, 2009). These factors therefore explain the differences in childhood and adolescent obesity and the need for age and gender specific criteria for BMI classification to fit appropriate interventions for dealing with the menace of childhood obesity between the sexes.

5.3.3 Educational Level of Parents

Educational level of both mothers and fathers did not have a statistically significant association with reducing BMI z values in the survey. This may be because most of the community residents are University Staff, resulting in comparatively similar and high levels of education as compared to the national statistics. Studies in Canada among 6-10 graders report that the odds of unhealthy eating (hence obesity status) is increased among communities where the percentage of high school educated parents was low (Janssen et al., 2006). In this study, over 95% of the fathers had at least

a secondary school education while over 80% of mothers had a secondary school education or higher. Also, more than half of fathers were educated to the tertiary level, as well as over 18.28% of mothers. In contrast to this study, parent's educational level influences child obesity status as observed in a survey on Tuscany children aged 8-9 years (Lazzeri et al., 2011). In this study, an inverse relationship was established between a child's obesity status and the educational level of their parents. Mothers who had a low educational level had a 9.3% prevalence of obese children as compared with mothers who had a high educational level (5.8%). Similarly, the prevalence of childhood obesity for fathers of these same children was 9.5% for low educational level fathers and 4.5% for fathers who had a high educational level (Lazzeri et al., 2011). Thus, interventions targeted at reducing the prevalence of childhood and adolescent obesity may target improving maternal education (Moradi et al, 2017).5.3.4 Socio-economic Status of Parents

It was observed that none of the socio-economic statuses assessed (occupation of both parents, as well as food money taken to school) had a significant association with the possibility of becoming obese after bivariate logistic regression analyses. Studies have shown the positive relationship between SES (both individual, as well as group level) and obesity in adolescents (Janssen et al., 2006). Thus, higher unemployment rates, educational levels and average household income at area levels are inversely proportional to adolescent obesity (Janssen et al., 2006). The similar socio-economic stata and educational levels across this sample of University Junior Staff may be a contributing factor to the unrelated socio-economic status and childhood/adolescent obesity status.

However, chi square analysis between obesity status and daily allocation of food money taken to school showed a statistically significant relationship between these two factors ($p=0.036$). Daily allocation of food money for school was chosen as an index for socioeconomic status of parents because generally, parents with high socioeconomic statuses tend to give more allowances to their

children. This study reflected this observation, as Fisher's exact statistics reported a significant association between father's occupation and food money taken to school (p value = 0.015). However, no significant association existed between occupation of mothers and food money taken to school (p=0.015).

5.4 Behavioural Factors

5.4.1 Dieting and Snacking Habits

Both chi square statistic and bivariate logistic regression did not show a statistical association between the risk of obesity and the daily number of meals eaten. However studies by Toschke et al., (2005) assessing the association between meal frequency and child obesity status among 5-6 year olds in Germany show inverse associations between the number of meals eaten and the risk of child obesity status. This observation has some similarity to a Portuguese study among adolescents between ages 13 and 17 living in the urban communities. According to the findings in this study, increasing meal frequency in sample adolescents tended to protect effectively their BMI status from increasing (Mota et al., 2008). Thus, the proportion of adolescents who were either overweight or obese, and who consumed less than three meals a day was significantly greater than that of those who were of a normal weight. This observation inferred that a daily meal frequency of three or more meals protects children from becoming obese. Similarly, children who were usually eating at least three meals more frequently had a reduced risk of increasing their BMI sex and age specific z scores in a survey conducted in USA (Franko et al., 2008). Also 10-12 year old males in a survey who had greater than three meals a day, and included breakfast as well, were twice less likely to develop obesity or a condition of becoming overweight (Antonogeorgos et al., 2012).

Changes in regular meal patterns, including a gradual rise in meal skipping among children may be reasons for current trends in increasing adiposity (Nicklas et al., 2001). A study in Canada among preschoolers observed that meal skippers (breakfast) had a higher risk of increased BMI. This was because of the positive correlation between energy intake and increased BMI but this trend was not observed among preschoolers who did not skip breakfast (Dubois et al., 2009). Meal skipping and its association with increasing BMI may be explained by its association with snacking. Some research have deduced an association with snacking and meal skipping (Savige et al., 2007), and since snacks contribute to weight gain due to their high calories its association with increasing BMI may be explained. This establishes the fact that meal skipping does not provide a solution to the reduction of the risk of adolescent and child obesity. Therefore, intervention programs aimed at reducing juvenile obesity or overweight may be more effective if these youths are encouraged to desist from skipping their meals.

Eating food away from home was common in majority of the study participants with about 86% of them eating a minimum of one meal prepared outside the home. Studies by Ayala et al., 2008 among 13 elementary schools in Southern California reported an association between foods that were consumed outside the home environment and the risk of obesity. Similar research by Gillis and Bar-Or, (2003) confirmed this finding by reporting a positive correlation between the percentage fat in the body and food that was taken away from home. Thus, obese adolescents and children in that study took greater portions of food away from the home as compared to their counterparts who were not obese. This observation highlights the importance of promoting eating from home as much as possible as an intervention for controlling the prevalence of child and adolescent obesity, which seems to be continuously on the rise.

Snacking has become very popular among children, a practice that has become established with the current dietary transition. This may be because of the availability of snacks within the reach of children which makes them readily assessible (Larson and Story, 2013). Snacks in this study included sugar sweetened beverages, baked products, confectionary and chips. Current trends show that children are consuming less fruits and vegetables, soups, mixed meats, eggs and grains and are now consuming more fruit juices and beverages, condiments, snacks, poultry and cheese (Nicklas et al., 2001). Snacks contribute to weight gain because they are energy dense and contain high calories , which contribute to excess caloric intake (Anderson and Butcher, 2006). Research have deduced an association between increased overall energy intake and the frequency of snacking (Larson and Story, 2013) and when excess calories are not balanced with a matching energy expenditure through physical activity, it may lead to obesity.

5.4.2 Physical Activity

Increase in the culture of a sedentary lifestyle has contributed to the gradual rise in prevalence of obesity in children between ages 5-19 years (Gupta et al., 2012) in developing countries. Several studies have observed the immense contribution of physical education in schools as far as obesity reduction in children is concerned (Metcalf et al., 2011; Jansen and LeBlanc, 2010; Riddoch et al., 2007). A physical activity intervention program designed to encourage physical activity in schools was launched in Chilean grade 1-7 school children. This obesity intervention program was reported to be highly successful as BMI z scores and obesity prevalence had a significant reduction from 17% to 12.3% in males and 14.1 to 10.3% in females (Kain et al., 2008). This study however did not support the positive correlation PE periods in schools had on reducing obesity prevalence in children and adolescents. While over 80% of study participants reported some Physical Education periods in their schools at least once weekly, school PE periods did not seem to contribute to

decreasing obesity in these children even though most PE periods were more than one hour (76%). This may be attributed to the activities involved in during those PE periods. Thus, participation in PE among children was encouraging (over 70%) but only a little over 30% of PE activities were reported to be active and vigorous.

5.4.3 Screen Time

A survey conducted by Amidu et al., (2013) in the Tamale Metropolis among children of ages 6-12 years made an inference in the relationship that existed between childhood overweight / obesity and time spent playing computer games. According to this study, obese children spent more time playing computer games as compared with their normal weighted counterparts. This was consistent also with the Legon Staff Village as a statistically significant association existed (directly proportional) between screen time and BMI z scores. Similar studies in Switzerland among children in grades 1-3 confirmed a positive association with childhood overweight / obesity and time spent in playing electronic games (Stetler et al., 2004). Playing video games for long hours promotes a sedentary lifestyle, hence increases the risk of obesity, since obesity thrives when there is relatively low physical activity.

5.4.4 Means of Transport to School

From the study, 38% of participants walked to school and back for at least 5 days weekly while 61.96% got to school through motor transport. This trend is in line with Swinburn & Egger's (2002) study where they reported a rise in the proportion of children who are being driven to school on a daily basis. With the advent of technology, many manual activities have been mechanized including mobility and this includes walking to school. This study however showed no statistical significant association between participants' weight class and walking to school. This may be as a

result of the large proportion (61.96%) who took motor transport to school and the relatively short distance from home to school for most of those who walked to school (15 minutes or less).

5.5 Study Strength

The coverage of the community during the survey was a study strength. The sample size was representative of the entire community. This was made possible because the community was organized and well planned.

5.6 Study Limitations

This type of study conducted was a cross-sectional and descriptive, and because of that, only measures of associations was analyzed. These measures cannot be established as the causative reasons of obesity in the population but rather levels of associations.

The conclusions drawn from the study may not be suitable for inference in other communities with wide educational and socioeconomic gaps. This is because of the type of residents at the Legon Staff Village. Most of the residents were university junior staff, hence had similar educational and socio-economic stata.

CHAPTER SIX

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Summary

The overall objective of this study was to investigate the prevalence of obesity in adolescents and children the respective risk factors at the Legon Staff Village. This was further streamlined to:

1. Determine the prevalence of childhood and adolescent obesity among children and adolescents between the ages of 5 and 17 at the Legon Staff Village.
2. Determine the socio-demographic characteristics that influence childhood and adolescent (aged 5-17) obesity at the Legon Staff Village.
3. Identify the behavioral factors which are likely to influence obesity rates among children and adolescents (aged 5-17) years at the Legon Staff Village.

A sum total of 93 children and adolescents were part of the study with 46 males (49.46%) and 47 females (50.54%). A questionnaire was used to obtain information on demographics, socioeconomic status, dietary patterns, screen time, physical activity and anthropometric measurements of height and weight. Data was analyzed using Stata version 15, a statistical analysis software. Summary statistics, chi squares statistics and logistic regression analyses was used to in various analytic stages of study.

The obesity prevalence was 7.53% while a combination of obese and overweight prevalence was 21.51%. The prevalence of underweight was 23.66% and that of normal weight was 54.84%. Overweight participants had a prevalence of 13.98%. Among those who were obese, the proportion of males was 85.7% while that of females was 14.29%.

Among the sociodemographic factors, sex was statistically significantly associated with obesity using chi square statistic (p=0.046). Behavioural factors that were statistically associated with obesity were screen time (p=0.037; OR=11.6; CI (1.16-116.42) for time spent in TV viewing and (p=0.001; OR=65; CI (5.12-825.79)) for time spent playing video games, meal skipping (p=0.017; OR=8.4 CI (1.45-48.54)), frequency of consuming foods away from home (p=0.040; OR=0.19; CI (0.034-0.942)) and frequency of snacking (p=0.031; OR=0.08; CI (0.009-0.798)).

5.2 Conclusion

The prevalence of obesity among the adolescents and children at the Legon Staff Village is relatively high. The combined prevalence of both obese and overweight participants is also high. The various sociodemographic and behavioural factors which contributed significantly to these are sex, screen time, snacking, meal skipping and eating away from home.

5.3 Recommendation

Schools and communities should be monitored by policy makers such as the government to enforce health improving regulations on dietary practices and physical activity or education, which will contribute to enhanced health of youths in the communities and also aid in reducing the rising prevalence of childhood and adolescent obesity. In addition, parents and care givers should discourage children from unhealthy eating habits such as meal skipping, excessive snacking and eating frequently outside the home.

Sociodemographic factors which contribute to childhood and adolescent obesity should be targeted during intervention programs to aid in the prevention of the onset of obesity in the pre-adult stage.

Awareness creation on behavioural factors such as excessive screen time, meal skipping, excessive snacking and eating frequently outside the home, which influence obesity in these youth should be

made a priority in the community and school environments, including parents and caregivers as well to help them put checks in place to monitor children/ adolescents under their care in order to reduce their risk of getting obese or overweight.

Considering this combined prevalence of childhood obesity and overweight in the Legon Staff Village, further studies should be conducted to understand the mechanism of these factors, and other synergistic variables which collectively contribute to the condition of obesity. The underlying factors contributing to the prevalence should be used as tools to promote effective intervention practices to combat this menace of obesity among the young ones in our communities.

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APPENDICES

APPENDIX 1

QUESTIONNAIRE: PREVALENCE OF CHILDHOOD AND ADOLESCENT OBESITY AT THE LEGON STAFF VILLAGE.

Code of Respondent …… House code: ……

SECTION A: BACKGROUND DATA

1) Sex a. Male ☐ b. Female ☐
2) Date of birth (ddmmyyyy)…….
3) Child lives with? a. Mother ☐ b. Father ☐ c. Both ☐ d.Grandparent(s) ☐ e.Other ☐ (specify)
4) Religion a.Christian ☐ b.Moslem ☐ c.Traditional Religion ☐ d. Buddhist ☐ e.Other ☐
5) Ethnicity a. Akan ☐ b. Ewe ☐ c. Ga ☐ d. Dagomba ☐ e. Hausa ☐ f. Other ☐ (specify)……...
6) Highest Education a. Basic ☐ b. Junior High ☐ c. Senior High ☐ d. Tertiary ☐ e. None ☐

SECTION B: SOCIOECONOMIC BACKGROUND

7) Occupation of Parent(s) ☐ / Guardian ☐
i) Father a. Professional ☐ b. Artisan ☐ c. Informal ☐ d. Self-employed ☐ e. Not employed ☐
ii) Mother a. Professional ☐ b. Artisan ☐ c. Informal ☐ d. Self-employed ☐ e. Not employed ☐
8) Level of Education of Parents(s) ☐ / Guardian ☐
i) Father a. Post Tertiary ☐ b. Tertiary ☐ c. Vocational / Secondary ☐ d. Basic ☐ e. None ☐
ii) Mother a. Post Tertiary ☐ b. Tertiary ☐ c. Vocational / Secondary ☐ d. Basic ☐ e. None ☐
9) Food money taken to school daily a. GH¢1 or less ☐ b. GH¢2-3 ☐ c. GH¢4-5 ☐ d. GH¢6-7 e.GH¢8-10 f. >GH¢10 ☐

SECTION C: DIETARY PATTERN / HABIT

10) No of meals eaten daily a. One ☐ b. Two ☐ c. Three ☐ d. Four ☐ e. Other ☐ (specify)……
11) Meals observed weekly a. Breakfast ☐ b. Lunch ☐ c. Supper ☐
12) Meal times skipped weekly a. Breakfast ☐ b. Lunch ☐ c. Supper ☐ d. None ☐

13) How often weekly? a. Once ☐ b. Twice ☐ c. Thrice d. Four Times e. Other ☐ (specify)….
14) No. of meals prepared at home a. One ☐ b. Two ☐ c. Three ☐ d. Four ☐ e. Other ☐ (specify)…
15) Meals prepared by a. Mother ☐ b. Father ☐ c. Grandparent ☐ d. Self ☐ e. Other ☐ (Specify)……
16) Daily frequency of snacking a. Once ☐ b. Twice ☐ c. Thrice ☐ d. Other ☐ (specify)
17) Snacks usually consumed (list all)
……
Tick the frequency of consumption of the following foods for the past one month

Food	Frequency During the Past one Month					
	Never	Daily	>2 a Week	Weekly	2/3 monthly	Monthly
ANIMAL PROTEIN						
Meat						
Fish/Seafood eg shrimp, crab, etc						
Milk / yoghurt/cheese						
	Never	Daily	>2 a Week	Weekly	2/3 monthly	Monthly
Egg						
Other……						
CEREALS AND GRAINS						
Corn (koko, kenkey, banku, etc)						
Rice						
Millet/sorghum						
Wheat (bread, biscuit, pastries)						
Oats						
Pasta, noodles						
Other ……						
LEGUMES, NUTS						
Groundnut						
Beans/peas/soyabeans						
Palmnut						
Agushie						
Other ……..						
FRUITS/VEGGIES EATEN						
Banana						
Pawpaw						
Mango						
Pineapple						
Orange						
Watermelon						
Apple						
Leafy vegetable/salad						
Other……..						
Other……..						

Other …….						
STARCHY FOODS						
Yam/potato						
Cassava (fufu, kokonte, gari,etc)						
Plantain						
Cocoyam						
Other …….						
OILS, FAT						
Palm oil						
Groundnut oil						
Palm kernel oil						
Margarine /butter						
Coconut oil						
Refined vegetable oil						
Olive oil						
Other …….						
BEVERAGES						
Cocoa/Tea/Coffee						
Fruit juice						
Carbonated / fizzy drink						
Alcohol (beer, palmwine, pito, etc						
Other ……						
CONFECTIONARY						
Toffee						
Ice cream						
Chocolate						
Other ……..						

SECTION D: SCREEN TIME

18) No. of hours spent watching TV

i) Weekday

a. < 1 hour ☐ b. 1-2 hours ☐ c. 2-3 hours ☐ d. 4-5 hours ☐ e.>5 hours ☐

ii) Weekend

a. < 1 hour ☐ b. 1-2 hours ☐ c. 2-3 hours ☐ d. 4-5 hours ☐ e.>5 hours ☐

19) No. of hours spent playing video games

i) Weekday

a. < 1 hour ☐ b. 1-2 hours ☐ c. 2-3 hours ☐ d. 4-5 hours ☐ e.>5 hours ☐

ii) Weekend

a. < 1 hour ☐ b. 1-2 hours ☐ c. 2-3 hours ☐ d. 4-5 hours ☐ e.>5 hours ☐

SECTION E: PHYSICAL ACTIVITY

20) How often do you have physical exercise periods at school?

a. Never ☐ b. Once a week ☐ c. Twice a week ☐ d. Three times a week ☐

e. More than three times a week ☐ f. Other ☐ Specify……..

21) How long are those periods?

a. < 1 hour ☐ b. 1-2 hours ☐ c. 2-3 hours ☐ d. 4-5 hours ☐ e.>5 hours ☐

22) How often do you take part in those periods?

a. Never ☐ b. Once a week ☐ c. Twice a week ☐ d. Three times a week ☐

23) During PE periods, you

a. Sit down (talking, doing school work, reading) ☐

b. Stand or walk around ☐

c. Run or play a little bit ☐

d. Run around and play quite a bit ☐

e. Run and play hard most of the time ☐

24) At school break time sessions, apart from eating you

a. Sit down (talking, doing school work, reading) ☐

b. Stand or walk around ☐

c. Run or play a little bit ☐

d. Run around and play quite a bit ☐

e. Run and play hard most of the time ☐

25) In the past week, indicate in the following list the physical activities you have been involved in and its frequency

Physical Activity	Frequency During the Past Week					
	Never	Once	Twice	3-4 times	5-6 times	7 or more
Walking						
Jogging / running						
Skipping/jumping/ampe						
Dancing						
Swimming						
Swinging / climbing						
Football						
Basket ball						
Volley / Handball						
Tag of war						
Chaskele						
Other …….						

26) Did anything stop you from doing your normal physical activity last week? a.Yes b. No

27) If yes, please specify ……..

28) Do you walk to and from school? a. Yes b. No

29) How many times a week……. and for how long? ……

30) If no, how do you get to school? ……

31). How many times were you involved in physical activity (sports, running, riding, climbing, etc) in your free time in the last 7 days?

a. None ☐ b. Once or Twice ☐ c. Three to Four Times d. Five to six times e. 7 or more

SECTION F: GENERAL KNOWLEDGE ON OBESITY

32) Does your school have periods when you are taught nutrition and healthy eating habits?

a. Yes b. No

33) If yes, how often?
a. Never ☐ b. Weekly ☐ c. Twice weekly ☐ d. Monthly ☐ e. Other ☐
Specify……
34) What do you think causes obesity? a. Eating habits ☐ b. Lack of exercise ☐
c. Hereditary ☐ d. No idea ☐ f. Others ……

SECTION G: ANTHROPOMETRIC DATA Date Measured…….

Age	
Weight / kg	
Height / m	
BMI / kg/m^2	
Remarks	

Filled by ……..

Signature ……. Date……

APPENDIX 2:

PARENT ACCENT FORM

Prevalence of Childhood and Adolescent Obesity and its Associated Risk Factors at the Legon Staff Village

Principal Investigator:

Betty Obeku

Address:

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

Phone: 0542595757

Academic Supervisor:

Dr. Adolphina Addo-Lartey

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

General Information about Research:

Your ward has been considered a participant of our childhood obesity study. Childhood obesity is a condition where children become too heavy for their age, which poses health risks such as hypertension, diabetes, heart disease and joint problems. Childhood obesity has become a health concern in most part of the world including Ghana due to the increasing cases emerging. We are doing this study to help us know the extent of the problem in your community in order to help us understand the factors that contribute to overweight among children aged 5-17 years. Permitting us to go ahead with this study will help us find the proportion on children in this age group who have unhealthy weights to help us come up with interventions to help children to achieve more healthy weights.

If we are granted permission, we will need to take measurements on your ward's, weight and height. Information will also be sought on his or her diet, physical activity, knowledge of obesity and demographic characteristics. It will take between 30 minutes to an hour.

Possible Risks and Benefits:

Apart from the time spent in answering these questions, there are no foreseen risks in this study. You will also bear no cost in this study. These procedures are usually taken in hospitals and other health facilities as normal health data. However, it is hoped that it will help us identify factors that will develop healthy behaviours in your ward to help him or her grow healthily. If at any point of the data collection process, you or your ward wishes to withdraw from the study, you are permitted to do so.

Confidentiality:

Information collected will be used only for academic purposes. Names will not be published and not identified with data collection questionnaires. Only the research team will have access to the information, which will be stored in a protected computerized system.

VOLUNTEER AGREEMENT

I have read and understood the benefits, risks and procedures for the project titled Prevalence of Childhood and Adolescent Obesity at the Legon Staff Village and have all my questions answered. I voluntarily agree to participate with my ward without consequences.

Name _____ Contact No_____

Signature / Thumbprint _____ Date _____

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

DECLARATION BY WITNESS

I was present when this document was read and explained to this parent in a language he/she understands. He / She have understood the benefits, risks and procedures for the project titled Prevalence of Childhood and Adolescent Obesity at the Legon Staff Village and have all questions answered. He / She voluntarily agreed to participate with his or her ward without consequences.

Name of Witness _____

Signature / Thumbprint _____ Date _____

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

Name of Person who obtained consent _____

Signature / Thumbprint _____ Date _____

APPENDIX 3

CHILD ACCENT FORM

Prevalence of Childhood and Adolescent Obesity and its Associated Risk Factors at the Legon Staff Village

Principal Investigator:

Betty Obeku

Address:

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

Phone: 0542595757

Academic Supervisor:

Dr. Adolphina Addo-Lartey

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

General Information about Research:

You have been considered a participant of our childhood obesity study. Childhood obesity is a condition where children become too heavy for their age, which poses health risks such as hypertension, diabetes, heart disease and joint problems. Childhood obesity has become a health concern in most part of the world including Ghana due to the increasing cases emerging. We are doing this study to help us know the extent of the problem in your community in order to help us understand the factors that contribute to overweight among children aged 5-17 years. Permitting us to go ahead with this study will help us find the proportion of children in this age group who have unhealthy weights to help us come up with interventions to help children to achieve more healthy weights.

If you grant us permission, we will need to take measurements on your weight and height. We will also ask you some questions about your diet, physical activity, knowledge of obesity, your personal information such as name, age, class, religion, etc. It will take between 30 minutes to an hour.

Possible Risks and Benefits:

Apart from the time spent in answering these questions, there are no foreseen risks in this study. It will not interfere with your school study time. However, it is hoped that it will help us identify

factors that will help you develop healthy behaviours to help you grow healthily. If at any point of the data collection process, you wish to withdraw from the study, you are free to do so.

Confidentiality:

Information collected from you will be used only for academic purposes. Names will not be published and not identified with data collection questionnaires. Only the research team will have access to the information, which will be stored in a protected computerized system.

VOLUNTEER AGREEMENT

I have read and understood the benefits, risks and procedures for the project titled Prevalence of Childhood and Adolescent Obesity at the Legon Staff Village and have all my questions answered. I voluntarily agree to participate in this exercise without consequences.

Name _____ Contact No. _____

Signature / Thumbprint _____ Date _____

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

DECLARATION BY WITNESS

I was present when this document was read and explained to this child in a language he/she understands. He / She have understood the benefits, risks and procedures for the project titled Prevalence of Childhood and Adolescent Obesity at the Legon Staff Village and have all questions answered. He / She voluntarily agreed to participate without consequences.

Name of Witness _____

Signature / Thumbprint _____ Date _____

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

Name of Person who obtained consent _____

Signature / Thumbprint _____ Date _____

APPENDIX 4

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case ofreply theResearch & Development Division number and date
ofthisGhana Health Service Letter should be quoted.P. O. Box MB 190

Accra

Tel: +233-302-681109

Fax + 233-302-685424

MyRef GHS/RDD/ERC/Admin/AppEmail: ghserc@gmail.com

Your Ref No.28th May, 2018

Betty Obeku
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 our Stud Protocol.

GHS-ERC Number	GHS-ERC060/01/18
Project Title	Prevalence of Childhood and Adolescent Obesity and its Associated Risk Factors at the Le on Staff Villa e
A roval Date	28th Ma ,2018
Ex i Date	27th Ma , 2019
GHS-ERC Decision	A roved

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)

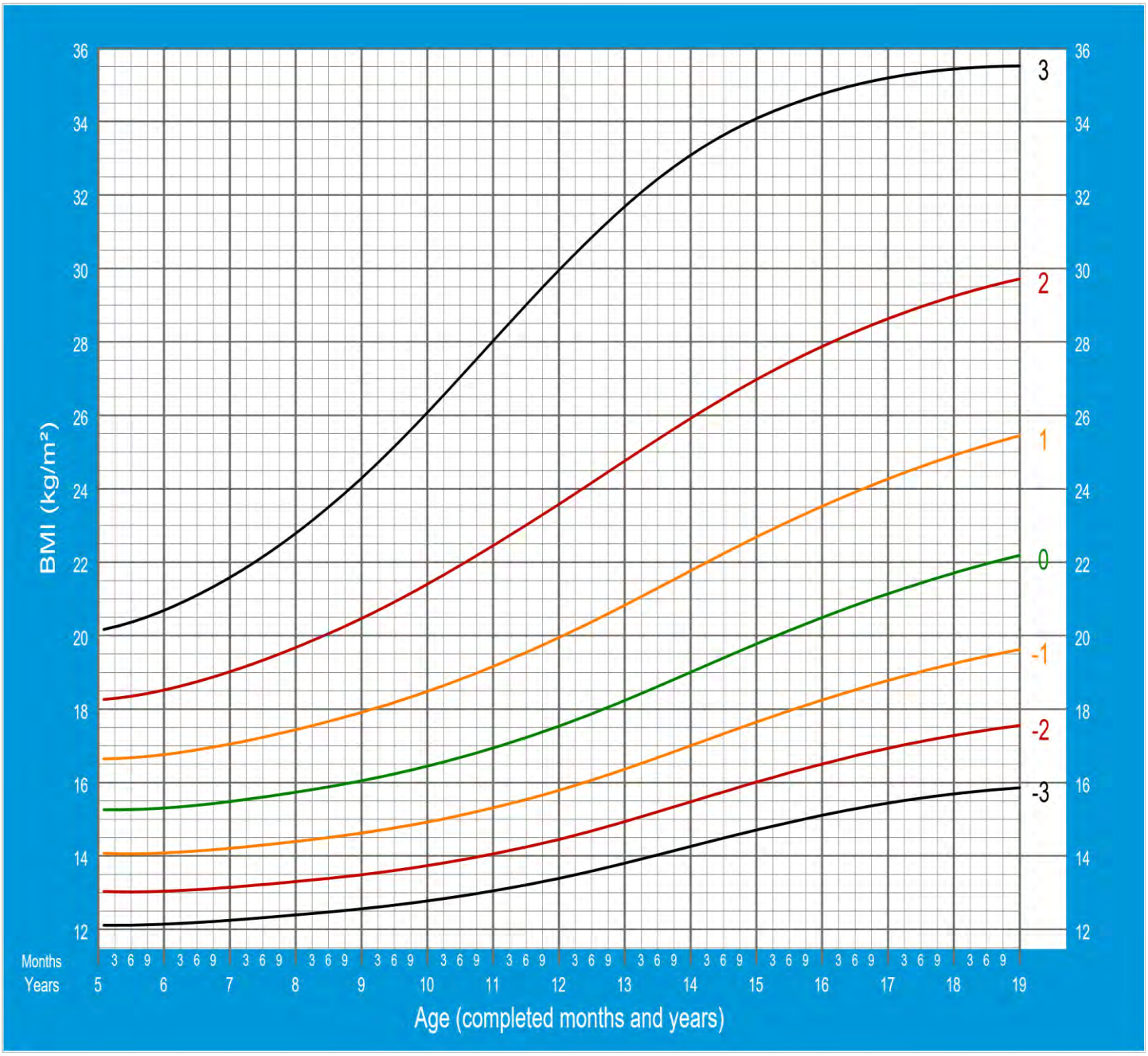
Cc: The Director, Research & Development Division, Ghana Health Service, Accra

APPENDIX 5

BMI-for-age BOYS

5 to 19 years (z-scores)

World Health Organization



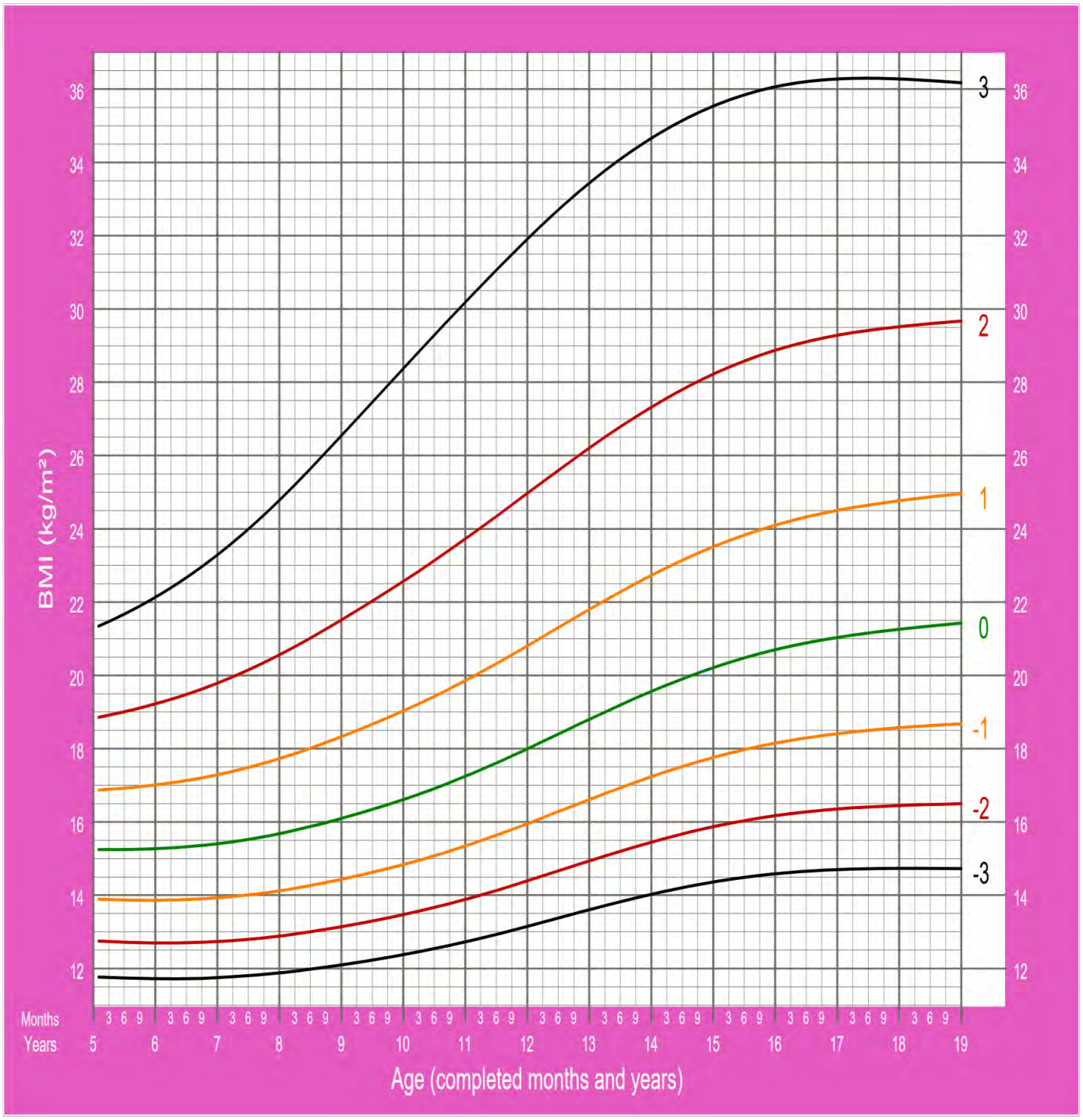
2007 WHO Reference

APPENDIX 6

BMI-for-age GIRLS

5 to 19 years (z-scores)

World Health Organization



2007 WHO Reference