

UNIVERSITY OF CAPE COAST

POTENTIALS OF TEACHERS AS SUPPORT INTERVENTION FOR  
REDUCING OBESITY AMONG PRIMARY SCHOOLS IN THE CAPE  
COAST METROPOLIS

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REDUCING OBESITY AMONG PRIMARY SCHOOLS IN THE CAPE  
COAST METROPOLIS

BY

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Thesis submitted to the Department of Vocational and Technical Education  
of the Faculty of Science and Technology Education, College of Education  
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for the award of Master of Philosophy Degree in Home Economics

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## DECLARATION

### Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:..... Date:.....

Name: .....

### Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

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Co-Supervisor's Signature:.....Date:.....

Name: Dr. Augustina Araba Amissah

## ABSTRACT

The prevalence rate of child obesity has increased globally, including developing countries such as Ghana. The use of teachers as implements of change to combat child obesity seem to be a useful idea since teachers have direct interaction with children for substantial amounts of time each day. Yet, there is no study that has evaluated the use of teachers in managing child obesity in Ghana. This study sought to investigate the intervention strategies that can be adapted by teachers in reducing childhood obesity among primary school pupils in Cape Coast. Survey research design was used to collect data using a multistage sampling technique from teachers (n=133) and students (n=317) in the Cape Coast Metropolis in Ghana. Content validated questionnaire was used for data collection. Results were analyzed using descriptive statistics with bootstrapping.

The results of the study revealed that about 5% of school children were obese and 9% of them were at risk of obesity or overweight. Additionally, teachers had 'good' perception (mean=3.01; SD=0.76) about child obesity, and identified dietary behaviour of children as the key determinant of obesity among the pupils. Although teachers were aware of some intervention strategies they could use in helping children with obesity, they identified some challenges that could hinder their progress such as; financial constraints, lack of time, and also lack of support from parents and pupils. It is recommended that stakeholders interested in preventing childhood obesity should support teachers to be involved in implementing strategic interventions toward the reduction of childhood obesity.

## KEY WORDS

Child Obesity

Pupil

Teacher

Strategies (Tools)

Perception

Primary school

Prevalence

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DEDICATION

To my beloved sister Elizabeth Sekyi- Whyte.

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## LIST OF ACRONYMS

BMI	-	Body Mass Index
CO	-	Child Obesity
COD	-	The Circle of Discontentment
CODT	-	Circle of Discontentment Theory
CVD	-	Cardiovascular diseases
CSHP	-	Coordinated School Health Program
EDB	-	Extreme Dieting Behaviours
EWCB's-		Extreme Weight- Control Behaviours
EST	-	Ecological Systems Theory
GDHS-		Ghana Demographic and Health Survey report
MVPA	-	Moderate to Vigorous Physical Activity
MONICA	-	World Health Organisation Project for monitoring of Cardiovascular Diseases.
RCT	-	Randomized Controlled Trials
SOC	-	Stages Of Change
TTM	-	Transtheoretical Model of Health Behaviour
TFA	-	Trans fatty acid

## CHAPTER ONE

### INTRODUCTION

#### **Background to the Study**

Globally, the prevalence rates of childhood obesity have grown into a pandemic among high, middle, and low income countries with an estimated 42 million children classified as obese or overweight (World Health Organization [WHO], 2012). The use of several strategies by schools to support academic excellence and general wellbeing has been an on-going process in countries and Ghana has not been left out. The incidence of certain types of nutritional challenges has obstructed some if not all of school children's academic work (Fisberg, Baur, Chen, Hoppin, Koletzko, Lau & Uauy, 2004). In recent years, schools have become increasingly more populated with overweight students that leave school leaders tasked with concerns of helping to reduce obesity (Aceves-Martins, Llauradó, Tarro, Solà, & Giralt, 2016).

The constant growth of childhood obesity, have been met with several strategies mostly developed and used in schools such as the National School Lunch, School Breakfast feeding program as well as banning the sale of high calorie foods in schools in America to help improve the diets of pupils (Story, Kaphingst, & French, 2006). Obesity in children has been found to be a serious nutritional challenge because it leads to the development of health complications such as high cholesterol, early signs of high blood pressure, breathing difficulties (asthma), early markers of cardiovascular diseases (metabolic syndrome), sleep disorders and others (British Medical Association; June, 2005; Biritwum, Gyapong, & Mensah, 2006; Truswell, 2010).

Obesity has been found to have effects on grades of students, attendance, illness in the school setting, and high rates in school dropout (Taras & Potts-Datema, 2005). The school setting often creates multiple opportunities for students to enjoy physical activities outside the physical education class, including break periods for playing in schools, after-school programs, extra curricula sports programs, and physical activity clubs (Centres for Disease Control, 2013). These opportunities are particularly important because they involve all students, including those who are not athletically gifted and those with special health care needs (Wechsler, McKenna, Lee & Dietz, 2004).

Literature has highlighted some strategies that have potentials for schools to address childhood obesity: physical activity and nutrition through a Coordinated School Health Program (CSHP) approach, maintaining an active school health council, strengthening the school's nutrition and physical activity policies, increasing opportunities for students to engage in physical activity, encouraging healthy choices in foods and beverages provided within the school and outside the school (Wechsler et al., 2004). Additionally, many teachers now provide students opportunities for physical activity in the classroom as part of planned lessons that teach mathematics, language arts, and other academic concepts through movement (Kohl, Noble, & Hunter, 2001).

Research on obesity recently focused more on school-age population and investigated its trends regarding how youth and teens appear to be managing their health (Budd & Volpe, 2006). As the rate of obesity keeps increasing among adults with its numerous health consequences, questions on



its effect on children has been prompted. Research indicates that in 2003 and 2004, 18.8% of children, age six to eleven years old, and 17.4% of adolescents, age 12-19 years old were considered obese (Thompson, Yaroch, Moser, Finney-Rutten, & Agurs-Collins, 2010). Comparisons from previous research in 1971 show that only four per cent of children aged six to eleven years, and 6.1% of youth aged 12-19 year were classified as obese (Kluger, 2008). This highlights an increase of 15% and 11 % respectively in childhood obesity among children age ranges (6-12 and 11- 19) years. However oin GDHS reporttwice, which is

Strategies to help reduce obesity in schools across the world have supported the declining academic success rates for obese students (Sahota, Rudolf, Dixey, Hill, Barth, & Cade, 2009). Schools with an abundance of vending machines, soda machines, and snack bars have limited the use of these high calorie food alternatives in order to promote healthier messages to the students (Taras & Potts-Datema, 2005). The strategies initially designed were focused on the messages sent to children by placing readily available, inexpensive high calorie foods in every hallway and comparing to healthier food options (Croll, Neumark- Sztainer, & Story, 2001)

According to other reports, evidence show that while formerly school systems failed to satisfy children's need for maintaining a healthy lifestyle (Sallis, Bauman & Pratt, 1998) by allowing few students (4-6%) of their necessary physical activity each day, they have recently become more budget conscious (Story, Neumark- Sztainer & French, 2002). One of the first courses schools often cut or reduce is time spent in extended physical education classes (Taras & Potts-Datema, 2005).

Another strategy used to reduce this nutritional challenge was by educating the children on healthy alternatives rather than put a negative connotation on the choices they are currently making (Benjamins & Whitman, 2010). Although many strategies have shown significant success in effective behaviour changes in the school setting, most fail to report long-term levels of obesity changes. This is partially due to the generalization of such prevention strategies and programs. Moreover, efforts to effect these obesity prevention strategies to age, ethnicity, and gender appear to yield much stronger long-term results (Benjamins & Whitman). It might also be that schools do what they can to provide exercise and better food choices, but when kids go home, they fall back into the lack of good food choices and a sedentary life style. Positively some of these strategies used by schools have indicated unquestionable results by showing significant increases in grade point average, academic involvement, attendance, improving self-image, and reducing dropout rates (Okunade, Hussey, & Karakus, 2009).

In Ghana, the government introduced some programmes such as the School Feeding Programme to provide meals to children on a daily basis supervised by teachers. This program was initiated as a tool to keep children in school but alternatively it has effectively served as a strategy to provide healthy choice of food to the children, thus helping to reduce their intake of calorie dense foods, 2010.

Teachers in their capacity, act as initiators, questioners, recorders, observers, instructors, facilitators, model guides and evaluators. These roles played by teachers provide them with the opportunity to interact with children. Therefore, they can be empowered with possible strategies such as; allowing

pupils to stand to answer questions, encouraging pupils to walk and play during break periods, prohibiting foods, drinks and sweets in the classroom, among others, to act as tools in their respective roles played in schools to help them address the rampant growth of child obesity. Since a large chunk of children's time today are spent with their teachers in school, they can ensure that children spend most of their time being physically active as well as ensuring that the food consumed by children during school hours are healthy and nutritious.

### **Statement of the Problem**

The potential role played by teachers in the developmental stages of children has been an issue requiring insight particularly on the challenges of obesity. [Growing up, the challenge of obesity and all its adverse effects such as, physically, psychologically and emotionally has been a personal struggle to me. Acquiring knowledge in the field of food and nutrition, especially on diet and food choices, brings back to mind the issues with this nutritional challenge. In reminiscing to when the problem started developing stimulated questions about why the needed guidance was not received? Could my teachers have supported my parents to provide me with the needed instructions on the food choices to make and reduce the intake of high-calorie foods?].

This mind bothering issue prompted the research in finding out the potentials of teachers in helping reducing this growing nutritional challenge. This led to a visit to one of the Ghana Education Service offices, where an interaction with one of the directors, revealed that the Education Service have not yet set up any formal intervention strategy to help reduce this public health problem. This is based on the perception that within the Ghanaian society, a

child whose weight is above the normal weight for his or her age is acceptable (Ofei, 2005).

Additionally, it seems parents tend to be pleased with their children being overweight which makes many individuals in the Ghanaian society comfortable with obesity. This nutritional challenge is therefore not taken up as a serious issue to be tackled even though reports from the Ghana Health Service indicates that child obesity has grown at an alarming rate of 3.1% in the country (Ghana Demographic and Health survey, 2014). Identified regions which reported high levels of the prevalence of childhood obesity were Central 4.6%, Greater Accra 5.2% and Volta 4.2% (Ghana Demographic and Health survey, 2014). Globally the challenge of childhood obesity continues to grow at an alarming rate. With an estimated global growth of over 600 million adults, childhood obesity has a record of 41 million (WHO Fact Sheet, June 2016). Although there appears to be no immediate causes for such incidents, the situation could be attributed to the eating habits and or the general behaviour of obese children (Anderson & Butcher, 2006).

Alternatively, a visit to some health and fitness centres' (gyms) around the Cape Coast Metropolis showed a different situation. Parents who visit the place come there with their children from Basic School levels. The researcher thus made some interactions with the gym instructors and it revealed that the parents wanted to keep their children physically active to help reduce their weight and burn the calories they normally consume. This inspired the researcher in finding out how best the incidence of child obesity could be reduced with the help of teachers since the GDHS report (2014) showed that Central Region ranked the second highest in the prevalence of child obesity in

Ghana (4.6%). Socially and psychologically, school children with obesity are affected and suffer low self-esteem, bullying, depression and also behaviour and learning problems (Wardlaw, Insel, & Seylor, 2003). The authors continue that such situations have the potential of causing a decrease in grade point averages, attendance, quality of life, and body self-image across the nation. Again, obesity in children may be able to affect their levels of participation in school activities leading them to display a lack of interest in school activities and the motivation to form social relationships.

From experience, it is known that teachers in their capacity have more influence on children as they spend more time with them than their parents in the world today. This is because; teachers have direct interaction with the children in the classroom, with about 90% of the classroom activities. That could give them the opportunity to support their emotional and psychological needs. In directing and instructing them, children mostly tend to listen and obey what their teachers tell them other than their parents. This creates a sound environment for teachers to support obese children to improved academic achievement, higher self-motivation, and increases in school attendance. Although, teachers have a major role in supporting school children in diverse ways, it appears that they are more concerned about the lessons being taught than the general welfare of the pupils. This study argues that, the possibility of reducing child obesity would be possible when teachers are empowered with tools (strategies) to reduce obesity among children.

The researcher therefore, found it necessary to investigate the potential strategies that could be used by teachers to support school children to reduce the on-going growth rate of obesity.

## **Purpose of the Study**

The main purpose of this study was to investigate the possibility of using teachers in reducing childhood obesity among primary school pupils in Cape Coast. Specifically, the study sought to:

1. to determine the prevalence rate of obesity among primary school children.
2. ascertain the perception of teachers about childhood obesity.
3. identify teachers' level of awareness about causes of obesity among primary school children in Cape Coast.

find out possible intervention strategies teachers can use in supporting children with obesity.

4. identify possible challenges teachers may face in supporting children with obesity in primary schools

## **Research Questions**

The study was guided by the following research questions:

1. What is the prevalence of obesity among primary school children in Cape Coast?
2. How do teachers perceive childhood obesity?
3. Which factors are teachers aware of that can cause obesity among primary school children in Cape Coast?
4. What intervention strategies can teachers use in supporting childhood obesity?
5. What possible challenges are teachers likely to face in supporting children with obesity within primary school pupils in Cape Coast?

## **Significance of the Study**

The findings of the study will be beneficial to parents, teachers and school authorities as it highlights strategies that teachers can use to support the reduction of obesity among children. It will also reveal to policy makers and school authorities, the usefulness of teachers in helping to prevent obesity among primary school children. Finally, the study's result will support the ongoing provision of school meals that will help provide the basic menu for healthy well-being of the children and subsequent reduction of childhood obesity.

### **Delimitations**

Although the incidence of obesity among children is a national challenge across the regions of Ghana, the study was conducted in the Cape Coast metropolis. It was also limited to investigating the role of primary school teachers and not the entire basic school system in finding effective strategies to support the reduction of childhood obesity.

### **Limitations**

Firstly, only about 317 pupils were selected for the study due to time and financial constraints. Also, only primary four to six pupils were used for the study because head teachers in the schools prevented the researcher from working with the pupils in lower primary because of the perception that when researchers visited the schools to measure their height and weight it was accompanied by giving them injections hence created fear amongst the children.

Secondly, the inability to achieve a hundred per cent (100%) return rate because some teachers failed to return their completed questionnaires while others could not respond to all the items of the questionnaire. That led to

bootstrapping of the results during analysis to provide a clearer picture of the study results. Thirdly, the exclusive use of questionnaires to collect information might have yielded shallow findings because other issues could not be followed up into greater depth details. Finally, the sampling technique used did not allow every teacher in the selected primary schools the chance to partake in the study. This implies that the findings may not be representative enough to be generalised.

### **Definition of Terms**

An understanding of terms that have been used in this study is necessary to the interpretation of this study. The following section defines relevant terms as they apply to this study.

Table 1-*Definition of Key Terms*

<b>Term</b>	<b>Definition</b>
Obesity	This is the state of being grossly fat or overweight. Or a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on the health of the individual ( , 2006). The body mass index(BMI) of the individual is above $30\text{kg}/\text{m}^2$
Body Mass Index (BMI)	It is an appropriate indicator or measure of body fat by calculating the individual's weight in kilograms and dividing by the square of height in meters (Cole, Bellizzi, Flegal & Dietz, 2000). It is universally expressed in units of $\text{kg}/\text{m}^2$
Child obesity	This is defined as the BMI of the child at or above the 95 <sup>th</sup> percentile for same age and sex. Also according to the World Health Organisation (WHO) growth reference for school-aged children, obesity is equal to two standard deviations body mass index depending on the age and sex of the child.
Perception	This refers to the way people think about something,



	phenomenon or an event and their idea of what it is like.
Prevalence	This refers to the rate at which a particular condition is widespread, of wide extent, common or has a high occurrence ((www.Dictionary .com). It can also mean the percentage of a population that is affected with a particular disease at a given time
Strategies	A plan of action designed to achieve a long- term or overall aim. It could also be a method chosen to bring about an achievement of a desired goal or a solution to a problem

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### **Organization of the Study**

This study is organised into five chapters. The first chapter is introduction, which provides the reader with the background of the subject, problem statement, and main objectives of the research, scope of the study and organization of the study. Chapter two presents a Literature Review where the topics will be ordered from a broader context to more project specific setting. The third chapter addresses the methodologies in terms of research design, population, sample and sampling procedure, instruments used, data collection procedure and analysis to be used. Chapter four presents findings and Discussion of the research with the attempt to analyse and explain the results of the study. Finally, the summary, conclusions and recommendations are presented in the last chapter.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

#### **Introduction**

In this chapter, existing theoretical and empirical studies that provide the background and basis for this study have been reviewed and discussed. It looks at the relevant works that have been carried out on child obesity with emphasis on teachers' role in managing childhood obesity (CO). Topics including factors influencing CO, teachers' perception on CO, various interventions for CO, interventions used by teachers to control CO and challenges faced by teachers in helping to reduce CO, have also been reviewed.

#### **Theories on Child Obesity (CO)**

The issue of CO has been demonstrated to be a complex phenomenon

(Gibbs, Waters, Leger, Green, Gold, & Swinburn, 2011). Due to the complexity of the factors that accounts for CO, a number of theories have been proposed to explain the concept over the years. The number of theories and frequency of proposition of new theories highlights the inherent inadequacies of earlier propounded theories. While some of these theories are complementary in nature, others have been contrasting, with still others playing a mediating role between contrasting theories. In all, the various theories that have been used to explain CO have been classified into three: behaviour-change theories, biologically-based theories, and social-ecological theories (Gibbs et al.). In this section, all three theories have been discussed, supporting each argument with relevant literature, and providing objective critique which highlights the shortfalls of each theory where necessary.

### **Behaviour-Change Theories of Childhood Obesity**

Behaviour-change theory of obesity suggests that a positive change or modification in a child's lifestyle has the potential of addressing child obesity (Martin, Chater, & Lorencatto, 2013). Interventions for prevention against obesity have predominantly used behaviour-change theoretical frameworks to both understand what causes weight gain and to guide the models for healthy eating and physical activity behaviours in order to address the imbalance that leads to weight gain (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). The most popular and often applied behaviour-change theory is the Transtheoretical Model of Health Behaviour Change (TTM) (Prochaska & Velicer, 1997).

The TTM uses a temporal dimension involving the stages of change, to integrate processes and principles of change from different theories of

intervention, which describes the sequential behaviour change from an unhealthy behaviour to a healthy one in an individual. It is a model of intentional change predicting the possible outcomes during the adaptation process of the 'new' acquired behaviour (Mastellos, Gunn, Felix, Car, & Majeed, 2014). Studies have shown the importance of using the stages of change (SOC) to plan dietary interventions for short-term weight loss amongst overweight and obese individuals over a minimum of three months (Shaw, 2006). The TTM provides a conceptual explanation of the processes that individuals go through when modifying behaviour challenges or acquiring a positive behaviour by changing dietary intake and or physical activity in order to achieve a sustainable weight loss (Mastellos et al., 2014). The SOC is the main construct of the TTM and illustrates the sequential progress and series of stages that individuals undertake for a specific behaviour transformation (Velicer, Prochaska, Fava, Norman, & Redding, 1998). The transtheoretical model construe change as a process involving, precontemplation, contemplation, preparation, action and maintenance; which an individual goes through in adopting a healthy behaviour or quitting the unhealthy one (Prochaska, 2013).

Although, change implies phenomena occurring over time, none of the leading theories of therapy contained a core construct representing time (Prochaska & Velicer, 1997). This is because behaviour change was often construed as an event, such as quitting smoking, drinking, or overeating.

Precontemplation is the stage in which people do not intend to take action in the foreseeable future, and this is usually measured within the next six months (Mastellos et al., 2014; Oldenburg, Glanz, & French, 1999). People

are likely to be in this stage because they may be uninformed or under informed about the consequences of their behaviour (Prochaska & Velicer, 1997). Additionally, they might have tried to change a number of times and become demoralized about their abilities to change. Both groups tend to avoid reading, talking, or thinking about their high-risk behaviours. They are often characterized in other theories as resistant or unmotivated clients or as not ready for therapy or health promotion programs (Prochaska & Velicer).

Contemplation is the stage where individuals openly state their intent to change within the next six months due to increased awareness on the benefits of changing but are hesitant in view of the cost involved in changing the behaviour (which may lead to their inability to take a decision to change and therefore get stuck at this stage for a longer period of time) (Mastellos et al., 2014). This group is known as contemplators or procrastinators and are often not ready for traditional action- oriented programs. During this stage, an individual is more aware of the pros of changing but are also acutely aware of the cons (Oldenburg et al., 1999; Werch, Ames, Moore, Thombs, & Hart, 2009). This balance between the costs and benefits of changing often produce profound uncertainty that can keep people stuck in this stage for long periods of time.

During the preparation stage, individuals are ready to change and keen to take action, and they need to set goals and priorities (Oldenburg et al., 1999). Often, such individuals have already engaged in processes, which have increased their ability to identify factors, which influence their lifestyle and the relevant health behaviour, and to initiate behaviour change. It is at this

stage that an individual desiring change is likely to make concrete plans such as signing up for a weight loss program.

The action stage is where individuals make overt modifications in their lifestyles within the past six months. In addition, individuals acquire the criterion agreed by professionals to reduce the risk of a disease (Mastellos et al., 2014; Oldenburg et al., 1999; Prochaska & Velicer, 1997; Werch et al., 2006). Action is defined as the most explicit behavioural transformation and needs considerable commitment of time and energy, that require the skills to use key strategies in order to change habitual patterns of behaviour and adopt a healthier lifestyle (Oldenburg et al. 1999).

In the final maintenance stage, individuals work to avoid relapse and are most often less tempted to deteriorate as they increasingly become confident and able to continue their changes (Mastellos et al., 2014), but do not apply change processes as frequently as the people in the action stage (Prochaska & Velicer, 1997). Based on temptation and self-efficacy data, the maintenance stage has been estimated by earlier authors to last from six months to five years. This stage has often been viewed as a static stage. It is however more of a continuation and not merely an absence of change (Mastellos et al.). The main characteristics include a stable behaviour change and avoiding relapse. Although, people do not necessarily move through the stages in a linear fashion (Mastellos et al.), they may relapse and repeat stage progressions, and may enter or exit the stages at any point (Miller & Rollnick, 2002).

In order for an individual desiring change (e.g. to lose weight) to be able to progress through these stages of the change process as aforementioned,

certain covert and overt activities are required (Prochaska, Velicer, DiClemente, & Fava, 1988). These activities are referred to as the processes of change. Processes of change provide important guides for intervention programs, since the processes are like the independent variables that people need to apply to move from stage to stage. Ten processes which have received the most empirical support in literature (Prochaska et al.) are considered below.

Consciousness raising involving increased awareness about the causes, consequences, and cures for a particular problem behaviour. Interventions that can increase awareness include feedback, education, confrontation, interpretation, bibliotherapy, and media campaigns. Dramatic relief initially produces increased emotional experiences followed by reduced effect if appropriate action can be taken. Psychodrama, role playing, grieving, personal testimonies, and media campaigns are examples of techniques that can move people emotionally (Conner, Longshore & Anglin, 2009).

Self-re-evaluation combines both cognitive and affective assessments of one's self-image with and without a particular unhealthy habit, such as one's image as a couch potato or an active person. Prochaska et al. (1988) therefore suggested value clarification, healthy role models, and imagery as techniques that can move people evaluatively.

Re-evaluation of the environment combines both affective and cognitive assessments of how the presence or absence of a personal habit affects one's social environment such as the effect of smoking on others. It can also include the awareness that one can serve as a positive or negative role model for others. Empathy training, documentaries, and family interventions

are possible ways which lead to such reassessments (Velicer, Prochaska, Fava, Norman, & Redding, 1998).

Self-liberation is both the belief that one can change and the commitment and recommitment to act on that belief. New Year's resolutions, public testimonies, and multiple rather than single choices can enhance self-liberation or what the public calls willpower. Motivation research indicates that people with two choices have greater commitment than people with one choice; those with three choices have even greater commitment; having four choices does not further enhance willpower. For example, three excellent action choices smokers can be given are cold turkey, nicotine fading, and nicotine replacement (Dallow & Anderson, 2003).

Social liberation requires an increase in social opportunities or alternatives especially for people who are relatively deprived or oppressed. Advocacy, empowerment procedures, and appropriate policies can produce increased opportunities for minority health promotion, gay health promotion, and health promotion for impoverished people. Strategically, the use of smoke-free zones, salad bars in school lunches and also easy access to condoms among others proved potential ways that help people to change (Marshall & Biddle, 2001).

Counterconditioning requires the learning of healthier behaviours that can substitute for problem behaviours. Relaxation can counter stress; assertion can counter peer pressure; nicotine replacement can substitute for cigarettes; and fat-free foods can be safer substitutes. Stimulus Control removes cues for unhealthy habits and adds prompts for healthier alternatives. Avoidance, environmental reengineering, and self-help groups can provide stimuli that



support change and reduce risks for relapse. Planning parking lots with a two-minute walk to the office and putting art displays in stairway are examples of reengineering that can encourage more exercise (Prochaska & Velicer, 1997).

Contingency Management provides consequences for taking steps in a particular direction. While contingency management can include the use of punishments, Landrum and Kauffman, (2006) revealed that self-changers rely on rewards much more than punishments. So, reinforcements are emphasized, since a philosophy of the stage model is to work in harmony with how people change naturally (van't Riet, Sijtsema, Dagevos, De Bruijn, 2011). Contingency contracts, overt and covert reinforcements, positive self-statements, and group recognition are procedures for increasing reinforcement and the probability that healthier responses will be repeated (Prochaska et al., 1988).

According to Landrum and Kauffman (2006), helping Relationships combine caring, trust, openness, and acceptance as well as support for the healthy behaviour change. Again, rapport building, a therapeutic alliance, counsellor calls, and buddy systems can be sources of social support (van't Riet et al., 2011).

Prochaska et al. (1988) identified two main underlying assumptions for TTM; the majority of people that are not ready to change their behaviour and will therefore not be helped by traditional action-oriented prevention programs and the complexities of behavioural change which may unfold in a sequence of stages. Individuals typically adapt these different processes of change according to the progress they make towards changing their behaviour (DiClemente, 1985). Although these assumptions hold true in many cases of

behavioural change, when the model is applied to health behaviour change, it is not assumed that people are automatically ready to act to change a personal health habit. Instead, interventions are individually tailored to meet people where they are at in their level of readiness for change. For example, if individuals are in the precontemplation stage, they might be provided with more information about their health problem (Beckman, Hawley, & Bishop, 2006). In contrast, if they are in the preparation stage, they might be encouraged to develop an action plan and to elicit support from friends and family.

The TTM has been applied to the management of obesity. In an application of the TTM, some investigators found that an intervention to improve dietary adherence in adolescents, which was designed to target each participant's unique stage of change, was positively received by the adolescents, whilst it got popular with the interventionists (Berg-Smith, Stevens, Brown, Van Horn, Gernhofer, Peters, & Smith, 1999).

In a family practice setting, Campbell, DeVellis, Strecher, Ammerman, DeVellis & Sandler (1994), designed and distributed individually tailored computer printouts based on patients' stages of change to give them the message about the need to reduce fat intake. At a 4-month follow-up, the tailored intervention produced significant decreases in fat intake scores compared with those of a control group.

Furthermore, the TTM has been applied to obesity management through an intermediary strategy namely, physical exercise. For example, in a study by Dallow and Anderson (2003), the researchers demonstrated significant and positive changes on a measure of processes of change when

obese women were engaged in a program that aimed to change the way they thought and behaved in relation to physical activity. A meta-analysis of empirical studies that applied the TTM to physical activity and exercise revealed that membership in a particular stage of readiness for change was correlated with different levels of physical activity (Marshall & Biddle, 2001).

Generally, the readiness for change construct is recognized as an important new tool in consultations on health behaviour change. This approach has been used to bridge several different conceptual models (Epstein, 1998). The application of the model helps people to be more active agents in behaviour change, rather than being the passive recipient of a medical professional's solution. (Rollnick, 1996). Barlow and Dietz (1998) pointed out that if a behavioural health intervention does not give consideration to a patient's stage of change, it may actually be harmful to the patient. For example, if a weight-management program is prescribed to a child who is not ready to make a change, it may actually decrease the child's self-esteem and impair his or her future efforts to manage weight.

### **Biologically-Based Theories**

A range of alternative ways of conceptualising the theories underpinning weight gain behaviours and solutions include genetic factors and biological variables, such as gender and age. Essentially, the regulation of body weight is conceptualized to be based on homeostasis; thus, a common biological theory of obesity is termed Homeostatic theory of obesity (Marks, 2015). Continuing the author considered Homeostatic regulation as a singular unifying principle in all health protection and illness prevention. Homeostasis is one of the distinguishing features of all living things which regulates health,

preserves life when in balance, terminates life when imbalanced, and its absence could result in the death of systems (Mamontov, Koptioug, & Psiuk-Maksymowiaz, 2006). Homeostasis operates at all levels of living systems: in cells, tissues, organs, organisms, societies and, in biodiversity and the planet as a whole (Lovelock, 2009). Tissue homeostasis regulates the birth (mitosis) and death of cells (apoptosis). Many diseases are directly attributable to defective homeostasis leading to over production or under production of new cells relative to cell deletion (Fadell & Orrenius, 2005). Biochemical and physiological feedback cycle regulate billions of cells and thousands of compounds and reactions in the human body to maintain body temperature, metabolism, blood pH, fluid levels, blood glucose and insulin concentrations inside the body (Matthews, Hosker, Rudenski, Naylor, Treacher, & Tumer, 1985). While good physical health promotes biochemical and physiological homeostasis, severe disruptions of homeostasis causes illnesses, including fatty acid storage imbalance which leads to obesity (Singla, Bardoloi, & Parkash, 2010).

Homeostasis is the in-built tendency of a living organism to maintain stable equilibrium among its internal components while interacting with the external environment. Homeorhesis is the tendency of living organisms to evolve along a trajectory while environmental conditions are continuously changing (Mamontov, 2007). Homeorhesis brings stability, order and normalcy in an evolving trajectory with internal and external disturbances. Homeorhesis is a necessary feature of any living system which reduces to homeostasis at any particular moment of time, (Mamontov et al., 2006).

Homeostatic imbalances occurring in the psychological state has been identified as a contributing factor in the incidence of obesity, and its imbalance creates ‘the circle of discontentment’ (COD), (Marks, 2015). Furthermore, the author’s theory of ‘the circle of discontent’ is described for most people in five pathways which tends to be in equilibrium as (1 = overweight and obesity – body dissatisfaction; 2 = Body dissatisfaction – negative affect; 3 = Negative affect – energy-dense consumption; 4 = energy-dense consumption – overweight & obesity; 5 = negative affect – overweight & obesity). Continuing, the author asserts that if for any reason, high levels of dissatisfaction, negative affect, consumption or increased body weight should arise, the interactivity through the feedback loops forms a vicious circle, that causes disturbance to the stability of the system controlling weight gain. Once activated, the system drifts away from equilibrium towards what in effect becomes a dysfunctional state of non-control. Furthermore, following from the fact that the activation of any one of the four processes within the circle activates its neighbours, the feedback loops runs up activity levels throughout the system which move into overdrive, just as is the case of a badly performing motorcar with the accelerator pedal stuck all the way to the floor.

In the first instance, many investigators have found an association between overweight or obesity and body dissatisfaction. Presnell, Bearman, & Stice, (2004) examined risk factors for body dissatisfaction using data from 531 adolescent boys and girls. Factors such as; elevations in body mass, negative effect and perceived pressure to be thin from peers, but not thin-ideal internalization, social support deficits or perceived pressure to be thin from family, dating partners or media, predicted increases in body dissatisfaction.

They also found gender as a moderate factor of the effect of body mass on body dissatisfaction. McLaren, Hardy and Kuh (2003), studied the relationship between past body size and current body dissatisfaction among 933 middle-aged women from a prospective birth cohort study. Women who were dissatisfied at mid-life were found to have been heavier at age seven and showed a more rapid increase in BMI with age.

It has been documented that when others are self-motivated such that obese individuals feel dissatisfied about their body size, it could be an effective intervention for obesity issues as found in a sample of undergraduates, where Duarte, Pinto-Gouveia and Ferreira (2015) found BMI to be highly positively associated with body image dissatisfaction ( $r = .58$ ). A novel finding was that self-compassion buffered the association between negative body image evaluations and young women's quality of life. Cruz-Sáez, Pascual, Salaberria, & Echeburda (2015), studied emotional distress and body image concerns in 712 Basque Country, Spanish normal weight and overweight adolescent girls and confirmed the Circle of Discontent Theory (CODT). Additionally, the authors found 12.3% of normal weight girls and 22.5% of overweight girls with extreme weight-control behaviours (EWCBs), such as; self-induced vomiting, taking laxatives, diuretics, diet pills and fasting. In normal-weight adolescents, engagement in EWCBs was associated with high levels of somatic symptoms, a drive for thinness and control overeating. In overweight girls, high levels of emotional distress, body dissatisfaction and depression were associated with EWCBs. The findings of Cruz-Sáez et al, (2015) were completely consistent with the CODT, where highly significant positive relations were found between BMI, emotional

distress, body image concerns and EWCBs, as predicted. While EWCBs represent an adolescent's striving to restore a more ideal state of homeostasis, to break the COD by restoring and normalizing equilibrium between their body weight, body satisfaction, affect and consumption, in Cruz- Sáez et al.'s study, EWCBs occurred with greater frequency in overweight than in normal weight adolescents. The overweight adolescent females reported a greater drive for thinness, more body dissatisfaction and more negative self- beliefs. In normal weight females, emotional distress, negative self-belief, control of overeating and drive for thinness predicted engagement in EWCB. The study also revealed that in overweight girls, depression and body dissatisfaction predicted engagement in EWCB. These results led the authors to conclude that emotional distress, together with the excessive importance placed on physical appearance to define one self, low self-esteem and the negative cognitions associated with the body and eating, could play an important role in the development of weight-control behaviours that put adolescent girls' health at risk, including those considered as normal weight (Cruz-Sáez et al., 2015).

Evidence provided was consistent with the CODT. For example, in a prospective study, Rierdan, Koff and Stubbs (1989) evaluated the importance of body image in early adolescent girls' depression and found scores of over 500 girls that were assessed twice, in the fall (Time I) and spring (Time 2) of a school year. The result from the discriminant analyses showed that body image at Time 1 was important in the prediction of persistence of depression. Paxton et al. (2006) examined whether body dissatisfaction prospectively predicted depressive mood and low self-esteem in adolescent girls and boys 5 years later. Time 1 body dissatisfaction was a unique predictor of Time 2

depressive mood and low self-esteem in early-adolescent girls and mid-adolescent boys. They concluded that body dissatisfaction is a risk factor for depressive mood and low self-esteem in both girls and boys indicated at different phases of adolescence.

Mond, Hay, Rodgers, Owen and Beumont (2004) found that impaired emotional well-being of overweight adolescents was due primarily to the effects of weight-related body dissatisfaction during both early and late adolescence. The authors concluded that body dissatisfaction was 'central to the health and well-being of children and adolescents who were overweight'. A reciprocal causal association between depression and body dissatisfaction was also reported by Keel, Haedt and Edler, 2001. Participants had completed a controlled treatment study of bulimia nervosa and participated in follow-up assessments 10 years later. Baseline levels of depression were found to prospectively predict body dissatisfaction at follow-up assessment, suggesting depression as a contributing factor in the maintenance of body dissatisfaction over a 10-year period.

In a prospective study, Wardle, Guthrie, Sanderson and Rapoport, 2001, found that baseline depression was associated both with body satisfaction and binge eating; given that depression contributed independently to binge eating which partly mediated the body-dissatisfaction effect. This pattern was confirmed in the longitudinal analysis which highlighted reduced depression's association with less binge eating, with the reduced depression partly mediating the effect of reduction in body dissatisfaction. Wardle et al. suggested that 'reductions in depressed mood or improvements in well-being during obesity treatment might be expected to have enduring effects on eating



control'. This issue could also be located during the period of pregnancy as it tends to be a period of stress and anxiety, especially in the case of an eating issue (Ward, Hales, Haverly, Marks, Benjamin, Ball & Trost, 2008).

Clark, Skouteris, Wertheim, Paxton, & Milgrom, 2009, examined depression and body dissatisfaction across pregnancy and the first 12 months of postpartum. During pregnancy, women's perceived attractiveness and strength/fitness remained stable, while feeling fat and salience of weight/shape decreased in late pregnancy. During the postpartum, feeling fat and salience of weight/shape increased. The study found that depression and body dissatisfaction were correlated concurrently and across multiple time points. The prospective analyses carried out by Clark et al. (2009), suggested that greater depression occurring in late pregnancy tends to predict body dissatisfaction at 6 weeks postpartum and feeling fat throughout the postpartum.

Reciprocal causal links in the pathway between negative affect and consumption of high-energy foods are well established in literature (Marks, 2015). Variety of discontents have been shown to have associations with food consumption and basic need satisfaction (Timmerman & Acton, 2001), anxiety (Nguyen-Rodriguez, Unger, & Spruijt-Mete, 2009; Schneider, Friedrich, Klotsche, Pieper, Nauck, John, & Silar, 2010), anger (Macht, 1998), stress (Adam & Epel, 2007) and boredom (Crockett, Myhre, & Rowke, 2015). Emotional eating has been viewed as an 'escape' to avoid negative self-awareness resulting in behavioural disinhibition and overeating (Heatherton and Baumeister, 1991). Distress or discomfort induced eating, including binge eating, was highlighted as an available response to negative emotions (Arnou,

Kenardy, & Agras, 1995; Stice, 2001; Stice & Shaw, 2002; van Strien, Herman, Engels, Larsen, & van Leeuwe, 2007) as overeating found in vulnerable individuals (Van Strien et al., 2007). Some studies suggest that women are more prone to emotional breakdown than men (Grunberg and Straub, 1992; Matcht, 1998), because the latter tends to rely more frequently on other practices such as drinking, drugs and gambling.

Le Port et al. (2012), examined the association between dietary patterns and depressive symptoms over 10 years in a French cohort of 12,400 people aged 45–60 years. Low- fat, snacking and fat-sweet diets in men, and low- fat and snacking diets in women, were associated with depressive symptoms at the start and at follow-up. Conversely, a traditional diet characterized by fish and fruit consumption was associated with a lower likelihood of depressive symptoms in women. The healthy eaten pattern, characterized by vegetable consumption, was associated with a much-reduced risk of depressive symptoms. The authors suggested that there was probably a reverse causality effect for the healthy eating pattern.

In a longitudinal, population-based study of 2,359 men and 2,791 women in Northern Finland, BMI at 31 years were found as the highest among stress-driven eaters and drinkers, especially among women (Laitinen, Ek, & Sovio, 2002). Stress-driven eaters liked eating sausages, hamburgers and pizza and chocolate more frequently than other people and consumed more alcohol. Rosenbaum and White (2015) investigated depression, anxiety and stress as independent correlates of binge eating in a mixed, community sample with diverse backgrounds. The findings indicated a relationship between anxiety

and binge eating, and between stress and binge eating, independent of depression.

Holt, Lee, Morton, and Tonstad (2015) examined the relationship between trans fatty acid (TFA) intakes and emotion regulation, mediated by positive or negative affect. Archival data on 1699 men and 3293 women were analysed to measure TFA intake at baseline, its positive and negative affect and emotional regulation at follow-up. The results showing that higher TFA intake was associated with subsequent difficulties, emotional awareness, clarity and regulation strategies, was mediated by affect. Lower TFA intake was associated with increased positive and decreased negative affect which, in turn, was associated with improved emotion regulation. These findings suggest that TFA intakes may cause problems in the regulation of emotion.

Graziano, Calkins and Keane (2010), revealed that proneness to boredom and difficulties in emotion regulation simultaneously predict inappropriate eating behaviour, including eating in response to boredom and other negative emotions and external cues. Economic pressures influenced depressive symptoms and spousal support which served as a buffer against poor health and weight management behaviours for husbands, while depressive symptoms exacerbated poor health and weight management behaviours for wives (O'neill & O'driscoll, 2015).

Lundahl and Nelson (2015) proposed four ways in which sleep problems were likely to increase food intake, namely, homeostatic mechanisms which disrupted appetitive hormones, impaired executive/cognitive functions with corresponding increases in reward sensitivity, increased negative affect and stress and increased impulsivity.

Guertin, Loftfield, Boca, Sampson, Moore, Xiao, ... and Sinha (2015) tested a longitudinal motivation model for healthy eating in patients with CVD. Participants with self-determined motivation were found to be more likely to develop a sense of self-efficacy towards eating and a healthy diet, which had beneficial effects on their physical health and life satisfaction.

Brown, Kola-Palmer and Dhingra (2015) reported gender differences and correlates of extreme dieting behaviours (EDBs) among 15,425 US adolescents from the 2011 Youth Risk Behaviour Survey. Being hit by a partner, being raped, bullied in school and feelings of hopelessness were all with EDBs in both females and males. They concluded that 'fasting, diet, pill use, and purging could be quick and useful markers ('red flags') for other risk behaviours and mental health difficulties for both genders.

Many strands of evidence suggested causal links between the consumption of high-caloric foods containing high levels of fat and/or sugar and the development of obesity. A review of clinical trials involving humans where effects of a reduction in the amount of energy from fat in the diet was studied showed that a reduction of 10% in the proportion of energy from fat was associated with a reduction in weight of 16 g per day (Bray & Popkin, 1998). A more recent review came to similar conclusions (Hooper, Abdelhamid, Moore, Douthwaite, Skeaff, & Summer, 2012), suggesting a causal link between ingested fat and weight change. Passive over-consumption of high-fat foods, in particular, has been linked with a higher frequency of obesity (Blundell & MacDiarmid, 1997). In a prospective study with 107,243 postmenopausal American women aged 50–79 years, greater chocolate-candy intake was associated with greater prospective weight gain (Greenberg,

Manson, Buijsse, Wang, Allison, Neuhouser, ... & Thompson, 2015). Similarly, increased consumption of sugar-sweetened beverages was found to cause weight gain and the incidence of type 2 diabetes in young and middle-aged women (Schulze, Manson, Ludwig, Colditz, Stampfer, Willett, & Hu, 2004). A systematic review of prospective cohort studies and randomized controlled trials (RCTs) by Malik, Pan, Willet and Hu (2013), showed evidence that consumption of sugar-sweetened beverages promoted weight gain in children and adults.

Economic analyses suggested that the increased prevalence of obesity in the United States could be largely attributed to the increased frequency of snacking in the diet (Cutler, Gleaser & Shapiro, 2003; Jahns, Siega-Riz & Popkin, 2001).

McDonald, Baylin, Arsenault, Mora-Plazas and Villamor (2009) investigated the prevalence of overweight and any associations with dietary patterns and physical activity in a prospective study in children in Bogotá, Colombia. It was revealed that overweight was 3.6 times greater in children whose mothers were obese compared with children whose mothers had normal BMI. Child overweight was also positively associated with adherence to a 'snacking' dietary pattern and to frequent intake of hamburgers and hot dogs with a prevalence ratio for at least once per week versus never of 1.93, independent of total energy intake and other potential confounders. In a second report, a snacking dietary pattern and soda intake were both found to be related to the development of adiposity (Shroff, Perng, Baylin, Mora-Plazas, Marin, & Villamor, 2014). Snacking and eating during the night were more apparent in people suffering from psychological distress (Colles, Dixon,

& O'Brien, 2007) and depression, and was a risk factor for obesity (Gallant, Lundgren, & Drapeau, 2012).

Setting aside the fact that weight gain is an unwanted side effect of some drug treatments for psychiatric disorders (Zimmerman, Gubeli, Puntener, & Molinari, 2004); psychiatric studies indicate a reliable association between depression and obesity.

A prospective study of depression and adolescent obesity with 9374 participants by Goodman and Whitaker (2002) showed that depressed mood at baseline independently predicted obesity at follow-up. Werch, Ames, Moore, Thombs and Hart (2009) investigated whether depressive symptoms in people with overweight or obesity was related to increased eating problems and decreased self-esteem. Depressed participants were observed to suffer from more eating problems, more restraint and higher BMI than non-depressed participants.

Roberts, Deleger, Strawbridge and Kaplan (2003) examined the temporal association between obesity and depression in a two-wave, 5-year observational study with 2123 participants, aged 50 years and older. Obesity at baseline was associated with an increased risk of depression 5 years later, even after controlling for depression at baseline and an array of other covariates. Luppino, de Wit, Bouvy, Stijnen, Cuijpers, Penninx and Zitman (2010) systematic review of longitudinal studies of depression and obesity indicated that obesity at baseline increased the risk of onset of depression at follow-up by 55%, while overweight increased the risk of onset of depression by 27%.

Similar findings were published by Faith, Butryn, Wadden, Fabricatore, Nguyen and Heymsfield (2011) from a Swedish longitudinal case

control study of children from birth to 15 years in which children more than 15% above average weight had suffered more psychosocial stress than controls (Mellbin & Vuille, 1989). In a prospective study of 7965 British civil servants aged 35–55 at entry into the Whitehall II study, Kivimäki, Head, Ferrie, Shipley, Brunner, Vahtera and Marmot (2006) measured work stress and BMI. A bidirectional effect of work stress on BMI was evident among overweight and obese men, but weight loss was more likely among stressed lean men.

Relatively few studies have investigated the direct association between body dissatisfaction and consumption of food and beverages. Stice and Shaw (2002) highlighted the pressure to be thin, thin-ideal internalization and elevated body mass were potential causal factors for increased risk for body dissatisfaction. However, they concluded that this relationship was mediated by increases in dieting and negative effect consistent with the CODT. Since the findings have been inconsistent, the potential role of the pathway from body dissatisfaction to consumption remains uncertain.

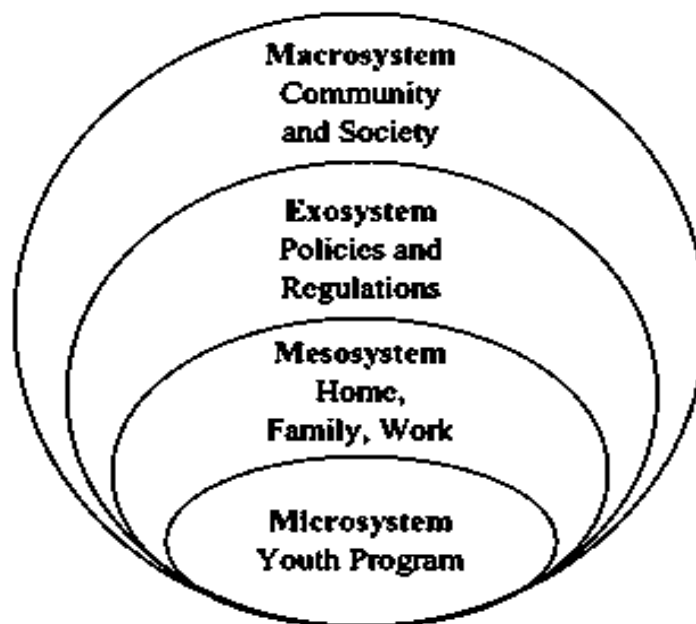
This theory suggests that an individual's body has an inbuilt tendency of becoming obese as a result of interaction with the external environment. However, in the quest of reducing the growth of obesity in children, teachers who form part of the child's external environment with which he or she interacts can be used to reduce the tendency of developing obesity through the use of intervention strategies.

### **Social-Ecological Theories**

It must be noted that the first two theories discussed focused on the individual. Yet, identified external (family, school, youth programs, and peer

groups) factors played a major role in obesity development (Penhollow & Rhoads, 2013). It has been acknowledged in the literature that childhood obesity has a multifactorial etiology, involving both individual and environmental factors (Boonpleng, Gallo, Corte, McCreary, & Bergren, 2013).

In view of this, Bronfenbrenner (as cited in Ryan, 2001), postulated in his ecological systems theory (EST) that human development, especially the psychological and social aspects, were influenced by a reciprocal relationship between the individual and the social system. More specifically, the author continued that an individual's surroundings tend to shape his or her attitudes, beliefs, and behaviours while those factors are also affecting their environment. In the context of physical activity, health behaviours occur within and are influenced by the multiple systems individuals reside within. Bronfenbrenner's social ecology framework comprised four systems: (1) microsystem; (2) mesosystem; (3) exosystem; and (4) macrosystem (see Figure 1).



*Figure 1: Ecological systems model*  
Source: Adopted from Bronfenbrenner (1979)



### **Microsystem**

According to EST, every individual is influenced by his or her interconnections with the environment. The EST proposes that individuals exist within a variety of settings and are directly and indirectly influenced by environmental entities, such as home, school, work, community, and society (Penhollow & Rhoads, 2013). These multiple layers, starting at the individual level and extending outward, affect individual health behaviours. The microsystem involves direct interactions between the individual and individuals in their immediate environment, such as at home, school, or work. The microsystem also encompasses the individual's attitudes, beliefs, knowledge, family interactions, and social relationships (Penhollow & Rhoads).

### **Mesosystem**

Youth play a role in a variety of influential contexts each day, including home, school, work, youth programs, and other free time peer settings, which constitutes their mesosystem (Boonpleng et al., 2013). The mesosystem includes the interaction between 2 microsystems. In other words, when 2 or more contexts within a microsystem connect, then a mesosystem has been created. The mesosystem consists of the interrelationships the individual experiences. For example, a mesosystem exists if a health education teacher and a parental organization (parent teacher association) work in tandem to develop a school physical activity intervention. Thus, a parent-focused, school-based childhood obesity prevention program would be considered as part of the mesosystem (Boonpleng et.al.).

### **Exosystem**

An exosystem is created when two or more microsystems are linked; however, the individual is not at the centre of at least one of the microsystems, but the microsystem still exerts influence over the individual. In other words, exosystems are composed of factors external to the individual and in which the individual is not directly involved in, but these factors still affect the individual. For example, if a parent had a long day at work and was too tired to take the child to the park to play, the parent's work environment will indirectly influence the child's home setting (Penhollow & Rhoads, 2013). This could lead to the possibility of accumulating fat due to lack of the required physical activity. In some cases, these factors could present as the equivalent to barriers to obesity prevention on the intrapersonal level (low socioeconomic status, unsafe neighbourhoods, availability of fresh produce) (Boompleng et al., 2013). In a broader perspective, the funding and budget cuts public school systems experience do not directly involve the children in those schools, but the children are influenced when physical education programs are cut; this makes funding issues as well as school lunch regulations factors that compose children's exosystems.

### **Macrosystem**

The macrosystem encompasses all the other systems (microsystems, mesosystems, and exosystems) and includes the culture of the systems. Culture is a broad concept that includes, but is not limited to, attitudes, behaviours, beliefs, knowledge, lifestyles, norms, and values. More specifically, cultural attitudes and beliefs surrounding eating habits and body shape can increase childhood obesity (Boompleng et al., 2013). For example, lack of knowledge regarding proper portion sizes and underlying cultural

norms of children having to finish all the food on their plate or eating second helpings of food only stand to increase the amount of food youth are consuming. Norms relevant to body shape and perceptions of what is considered attractive and healthy differ according to racial and ethnic cultures. Black and Hispanic cultures favour fuller body shapes and sizes as compared with White culture that tend to identify heavy child body shapes and sizes as healthy (Boompleng et al., 2013). **Application of EST to Child Obesity**

Bronfenbrenner's EST has been reported to be bidirectional, meaning that one level of the system (the microsystem) is affected by another level of the system (the macrosystem), and vice versa. For example, youth (microsystem) are thought to be highly influenced by schools (mesosystem), which are nested within communities (exosystem), which are nested within the society at large (macrosystem). It is in the microsystem where most youth obesity prevention programs are created because these programs only affect one level of the youth's environment (home, school, or after-school program) (Boompleng et al., 2013). In the microsystem, individual elements of the participants are taken into consideration when developing youth obesity prevention and intervention programs. Gender, sexual orientation, race/ethnicity, physical abilities, and self-efficacy should all be considered when constructing a program (Penhollow & Rhoads, 2013). Since physical ability varies widely on an individual basis and according to age, the new technology can not only encourage youth to participate in physical activity, but can also be appropriately tailored to physical ability. For example, Microsoft is pilot testing the effects of Xbox Kinect, a gaming console that

registers physical movement such as running, jumping, and dancing as youth play various games.

The Kinect exercise room was implemented in an elementary school in Northwest Arkansas in November 2012 and served as the starting point for possible creation and integration of similar exercise rooms throughout the nation. Microsoft is offering free Xbox Kinect trials for K-12 schools and offers additional discounts to academic institutions to purchase the Kinect system. A prevention program implemented on the mesosystem level increases the likelihood of success because more than one of the youth's microsystems is influenced by the program. For example, rather than implementing a school program where the youth only experience the intervention at school, creating a combined school and home approach that incorporates parental involvement increases the likelihood that youth will adopt the behaviour(s) the intervention is trying to foster. In the above scenario, children would receive the intervention both at school and home. This approach has been widely used and proven successful when creating drug education programs that target children at elementary school age and younger. However, program designers assess the level of willingness parents have to be involved in a combined school and home approach because parental commitment to work and other family duties may prevent them from full program participation. Garden-based youth nutritional programs have been implemented in schools and as part of the community in an effort to increase young people's consumption, preferences, and attitudes toward fruits and vegetables. Ratcliff, Jenkins, Reiter-Purtill, Noll & Zeller, 2011 implemented a garden-based educational program for sixth graders in two schools that included garden activities during school

hours and on weekends to allow students to model behaviours for friends and family. More specifically, students were asked to invite friends and family to community garden events to demonstrate the garden activities they learned throughout the 13-week program. In addition to gardening activities, such as planting and harvesting, students learned how to prepare and cook the fruits and vegetables grown in the garden, which increased self-efficacy relevant to consuming fruits and vegetables.

This program was implemented on the mesosystem level because it influenced the self-efficacy of youth (intrapersonal level) and 2 or more microsystems (school, home, and/ or peer environments). It is much more difficult to implement change on the exosystem level because programs at this level are mainly concerned with policies and regulations, the development of which tends to be time-consuming. However, approaching childhood obesity prevention at this level would include the following: advocating for physical activity to be mandatory in schools rather than cut because of budget limitations; stricter regulations of school lunches in primary care facilities in addition to elementary, middle, and high schools; regulating the number of new fast food restaurants built in lower-income areas; building more parks and recreational areas for children to play; and providing free and safe aftercare programs for children with parents who work for long hours. In the view that youth comprise a population that is not able to advocate for their own needs, it is imperative for teachers, school officials, parents, community leaders, and health educators to advocate for their needs. For example, in 2010, the San Francisco, California, Board of Supervisors banned McDonald's from including toys in happy meals that did not meet nutritional standards. In

addition to advocating for policy changes, it may be beneficial for schools and communities to create partnerships on the macrosystem level with external organizations that can provide the desired services without having to go through the “red tape.” As previously mentioned, the collaboration of Microsoft with the school district and the elementary school to pilot test the Kinect exercise room would be a prime example of creating an external partnership. Additionally, the National Football League (NFL) partners with schools and local youth sports teams to implement the Play 60 program. The Play 60 program which is a youth health and fitness program focuses on decreasing childhood obesity by encouraging youth to participate in 60 minutes of physical activity every day. The program after implementing at the grassroots level was geared towards affecting schools, after-school programs, and youth players that are often personally involved and visit different schools and city sports leagues to encourage program participation.

### **Empirical Review**

In this section, empirical studies which highlight the relationships between child obesity, prevalence of child obesity, teachers’ perceptions about children with obesity, factors that causes child obesity and various intervention strategies employed in schools to curb child obesity have been reviewed. Additionally, challenges faced by teachers in helping to reduce Childhood Obesity have been captured.

### **Obesity**

Obesity is a medical condition in which excess body fat accumulates in the body to a point where it has negative effect on health, which leads to reduction in life expectancy and/ or increase in health problems such as;

Cardiovascular diseases, type 2 diabetes, sleep apnea, among others (Haslam, Sattar,& Lean, 2006). Obesity may be also described as a physical condition characterized by excessive deposition or storage of fats in the adipose tissues (Bakhrui, & Mintz, 2006). People are considered obese when their body mass index (BMI), a measurement obtained by dividing a person's weight by the square of the person's height, exceeds  $30\text{kg/m}^2$ , with the range  $25\text{-}30\text{kg/m}^2$  defined as overweight (Haslam et al., 2006).

Obesity is one of the leading causes of preventable death worldwide, with increasing rates in adults and children. Authorities view it as one of the most serious public health problems of the 21<sup>st</sup> century (Barness, Opitz, & Gilbert-Barness, 2007). Although, in history and still in some parts of the world, obesity was widely seen as a symbol of wealth and fertility, it is much stigmatised in today's modern world, particularly in the Western world, (Woodhouse, 2008). As a result, the American Medical Association in 2013 classified obesity as a disease (Pollack, 2013).

Overweight and obesity usually develops as a result of excess consumption of foods into the body which it has no use for the excesses making it stored as accumulated fat. It is a serious health hazard as the extra fat accumulated by the body puts a strain on the heart, kidneys and liver as well as the large weight bearing joints such as the hips, knees and ankles, which ultimately shortens the life span (Barkhrui & Mintz, 2006). There is now a growing awareness that much adult obesity has its origin in infancy, childhood and adolescence; this gives the implication that the prevention of obesity should begin in infancy, because of the belief that obese five-years-old are more likely to become fat during adolescence (Barkhrui & Mintz, 2006).

## **Childhood Obesity**

Obesity in children is a serious medical condition which has negative effects on the child. It occurs when a child is well above the normal weight for his or her age and height, and usually characterized by the abnormal accumulation of excess fat stored in the body to the point where it impedes the health of the individual and causes diseases and death that could be prevented. (Truswell, 2003 & Mayo Clinic Foundation for Medical Education and Research, November, 2016). Many paediatricians classify an obese child as one who falls above the 95th percentile in weight for height. (Batch & Baur, 2005). If a child's BMI –for- age percentile is greater than 95th percentile, then that child is classified as obese. However, if the child's BMI for age percentile is greater than 85% and less than 95% then it is classified as overweight (WHO,2007)

Children considered to be affected by obesity are 70% more likely to continue being affected by obesity into adulthood. In addition, they are at greater risk for high cholesterol, high blood pressure, diabetes, sleep apnea and cancer (Biritwum, Gyapong & Mensah, 2005). Aside the clinical perspective, children who are affected by obesity face social discrimination leading to bullying, low self-esteem, depression and also behaviour and learning problems (Wardlaw, Insel, & Seylor, 2003)

## **Anthropometrics**

Anthropometrics are the objective measurement of body muscle and fat, that are used to compare the growth in the young and assess weight loss or gain in the motive individual or to assess the size, shape, and composition of the human body (Onis, 2006) Common methods used to gather, these



measurements are BMI, waist-to- hip ratio, and skin fold measurement of several areas of the body. Anthropometry can be said to be a practical and immediate applicable technique for assessing children's development patterns during the first years of life (Ulijaszek & Kerr, 1999). There are several ways of measuring the human body which may require minimal tools. Weight is a basic anthropometric measurement that is easily measured with a scale and height can be determined with a simple measuring stick.

Height and weight are the only measurements needed to determine a person's BMI. A tape measure is the only tool required to determine an individual's waist-to –hip ratio (a measure of the waist circumference divided by the hip circumference), ([www.study.com](http://www.study.com)). Anthropometry can thus be said to be used to measure an individual to determine if he or she needs nutritional intervention or can be used to measure many individuals to show if malnutrition is a problem in the population or its prevalence ([www.conflict.ishtm.ac.uk](http://www.conflict.ishtm.ac.uk)).

### **Body Mass Index (BMI)**

Body Mass Index (BMI) is a measure used to determine childhood overweight and obesity (Cole, Bellizzi, Flegal & Dietz, 2000). Assessing the BMI of children is more complicated than for adults because a child's BMI changes as he or she matures. Growth patterns differ slightly between boys and girls as the age and the sex of the child need to be taken into accounts when estimating whether BMI is high or low. A child's BMI is categorized using variable thresholds that take into account the Child's age and sex. That threshold is derived from a reference population known as a child's growth reference, produced by the Centre for Disease Control (CDC). The BMI

measure is used to determine childhood overweight and obesity when they fall above the 85<sup>th</sup> percentile and below the 95<sup>th</sup> percentile for the children of the same age and sex(Ogden, Carroll, Kit, & Flegal, 2014).

**The BMI – for-age weight status category and its corresponding percent are shown in the table below.**

Table 2- *Child Obesity Classification Table*

Weight Status Category	Percentile Range
Under weight	Less than the 5 <sup>th</sup> percentile
Normal or healthy weight	5 <sup>th</sup> less than the 85 <sup>th</sup> percentile
Over weight	85 <sup>th</sup> to less than the 95 <sup>th</sup>
Obese	95 <sup>th</sup> percentile or greater

Source: [www.cdc.gov](http://www.cdc.gov)

The BMI is calculated by dividing a person’s weight in kilograms by the square of height in meters. For children, BMI is age and sex specific and is often referred to as BMI –for-age while a child’s weight status is determined using an age and sex specific percentile for BMI rather than the BMI categories used for adults. This is because children body composition varies based on their age and also between boys and girls.

**Prevalence of Child Obesity**

Childhood overweight and obesity has reached epidemic levels in developed countries, with 25% of children in the US being overweight and 11% being obese. Among this numbers, 70% of obese children grow up to become obese adults (Nicklas, Baranowski & Cullen, 2001). It is noteworthy that the prevalence of childhood overweight and obesity has increased since

1971 in developed countries, with the highest prevalence rates of childhood overweight and obesity being observed in developed countries UNICEF/WHO/ World Bank Group, 2016. However, currently, its prevalence is increasing in developing countries as well and higher as in the Middle East, Central and Eastern Europe (WHO, 2012).

The World Health Organization project the monitoring of cardiovascular diseases; (MONICA), for instance, in 1998, reported Iran as one of the seven countries with the highest prevalence of childhood overweight and obesity. Also, in a recent WHO global estimate it was reported that in 2014 about 13% of the world's adult population were obese (over 600 million) which has doubled in the prevalence rate of obesity from 1980 to 2014 (WHO fact sheet, June, 2016). They also included in their report that over 41 million children were overweight and obese worldwide.

In Saudi Arabia, it was reported that, one in every six children aged six to 18 years old was obese. (McCarthy, Ellis, & Cole, 2003). Also, in both developed and developing countries there were proportionately more girls overweight than boys, particularly among adolescent (McCarthy et al., 2003).

Ng, Fleming, Robinson, Thompson, Graetz, Margono and Abraham, (2014), in a study on the prevalence of child obesity reported a different scenario. They indicated in their study that, there was also an increase significantly in children and adolescents in both developed and developing countries. However, 23.8% of boys and 22.6% of girls were overweight or obese in 2013 in developed countries. This implies that there were more obese males than females.

Furthermore, in Africa, the prevalence of obesity as reported by the WHO media centre, indicated that the number of obese or overweight children had nearly doubled from 5.4 million in 1990 to 10.6 million in 2014 (WHO Media Centre Fact, 2016). For example, a study conducted by Mpembeni, Muhihi, Maghembe, Ngarashi, Lujani, Chillo, ... and Njelekela (2014) on a study on the prevalence and determinants of obesity among primary school children in Dar es Salaam, Tanzania, used a total of 446 children from nine primary schools in Dar el Salaam, which revealed that, the mean BMI for girls was high than that of boys and this difference was significant ( $p= 0.002$ ). The overall prevalence of the child obesity was 5.2%. Obesity was highlighted as higher among girls (6.3%) as compared to boys (3.8%). Similarly, the prevalence of overweight was higher among girls (13.1%) compared to boys (6.3%,) with the distribution of BMI categories among girls and boys being statistically significant ( $p= 0.031$ ).

In Ghana, the Demographic and Health Survey (2014) revealed that among children, obesity is growing at the rate of 3.1%, with its high prevalence in the Greater Accra (5.2%), Central (4.6%) and Volta (4.2%) regions respectively. This was confirmed in the literature by several studies such as one conducted by Amidu, Owiredu, Saaka, Quaye, Kumibea and Mogre (2013) on the prevalence of obesity with its determinants in the Tamale metropolis. The study showed that the overall prevalence of overweight and obesity among the selected children drawn from the private and public schools was 9.8% (39/400) and 7.5% (30/400) respectively. It was also revealed that, among the two schools selected for the study, children from the private schools were taller and bigger than their counterparts from the public schools.

This was based on the anthropometric measurements taken. The mean percentage of body fat in children from the private schools was significantly higher when compared to that of children from the public schools. On assessing the determinants of obesity, the mode by which the children were going to school was observed. It was revealed that, overweight and obese children were more likely to go to school in cars. They also used playing computer games as an indicator of sedentary lifestyle and reduced physical activity. It was observed that there was a significant steady rise in the proportion of children who played computer games with overweight and obesity.

Another study by Mohammed and Vuvor (2012) on the prevalence of childhood obesity/overweight among basic school in Accra also identified that childhood obesity or overweight ranked very high especially among the female subjects. A 10.9% prevalence of child obesity was observed with higher prevalence in girls (15.0%) than boys (7.2%) (P-value = 0.001), indicating that, females in general recorded a higher body composition than their male counterparts. There is the possibility of both hormonal changes and beauty affecting the results trends, (Amoah, 2003). Their findings was however, lower than an earlier survey conducted by Abachinga (2001) which recorded a 19.3% prevalence in Legon and Achimota school going children.

### **Perception of Teachers about Children Obesity**

In light of the greater emphasis on childhood obesity prevention, schools are increasingly viewed as potential sites for preventive interventions (Neumark-Sztainer, Story, & Harris, 1999). Teachers and health care providers working in schools have continual contact with students. School

staffs therefore, have the potential to have discussions and provide information regarding the prevention of both obesity and weight-related stigmatization through formal interventions and informal interactions with students. The teachers' perception, beliefs, and attitude towards the childhood obesity or children suffering from the condition, however, affect their efficacy in using their influence to help control childhood obesity. In view of this, a number of studies have been carried out to evaluate teachers' perceptions about children with obesity since it is thought of as the most important predictor to childhood obesity. For example, Price, Desmond, & Ruppert, (1990) assessed elementary school physical education teachers' perceptions of obesity and the schools' role in dealing with the challenge. A random sample (n = 400) from the Council of Physical Education for Children was sent the questionnaire and 321 responded (80 per cent). The results indicated that respondents were almost unanimous (93 per cent) in their beliefs that normal weight was an important indicator to the health of children. Respondents also accurately perceived the etiology of childhood obesity. Physical education teachers' perception was that they and school nurses were the school personnel who should play a major role in supporting the reduction of childhood obesity. However, the majority did not believe they were adequately prepared or competent in the colleges to design programs for obese children to engage in exercises.

Wilson, Smith, Wildman, Wilson, Smith and Teachers (2016), recently evaluated teachers' perceptions of youth with obesity in the classroom. Online questionnaires assessing attitudes toward children with health conditions were completed by 140 first to fifth grade teachers. Teachers rated children with asthma as more likely to be accepted by their peers than children with obesity.

Additionally, teachers reported children with obesity as more burdensome to have in their classroom. The authors indicated in their findings that the teachers reporting children with obesity as more burdensome and less accepted may be influenced by societal attitudes related to the stigma associated with obesity. A study found that junior and senior high school teachers believed persons with obesity were less tidy, more likely to have family problems, and less likely to succeed than persons who were not obese (Neumark-Sztainer et al., 1999). Additionally, a study examining the beliefs of physical education (PE) students, training to become PE teachers, found that these students had significantly higher levels of anti-fat bias than psychology students (O'Brien, Hunter, & Banks, 2007). In a separate study, physical education teachers of elementary through college students expressed beliefs that the youth of healthy weight had better physical, social interaction, cooperation, and reasoning abilities than their peers who were overweight (Greenleaf & Weiller, 2005).

Odum, McKyer and Tisone, (2009) considered elementary school personnel's perceptions on childhood obesity. These authors conducted thirty-one semi-structured interviews with elementary school personnel (teachers, administrators, and support staff) from 5 rural schools with a predominantly Hispanic (58.18%) and Black (30.24%) student population. The constant comparison method was used to identify emergent themes. Their finding was that all but one participant considered obesity to be a challenge among elementary school children.

Finally, in a survey of elementary school principals, over one-half believed psychological problems were associated with obesity in youth. Furthermore, one-fourth believed that teachers would not be in favour of placing an

emphasis on the treatment of obesity in schools. **Factors Causing Child Obesity**

- (i) Obesity is described as the imbalance between energy intake and the energy used. This could be attributed to a number of factors that cause it. As a result, Cole, Bellizzi, Flegal and Dietz, 2000 was of the opinion that identifying the risk factors is strategic to the prevention or control of child obesity. Although the causes of childhood obesity are widely spread, certain factors are targeted as major contributions to this epidemic. The causes include: Environment, Lack of physical activity, Hereditary and family, dietary pattern and socio-economic status among others (Sahoo, Sahoo, Choudhury, Sofi, Kumar, & Bhadoria, 2015).
- (ii) Environment being the prevalence of TV commercials, surrounded by environmental influences that deprive children of physical activities. Also eating out, large eating portions, drinking lots of beverages example soda or juice boxes are contributing factors to obesity in children (Deghan & Akhtar- Danesh, 2005). Some school policies, demographics and parents' work-related demands can also further influence the eating and activity behaviours of the child (Sahoo et al., 2015).
- (iii) Lack of physical activity, studies also show decrease in overall physical activity, due to the growing use of computers, increased time in watching television and decreased physical education in schools (Hancox & Poulton, 2006). This increase in the amount of time used in sedentary activities has decreased the amount of time spent in physical activities. In times past, most children walked or rode their bikes to school.



However, a review on the physical activity of children today indicated that most parents drive their children to school with reasons such as their living far away from the schools coupled with the absence of safe walking routes (Sahoo et al., 2015).

- (iv) Heredity and family: genetics play a role in obesity but it mostly needs to be coupled with other environmental and behavioural factors in order for it to affect weight (Sahoo et al., 2015). Genetic factors such as leptin deficiency or hypothyroidism a medical condition as well as side effects of drugs (example, steroids) and genes accounts for less than 5% of cases of childhood obesity, (Deghan et al., 2005), and this trend (s) cannot be said as major causes of the increase in childhood obesity (Anderson & Butcher, 2006).
- (v) Dietary patterns: food portions, the prevalence of “super-sized” portions and “all you can eat buffets” create a trending in over eating (Biritwum et al., 2005). Foods served at fast food restaurants most often are high caloric foods with less nutritional values. Therefore the intake of large portions of high caloric foods and not using it results in the energy imbalance that leads to obesity. The WHO in their global strategy on diet, physical activity and health program (February, 2017) suggested that to help reduce obesity among children, they should be advised to increase the consumption of fruit and vegetables as well as legumes whole grains and nuts. Since they identified that, the low intakes of such foods were contributing factors to the development of obesity among children. They further suggested that children must limit their intake of sugars and also focus their consumption of fats from saturated fats to unsaturated fats.

Socio-economic status: children from lower income homes are at greater risk of being affected by obesity due to; inability to take part in extra curricula activity, and educational levels, ([www.obesityaction.org](http://www.obesityaction.org)). On the other hand, Wake, Salmon, Waters, Wright & Hesketh, (2002) indicated in their study that, children from high income families usually had high purchasing power and most often their parents do less cooking at home. They were most likely to consume outside foods which tends to be high in calories. In support, Brug (2007), pointed out in their study that high consumption of energy dense foods was a major cause of obesity. As a result, Moy, Gan & Siti Zalcha, (2004), indicated in their study that the rapid growth of fast food restaurants and promotional activities played a major role in contributing to the increase in the consumption of high caloric diets. Koster (2007), added that parents' heavy schedules have resulted in increases in the growth of obesity among children. This is because such parents hardly make efforts to cook healthy meals and mainly shifted the role of caring for children to house maids, day care assistants and cooks, in order to release them from the stress of their workload, which often lead to the consumption of unhealthy foods.

### **Child Obesity Intervention Strategies used in Schools**

A number of intervention strategies have been employed in schools by teachers and other health professionals to help manage child obesity. In a study, Shaya, Flores, Gbarayor and Wang, (2008) identified in total, 15 of intervention studies that exclusively utilized physical activity programs, 16 studies exclusively utilized educational models and behaviour modification strategies, and 20 studies utilized both. In addition, 31 of these studies utilized exclusively quantitative variables like body mass indices and waist-to-hip ratios to measure the efficacy of the intervention programs, and the other 20 studies utilized a combination of quantitative and qualitative measures that

included self-reported physical activity and attitude toward physical activity and the tested knowledge of nutrition, cardiovascular health, and physical fitness. A total of 40 of these studies achieved positive statistically significant results between the baseline and the follow-up quantitative measurements.

Similarly, in an editorial, Durant, Baskin, Thomas, & Allison, (2008) identified other strategies used in schools to manage child obesity. For example, the following strategies and efficacy were reported:

- i. Nutrition and physical activity interventions resulted in significantly reduced weight compared with control conditions (standardized mean difference,  $SMD=-0.29$ , 95%  $CI=-0.45$  to  $-0.14$ , random effects model).
- ii. Reduction in TV viewing, on the basis of one study, as a treatment also showed equivalent efficacy ( $SMD=-0.35$ , 95%  $CI=-0.63$  to  $-0.06$ ).
- iii. Weight reduction was also induced in trials that included parental or family involvement ( $SMD=-0.20$ , 95%  $CI=-0.37$  to  $-0.04$ ).
- iv. Combined nutrition and physical activity interventions were not, on average, significantly more effective than the one nutrition intervention that did not include physical activity ( $SMD=-0.39$ , 95%  $CI=-0.56$  to  $-0.23$ ).
- v. Interventions aimed at increasing physical activity without any effort toward dietary intervention did not significantly reduce body weight.
- vi. ‘The robustness of these findings was limited since because of high degree of heterogeneity.’

Another quite comprehensive study which discussed a number of school-based interventions was reported by Budd and Volpe, (2006). These

authors reported studies with a primary aim of reducing BMI, had significant findings. The most successful and best known intervention, according to them, is the “Planet Health” intervention, an interdisciplinary classroom curriculum implemented by teachers in the sixth-to eighth-grade classes of 10 randomized schools in Boston, MA. The intervention used in Planet Health consisted of lessons incorporated into mathematics, science, English, social studies, and physical education classes. The objectives focused on classroom education and behavioural modification to: (1) decrease television viewing and computer time to less than 2 hours/day, (2) increase overall moderate to vigorous physical activity (MVPA) through behaviour choice techniques of self-assessment, goal setting, and fitness testing, (3) reduce the consumption of high-fat foods, and (4) increase overall fruit and vegetable intake. This multicomponent intervention met state curriculum standards and consisted of one lesson on each objective in each specific subject class during two school years. Specially trained regular classroom teachers taught the lessons. After two years, the overweight prevalence for girls participating in the intervention decreased from 23.6% to 20.3%, pre to post intervention, respectively. However, no significant reduction in BMI was found for the boys in the intervention group when compared with controls. Other findings included a reduction in television watching for both boys and girls and improved dietary patterns among the girls.

The second successful study was conducted by Robinson (2001) and focused on reducing the time third and fourth graders spent watching television and playing video games. The aim was to limit television and computer times to seven hours a week. The intervention lasted 6 months and

involved 18 class sessions taught by the regular classroom teachers, family monitoring and self-reporting of television and video game use via an electronic television monitor, and a 10-day television turn-off challenge as a culmination event. Follow-up was conducted at the end of the school year. Both the boys and girls in the intervention group had a significant adjusted change in BMI compared to the control group ( $p = .002$ ). Other findings of the intervention included a reduction in the parents' and children's reports of the television viewing and video game use, which dropped to 8.80 hours/week compared to 14.46 hours/week in the control group ( $p = .001$ ). The number of meals consumed while watching television was also reduced. A limitation of this study was that Robinson only compared 2 elementary schools ( $n = 192$ ), with a follow-up of one school year.

An important study is the Pathways 14 intervention, targeting 1704 third to fifth grade Native American Indians in Arizona, New Mexico, and South Dakota. This culturally appropriate intervention included classroom behaviour change curriculum on eating and physical activity, food service interventions, improvements to physical education during school time, and family involvement (Budd & Volpe, 2006). The study had much strength including the involvement of the American Indian community in all aspects of the research, including implementation and outcome analyses. Despite the strengths, the BMI of the intervention group did not change. The investigators suggested that the homogenous American Indian sample might have required a more intense or longer intervention, considering that the population had a high rate of obesity and diabetes. Nonetheless, the Pathways study found significant differences in changing the food service environment to reduce the fat content

of school lunches, improving self-reported out-of-school physical activity, and reducing self-reported dietary fat intake among the children in the intervention groups. Although small, these improvements could be influential in reducing and/or preventing diabetes in children.

### **Challenges to Implementation**

In the implementation of school-based child obesity intervention programs, a number of challenges have been reported by some earlier authors. For example, Barlow and Dietz (1998) reported lack of engagement and insufficient implementation time as challenges to the implementation of child obesity control programs. Other authors have also documented lack of funds, and policy change as challenges to the successful implementation of intervention programs (Fagen, Asada, Welch, Dombrowski, Gilmet, Welter, & Mason, 2014).

Karnik and Kanekar (2012) also were of the opinion that, financial constraints were a major challenge in the implementation of intervention programs. They documented that, intervention programs needed monitoring of progress and sustenance, training teachers, providing infrastructure and facilities to provide physical activities all of which is costly and challenging in today's world that is full of economic problems.

### **Chapter Summary**

This chapter discussed relevant works that have been carried out on child obesity with a review on the emphasis on teachers' role in managing childhood obesity (CO). Specifically, literature on related topics including various interventions for CO, teachers' perception on the factors that contribute to CO, interventions used by teachers to control CO, and challenges faced by teachers in helping to reduce CO, were reviewed.

## **CHAPTER THREE**

### **RESEARCH METHODS**

#### **Introduction**

This chapter focuses on the research methods used in the study. It describes the study area, research design, population, sample size and sampling techniques, and procedures for data collection and analysis of data.

#### **Study Area**

The study was conducted in the Cape Coast Metropolis (Figure 2), which has a traditional name 'Oguaa' originating from the Fante word 'gua' meaning market. The Metropolis is surrounded to the South by the Gulf of Guinea, to the West by Komenda Edina Eguafo Abrem Municipality, to the East by the Abura Asebu Kwamankese District and also to the North by the Twifu Heman Lower Denkyira District. Its location is on the longitude of 1° 15'W and latitude 5°06'N and occupies an area of approximately 122 square kilometres. Based on the Population

and Housing Census in 2010, the population of the Cape Coast Metropolis stands at 169,894; thus signifying a 7.7% of the Central regions' total population. The population constitutes of 48.7% males and 51.3% females, among which the proportion of children below 15 years is 28.4%.

Further, among the population of 11 years and above, about 90% are literates. Proportionately, there are more literate males than females, that is, 94.1% and 85.6% respectively. The economic activity status of the entire population is very high with about 54.7% of age 15 and above being economically active. Among the economic activities about 90.7 % are employed as professionals, service and sales workers, and craft and related trade workers.

Furthermore, the Cape Coast Metropolis has a lot of schools ranging from basic to tertiary. There are about 355 schools (both public and private) in the Metropolis. With regards to basic schools, there are about 207 schools (128 public and 79 private), statistically about 58.3% of the total schools in the metropolis. The total number of teachers in the basic schools is also about 1755 (The Composite Budget, 2016). Record obtained from the Cape Coast Metropolitan Education office, shows 120 primary schools (80 public and 40 private) in the metropolis with about 720 teachers if there is a minimum average of six teachers in each primary school, (480 public and 240 private). The record also showed about 30,000 primary school pupils in the metropolis.



Figure 2: Map of Cape Coast Metropolis



Source: Ghana Statistical Service, GIS

### **Research Design**

A research design constitutes the blueprint for fulfilling research and answering questions. It indicates an outline of what the researcher does from writing research questions and their operational implication to the final data analysis. This study is a descriptive survey design. According to Cohen, Manion and Morrison (2007), a choice of design for a particular study must be based on the purpose of the study. Since this study sought to find out the potential of using teachers in basic schools to help reduce child obesity, the survey design was found appropriate. This was to support the investigation into respondents' opinions on the strategies that could be used in reducing obesity among children and help make recommendations to improve the challenge. As ascertained by Cohen et al. (2007), descriptive surveys are suitable for this type of research because they give room for data to be collected and used in investigating a current issue in order to make recommendations to improve the problem. Since child obesity is a growing nutritional challenge in

Ghana and the researcher was interested in investigating the potential of using teachers to reduce child obesity, the survey was opted for as the suitable design for the study.

One major advantage of this design is that, the design has the ability of obtaining information from a large sample of respondents using a carefully designed and administered questionnaire. This also assisted in giving a clear description of the respondents' opinions on the issue under investigation.

## **Population**

Population refers to the entire group of individuals or cases from which a sample may be drawn from for the study or about which the researcher would like to make generalizations. According to literature, the population must also meet a designated set of criteria (Nitko, 2004). The population for this study comprised all teachers and pupils in primary schools in the Cape Coast Metropolis totalling about 720 teachers and also about 25,420 pupils per the records obtained from the Ghana Education Service (Cape Coast Metropolis,2017) .

The target population was all primary one to six teachers from the selected schools (private and public). All school-aged pupils between the age range 6 and 15 were targeted. The normal age range for children in primary school in Ghana is 6- 12 years; however, the upper age limit was increased to 17 because children in rural areas normally start school late or spend more time in school because they may have to repeat classes due to their academic weaknesses.

For this study, pupils from primary four to six were selected in the schools chosen. This is because it was assumed that they were old enough and more likely to understand the requirement for the study. The inclusive criteria for the study were all primary one to six teachers who were available and willing to participate in the study, and the selected primary pupils who were available, willing and had their parents/guardians' consent for their participation. It excluded the teachers who were not available and willing to participate in the study. Also, the pupils who were not selected, had parents or guardians who did not give their consent for

their participation and those with physical deformities that could affect the accuracy of the anthropometric measurements were excluded. For example, cripples or hunchbacks.

## **Sample Size and Sampling Procedure**

### **Sample Size**

Sampling in the view of Kumar (1997) is a process of selecting few from a bigger group known as the sample population to serve as the basis on which fact, situations or outcome regarding the bigger group will be estimated. For efficiency, representativeness, reliability and flexibility in the study, a justified sample size must be obtained. With respect to sample size determination, Cohen, Manion and Morrison (2007) are of the opinion that it can be obtained in two ways; the researcher can either carefully ensure that the sample is a good representation of the wider population or by using a table which forms a mathematical formula. Based on this, the Krejcie and Morgan (1970) table for determining sample size was used (See A. As laid down by them, a sample of 248 teachers is ideal for a population of 720 teachers. These were drawn from 42 randomly selected schools. (insert pic of table)

A sample size of 330 pupils was selected from the randomly selected schools. However, the sample size of 317 was finally obtained and used because these children had the approval of their parents or guardian to participate in the study.

### **Sampling Procedure**

The multi stage sampling procedure was used for the study. Multi-stage sampling is a complex form of cluster sampling which contains two or more stages in sample selection. Cluster sampling is a technique in which

clusters of participants that represent the population are identified and included in the sample. In this research the sampling procedure involved three steps. Initially, the total number of all primary schools in the Metropolis was obtained from the Cape Coast Ghana Education District Directorate office along with the teacher and pupil population. Secondly, a sampling frame was made using the list of schools based on their categories: private and public. The schools were then selected using the simple random (lottery) method. After selecting the schools, the teachers teaching in primary one to six were purposively selected for the study. In cases where the selected school had two or more streams, a simple random selection of 'Yes' or 'No' was used to select six teachers of the teachers from the primary school.

On the other hand, the pupils were also randomly selected from both clusters of school and from the six circuits in the Metropolis. At the first stage, a simple random method was used to select two schools from each circuit, that is, one public and one private. Afterwards, the lottery method with replacement was used to select the sample of 25 pupils from each cluster of school. This was done by compiling the list of all primary four to six pupils using their class registers. Fifty pupils from public and private schools were thus drawn from each of the circuits in the metropolis. Furthermore, to make up for the unavailable children or wards whose parents did not grant approval, an extra 30 pupils were randomly selected in addition to the sample. Finally during data collection a sample size of 317 pupils were available and had the approval to participate in the study.

## **Data Collection Instruments**

For the purpose of this study, two instruments were used for data collection: structured questionnaire and a form for recording anthropometric measurements.

### **A Structured Questionnaire**

A structured questionnaire (Appendix B) was designed by the researcher with the assistance of supervisors and used to collect data from the teachers for the study since it provided the opportunity to sample the perceptions of a large population. Suitably, it helped obtain the opinions of the teachers on the strategies they can be empowered with to help reduce the growing challenge of child obesity. The use of questionnaire made it possible to quantify the responses of the respondents. However, as a limitation the questionnaire

### **Pre-Testing of Research Instruments**

According to Oppenheim (2000), and Wilson and McLean (1994), to increase validity and reliability of the questionnaire, there is the need for pilot test. Piloting has to do with assessing for clarity items, instructions and the general outline of the questionnaire, which helps to get rid of difficult or ambiguous words (Cohen et al., 2007). Since the questionnaire was self-designed, the researcher prior to the study conducted a pilot study.

The questionnaire was pilot tested in the 3 schools. The following points were also assessed during the pre-test:

- Reactions of respondents to the research procedure.
- Whether the tools were reliable (weighing scale and height rods).

- Time needed for performing anthropometric measures per participant.

After which the Cronbach's Alpha was used to test and analyse the reliability of the instrument. The Cronbach's Alpha reliability coefficient of .91 and .89 indicates that the instrument was reliable. This test was also important because, it helped the researcher to correctly restructure some part of the items of the instrument that had low reliability and helped to avoid getting unintended results. The validation was done by the supervisors to ensure that all ambiguities were removed and clarity made.

### **Data Collection Procedure**

A letter of introduction was collected from the Department of Vocational and Technical Education, University of Cape Coast, to seek permission from the Ghana Education Service as well as various heads of schools selected to administer the questionnaires during their recess periods (Appendix C & D). The researcher introduced herself and the purpose of the study was explained to the school authorities and pupils. After the school authorities agreed for the study to be undertaken, consent letters were sent to parents of all pupils in classes' four to six through their children (Appendix E). This was to seek the parents' approval for their wards to participate in the study. Those who agreed had their children included in the study. The researcher distributed copies of the questionnaires to teachers to complete. The anthropometric measurements were taken in the mornings in the school premises. Weight and height measurement of the school pupils were taken using a standardized electronic scale and a height rod by following the standard procedures outlined by Gibson (2005). Prior to measuring the



children, the weighing scales were calibrated using known weights each day before using them. It ensured that even though participants were in their usual school uniform, they were without foot wear, socks, watches, and items in their pockets or any heavy clothing like jacket or sweater. The recording of the height and weight measures were always to the nearest millimeter and 0.1kg respectively.

### **Procedure for Anthropometric Measurements**

A standardised UNICEF electronic scale produced by SECA and a height rod were used to take weight and height measurements of the school pupils respectively following standard procedures outlined by Gibson (2005). Heights were recorded to the nearest millimetre while weights were recorded to the nearest 0.1 kilogram.

### **Training of Research Assistants**

Two field or research assistants were recruited and trained to assist in the data collection. During the training they were briefed on;

1. The objectives of the study
2. Description of obesity and its risk factors
3. Selection of study participants
4. Receiving informed consents from study participants
5. Data collection technique of weight and height measurements as well as distribution of questionnaires.

### **Weight Measurement**

Body weight was measured to the nearest 0.1 kg using a body composition monitor/ weighing scale. The scale was placed on a flat surface and stepped on for it to display 0.0 kg. Participant data; age, height and sex

were inputted into scale and waited till 0.00 appeared on scale. Participants were asked to remove their footwear (shoes, slippers, sandals, and socks). Each participant stepped onto the scale with one foot on each side of the scale. They were also asked to stand still, face forward, place arms on the side and wait until asked to step off. Weight and Body Mass Index (BMI) figures that appeared on the screen were recorded.

### **Height Measurement**

Height was measured to the nearest 0.1 cm, using a height rod. The height rod was fixed appropriately to a wall and study participant were asked to remove their shoes and heavy clothes. Subjects were then asked to stand with their backs straight, and arms hanging loose by their sides with feet flat, buttock, shoulder blades and head touching the wall. The height rod was aligned to the vertex of the head and reading recorded.

### **Questionnaire Administration**

The questionnaire (Appendix B) was in various sections and it was administered to the teachers either through the help of head teachers or personally to them in their various classrooms.

### **Data Analysis**

Data analysis involves making comprehensive statements and analytical descriptions about statements made by respondents. For every research to be meaningful, data collected must be organised, analysed and summarised.

The data were hand-coded and analysed using the Statistical Product for Service Solution computer software (SPSS version 21.0) to generate results using frequency and percentage distributions for better generalisation and conclusions. The results were presented using charts and in tables where necessary.

For research question one, descriptive statistics were used to calculate and determine the prevalence of obesity among pupils. Microsoft Excel software was used to calculate the Body Mass Index using the heights and weights of the pupils to confirm the readings from the body composition monitor/ weighing scale. Body Mass Index (BMI) was calculated as weight (kg)/height ( $m^2$ ). The World Health Organization's (2007) BMI-for-age charts (Appendix F, G, H & I) were used to classify the Body Mass Index (BMI) status of the pupils. Thereafter, descriptive statistics were used to calculate and determine the prevalence of obesity among the pupils.

Research question two, measures of central tendency with bootstrapping technique was used to determine the perception of teachers about child obesity. The bootstrapping was performed for samples of 1000 to ensure robust estimates of significant or p-value, standard errors and the confident intervals (Field, 2013) for the mean differences. To achieve this, Bias Corrected and accelerated (BCa) intervals were used since it ensured adjusted intervals were more accurate (Pattengale, Atipour, Bininda-Edmonds, Moret, & Stamatakis, 2010).

Research question three to five, used descriptive statistics (frequencies and percentages) and reported using means and standard deviations. The

means was used to report because it uses every score in the data and tends to be more stable in samples (Field, 2013). JBenchmark for the means

### **Ethical Consideration**

Social scientists face ethical problems and cannot carry out research that involves people without any informed consent (Israel & Hay, 2006). Ethical concerns are expedient when planning and conducting research. An introductory letter was sent to the authorities of the Cape Coast Metropolitan Assembly to seek clearance to conduct the study as well as to the Educational Unit. Ethical approval was sought from the Institutional Review Board of the University of Cape Coast before conducting the studies (Appendix K).

The researcher adhered to all the ethical issues that supported research work. All respondents were given much information needed to make an informed decision about whether or not they wished to participate in the study. Moreover, respondents were assured that, information provided will be treated as confidential as possible. Also, as part of exercising a high level of confidentiality, anonymity was highly addressed to ensure that the research was devoid of the names of the participants.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### Introduction

This chapter presents the analysis and discussion of data collected from the 42 selected primary schools in the Cape Coast Metropolis. The data was analysed to reflect the research topic: Potentials of teachers as support intervention for reducing obesity among primary school children.

The first section present results on the prevalence of obesity among primary school children, based on their gender, age and the type or cluster of school they attend. The second section present results on teacher's perception about child obesity. Teachers' level of awareness about the factors causing child obesity is presented in section three, while the fourth section highlights the findings on the various intervention strategies that teachers can potentially use to prevent child obesity. Finally, the challenge(s) that teachers are likely to face in supporting children with obesity are presented.

To determine the prevalence of obesity, a sample size of 317 pupils were simple randomly selected and used for the study, with 169 (53%) females and 148 (47%) males. Both males and females were selected for the study because of the differences in their physiological and genetic make-up, as it is perceived to possibly affect their tendency of acquiring or accumulating excess body fat. Additionally, 136 out of these 317 pupils, representing 42.9%, were selected from private schools and 151 representing 57.1% were also selected from public schools. Pupils within the age range of 9 – 17 years were included in the study. This was also done to make it possible to compare the prevalence of obesity among the pupils from both clusters. This is because, in

Ghana, private schools are mostly attended by pupils whose parents are economically well to do and thus more likely to spend more in their quest of catering for their wards. And this could affect the dietary behaviours and level of physical activity of the pupils as compared to the pupils who attend the public institutions Amidu et al., 2013. .

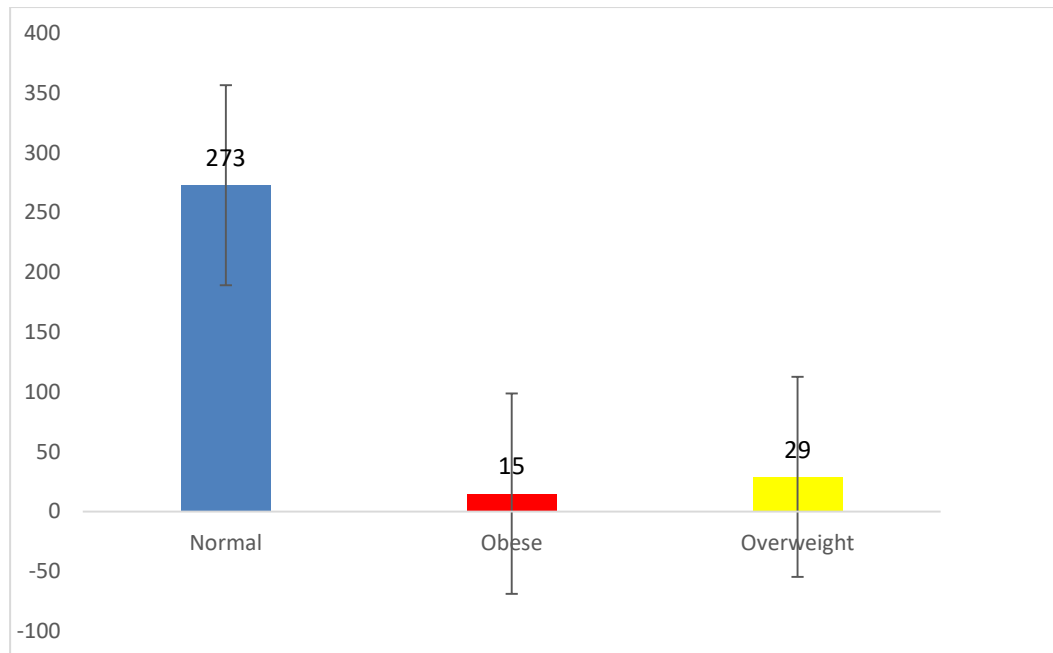
On the part of the teachers, 248 randomly selected from both clusters of private and public schools. Mostly, private owned schools operate on profit making purposes, but do not employ experienced graduate/ professional teachers since doing that will require them to pay higher salaries.(ref) They most often employ unprofessional teachers and this could also affect the teachers' level of awareness of interventions for childhood obesity and also their willingness to implement these intervention strategies.

Data was

### **Research Question 1**

**What is the prevalence of obesity among primary school pupils in Cape Coast?**

This Research Question sought to determine the prevalence of obesity among primary school children in the Cape Coast Metropolis. Figure 3 shows the overall prevalence rate of child obesity.



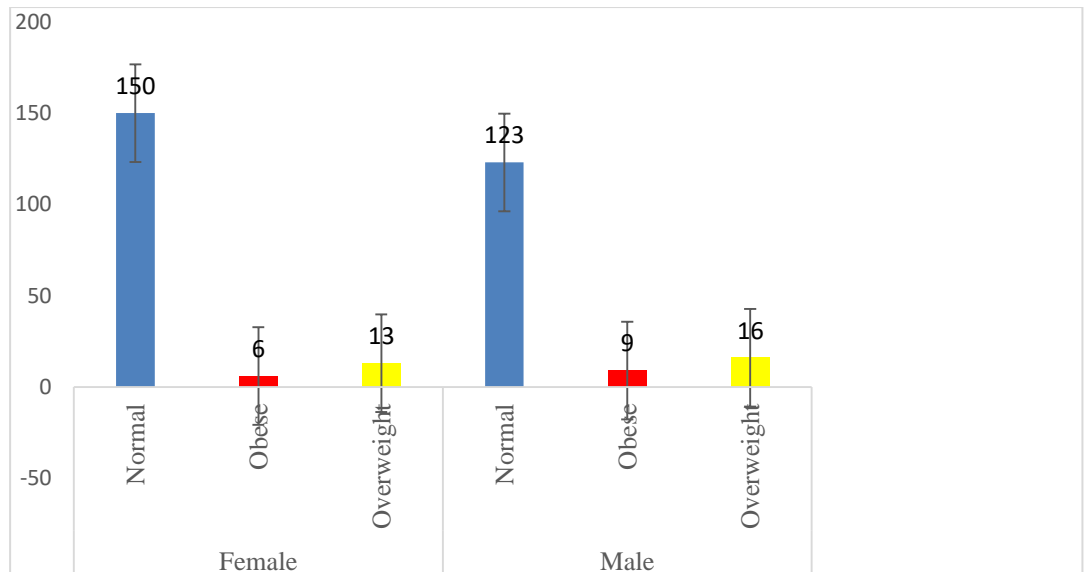
*Figure 3-* Prevalence of Obesity Among Pupils

Source: Field Data: Sekyi-Whyte, 2017

From Figure 3, the overall prevalence of obesity among the selected pupils was about 5% (15) of the total number of pupils selected. These classifications were done using the BMI growth reference chart (Appendix E, F, G & H) produced by CDC using their percentiles and Z-scores. The error bars indicated in the figure shows no statistical difference between the pupils who were obese and those who were overweight and at risk of obesity and this shows that, although the rate of obesity among the pupils who were classified as obese was as low as 5%, pupils who were at risk or overweight were as high as 29 (9%) which is almost twice the number of obese pupils classified. This brings the two to an estimated 14% of the total number of pupils to confirm assertions in WHO's report that in Africa, the prevalence of obesity has doubled from 5.4 million in 1990 to 10.6 million in 2014 and again in 2016 of that child obesity reached an alarming rate of an estimated 41 million children (WHO Media Centre Fact Sheet, 2015/ 2016).

The Ghana, 2014 Demographic and Health Survey report for child obesity growth rate in the Central Region stood at 4.6% which was highlighted in this study. The findings also agreed with Amidu et al.,’s (2013) study on the prevalence of obesity among basic school pupils in Tamale where it showed that, obesity and those at risk of obesity was growing at an alarming rate of 17.6%. The findings further supported Aduama (2004) findings on the prevalence of obesity among primary school pupils in the Greater Accra Region at a growth rate of 15.2%. Additionally, the nutritional challenge found in this study appears to be consistent with the findings and conclusions of Nicklas, (2001), where it was stated that about 25% and 17% of children in the US were overweight and obese respectively. Nicklas therefore concluded that about seventy percent of obese children grow up to become obese adults. A breakdown on the prevalence rate based on the gender classification was further analyzed and shown in Figure 4.





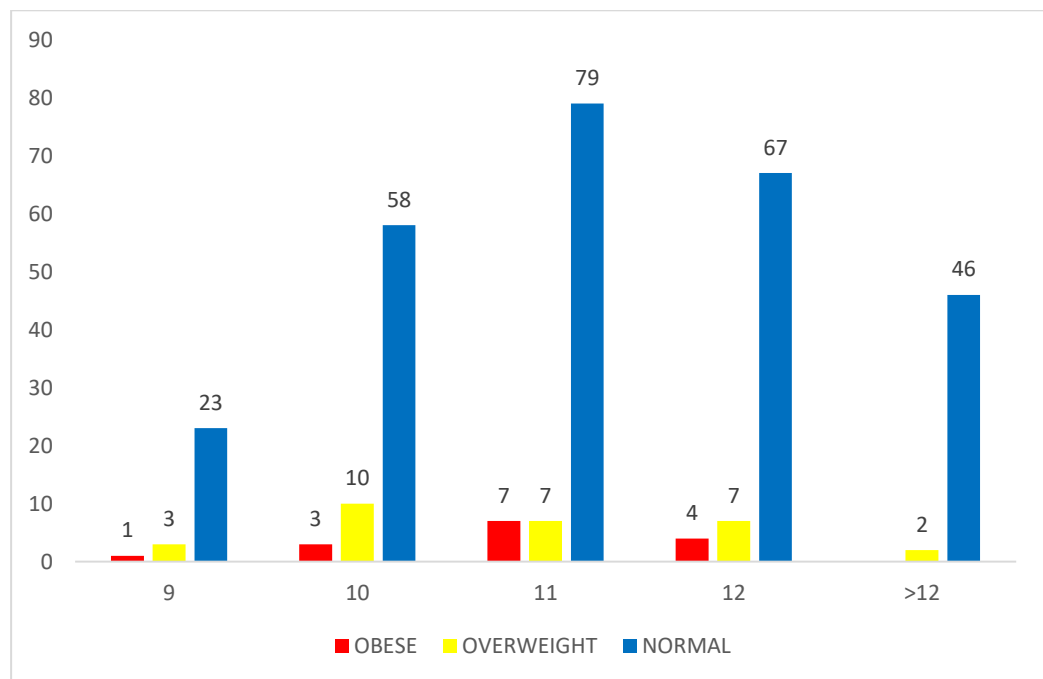
*Figure 4-Prevalence Based on Gender*

Source; Fieldwork, 2017

Figure 4 shows a high prevalence rate of obesity at 6.1% among the randomly selected males for the study as compared with the rate of obesity of 3.6% among the females. This shows that obesity among the males was almost twice the number of obese females which confirms a study by Ng.et al. (2014), where the prevalence of obesity indicated that there were more obese males than females in developed countries. The figure further indicated from the error bars displayed, that there was no statistical difference between overweight and obese pupils from both sexes, although those at risk of obesity or overweight was at an alarming rate of 10.8% males and 7.7% females. However, the findings indicated a different trend in the prevalence of obesity among children in the Cape Coast Metropolis because studies conducted previously showed a higher rate of incidence among females more than the males. For instance, a study conducted by Mohammed and Vuvor (2012) showed a higher prevalence of obesity of 15% among females as compared with 7.2% among males. Although, they concluded that the higher prevalence

rate among females may be due to hormonal changes and other factors. The variations in this study could be attributed to a number of factors such as; weather conditions, dietary behaviours, as well as individual’s standard of living. These factors have been argued in the literature to give indications that an individuals’ social environment, physical environment and macro-level environments are all possible factors that interact both directly and indirectly, to impact upon energy intake and physical activity behaviours (American Heart Association (AHA, 2009).

Furthermore, to determine the prevalence of obesity based on the age range of the pupils, an additional analysis was done as shown in Figure 5.



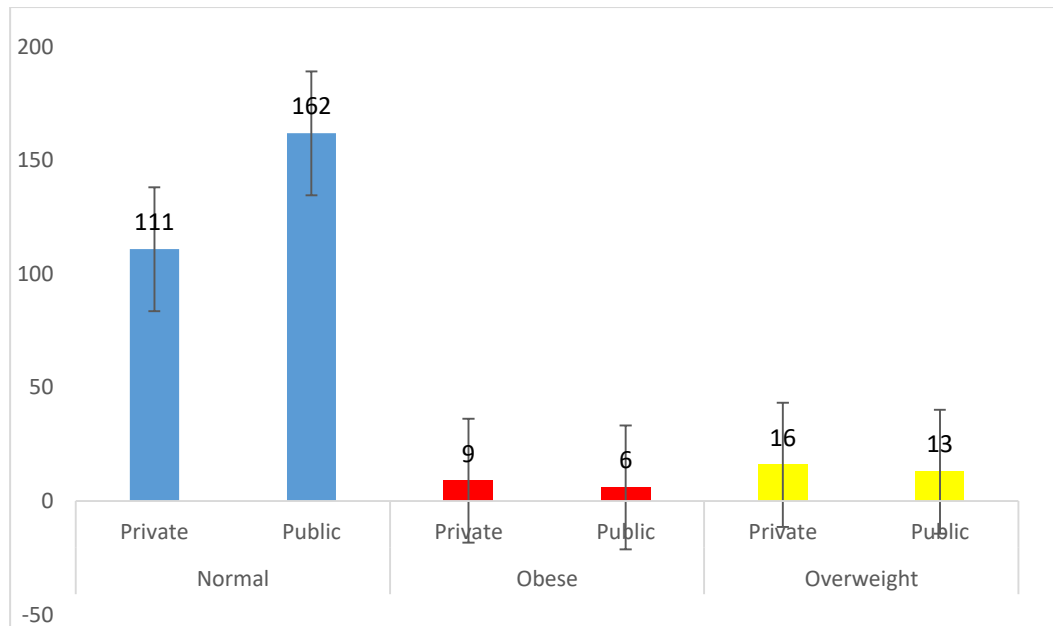
*Figure 5-Prevalence Based on Age*

Source: Fieldwork, Sekyi- Whyte, 2017

Figure 5. shows the prevalence of obesity across the various age ranges. A high incidence of obesity was highlighted among pupils of age 11 (2.2%). It was however very low at the age 9. It could therefore be said that obesity and the risk of obesity was at a high level among pupils within the age

range of 10-12 years, particularly, at 10 years. The figure also gives an implication that the rate of obesity increased with the children's age and was at its peak level at age 10, then it sort of stabilised in the range of 11-12 and from there it declined as shown in Figure 4. This result agrees in part with the findings of McCarthy et al. (2003) which indicated that, one in every six children aged 6 to 18 is obese. Mpembeni et al. (2014) also indicated in their study that, children above 10 years were three times more likely to develop obesity. Again, AHA, (2009) children's rate of obesity tends to increase as they age (6 years: 12.4% obese; 14.9% overweight; 14years: 20.8% obese; 17% overweight). In support, a study conducted by McLaren et al. (2003) where they studied the relationship between past body size and current body dissatisfaction among 933 middle-aged women from a prospective birth cohort study, found out that, women who were dissatisfied at mid-life were found to have been heavier at age seven and showed a more rapid increase in BMI with age. Generally, it could be argued that the incidence of obesity tend to increase as children advance in age was highlighted in previous studies (Barkhru& Mintz, 2006).

Figure 6 also shows the prevalence of obesity among the type of school (cluster) attended.



*Figure 6-Prevalence of Obesity Based on the cluster of Schools*

Source: Fieldwork, 2017

Figure 6 also shows the prevalence of obesity based on the cluster or type of school attended. It revealed more obese pupils in the private schools 9(2.8%) as compared to those in the public schools 6(1.9%). In terms of those overweight and at risk of obesity, the figure showed high prevalence among private schools, 16(11.7 5%) than those found in the public schools, 13 (4.1%). This implies that, the prevalence of obesity and those at risk was very high at an estimated level of 8% in the private schools than 6% in the public schools. This finding supports previous studies conducted by Amidu et al. (2013) on the prevalence of obesity among basic school pupils in the Tamale metropolis where it was revealed that, among the pupils in the private schools the mean percentage of body fat was significantly higher than those from the public schools. This they assumed to be as a result of the high economic background of the pupils in the private schools. Wake et al., 2002, also reasoned that most parents with high socio-economic status tend to have

children who have a high risk of obesity. This they documented was as a result of the high purchasing power of their parents, and readily available electrical gadgets such as television, video games and computer games which pushed pupils to spend most of their time with these items and subsequently affected their level of physical activity. Additionally, Brug (2007) documented that their frequent snacking on high caloric foods could have been associated with the higher BMI rates.

In summary, to answer the question on the prevalence of obesity among primary school pupils in the Cape Coast metropolis, the analysis showed an overall prevalence rate of 5% among the selected pupils for the study. In comparison, obesity was more prevalent in males than in females and also high among pupils at age 10 for both sexes. On the bases of the schools the pupils attended, the analysis showed a high prevalence of obesity among private school pupils as compared to the pupils who attended public schools.

## **Research Question Two**

### **How do teachers perceive child obesity?**

This research question was to find out the perception of teachers about child obesity. And the Table 3 presents summary of their general perception about the nutritional challenge.

*Table 3-Perception of Teachers about Child Obesity*

Gender	Statistic		Bootstrap				Interpretation of mean
			Bias	Std error	BCa 95% Lower	CI Upper	
Male	N	63	0	0	-	-	Good perception
	Mean	3.27	.00	.08	3.12	3.45	
	Std. dev.	.66	-.05	.05	.57	.74	

Female	N	70	0	0	-	-	Good
	Mean	3.16	.01	.09	2.97	3.34	perception
	Std. dev.	.78	-.00	.06	.67	.89	

a. Unless otherwise noted, bootstrap results are based on 1000 bootstrap samples[]

The Table 3 shows the opinions of the teachers about child obesity based on their gender classification. It indicates that, both male and female teachers had good perceptions about child obesity. However, more males had a good perception about child obesity with a mean of 3.27 than the females who had a mean of 3.16. The data was analysed and bootstrapped to give a clearer and more concise picture of the information obtained. The table showed that based on a 95% confidence interval, the males had a lower (3.12) and upper (3.45) sample means. The actual statistic mean obtained fell between the lower and upper confidence interval. This implies that, the mean obtained was a true and concise picture of the data obtained. Also, the females had a lower (2.97) and upper (3.34) confidence interval sample mean. That also was within the range of the actual mean obtained of 3.16 to indicate that the results obtained was true and correct. This finding is consistent with previous studies on the perception of teachers about child obesity which highlighted a majority of the them had a good perception about obesity and considered it to be a challenge facing elementary school pupils,(Odum et al., 2009). Another study by Price et al., 1990 also indicated that teachers believed that normal weight was very important to the health of children and were therefore ready to work together with school nurses to support the reduction of child obesity; although some were of the opinion that they were

not adequately prepared to design intervention programs to support the reduction of childhood obesity.

Further analysis on the teachers' perception about child obesity is in Table 4. Table 4- Teachers *Perception about Child Obesity*

Variable	Mean	Standard deviation
Child obesity is a common nutritional challenge in Ghana	2.376	1.266
Child obesity is a condition where a child's BMI is above the normal weight and height for his/her age	2.798	1.325
Knowledge about child obesity can be found in books, journals, on social media	3.332	1.332
One can identify a child as obese by appearance, dietary practises, physical activity level	3.388	1.138
It is a serious medical condition that needs immediate attention	3.392	1.004
Obesity in children is perceived as normal and is accepted by society	2.975	1.263
As teachers we should all be concerned and involved in helping reduce this challenge	3.968	0.919

Source: Fieldwork, 2017 ; 0.45- 1.44 = poor- 2.45 - 3.44= good- 4.44=

very perception >4.45 =

From Table 4, teachers perceived the need to get themselves involved in supporting the fight against the increasing levels of obesity among children in basic schools (mean = 3.968); this finding confirms the findings of Price et al.,(1990), where they indicated the acceptance of teachers to be involved as agents for the reduction if not total eradication of childhood obesity. Another area teachers had a good perception about was on the issue of considering obesity as a serious medical condition that needed immediate attention (mean= 3.392), which was also consistent with conclusions made by AHA (2009) where they described obesity as a disease requiring critical medical attention (Pollack,2013). Barness et al., (2007) also indicated in their study that, obesity

was widely seen as one of the most serious health problems in the 21st century that mainly lead to stigmatisation (Woodhouse, 2008).

The teachers also had the perception of basing their description of obese children on their appearance, dietary practices, and level of physical activities, which supports studies conducted by Schulze et al., 2004; Greenberg et al., 2015; as well as Malik et al., 2013 where obese children were identified with excess consumption of high calorie foods such as sugar sweetened beverages and chocolate-candy. Cutler et al., 2003 and Jahns et al., 2001 also associated frequent snacking in the dietary practices of obese children. In line with this, Mastellos et al., 2014 suggested that individuals change their dietary behaviours in addition to engaging in more physical activities to offset the current incidence of obesity particularly among school going children.

### **Research Question Three**

#### **Which factors are teachers aware to cause obesity among primary school children?**

This research question sought to identify from the teacher's level of awareness, the causes of obesity among the primary school pupils in the Cape Coast metropolis. Table 5 presents the summary of distributions of the factors and their level of awareness.

Table 5- Factors *Causing Child Obesity*

Factor	MEAN	SD	LEVEL	RANK
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Dietary	3.87	0.94	Much aware	1
Biological	3.10	1.41	Fairly aware	2
Sociodemographic	2.52	1.25	Fairly aware	3
Physical Activity	2.26	1.23	Less aware	4

Source: Fieldwork, 2017 t aware 1.44 =awareless aware; 2.45= fairly

awaremuch aware; = very much aware.

From Table 5, the teachers' awareness of dietary factors showed as the highest (mean = 3.87) cause of obesity among the pupils in Cape Coast to give an implication they were much knowledgeable about some of the other causes of obesity (biological (mean= 3.10); socio-demographic (mean= 2.52). On the other hand it appears that teachers were not aware of the importance of physical activities in the reduction of obesity. These findings agrees with previous studies by Sahoo et al., 2015 and Biritwum et al., 2005 where they identified dietary patterns, over-eating because of 'super-sized' portions of food sold in fast foods, genetics, socio economic factors as causes of obesity among children. Thus increases in intake of large portions of high caloric foods that most often are not used leading to the imbalance that result in obesity. The WHO in their global strategy on diet, physical activity and health program, identified low intake of fruits and vegetables and low level of physical activity as contributing factors towards the development of obesity among children. They however, suggested that children increase their physical activities and also limit the intake of sugars to help decrease the accumulation of fat. Hancox and Poulton, 2006, also in their study, identified lack of physical activities to be due to the growing use of computers and increased time spent watching television as a risk factor to the development of obesity

among children. The study further probed into issues on the highest ranked factor (dietary patterns) in order to ascertain specific causes into the incidence of childhood obesity which is shown in Table 6.

Table 6-*Dietary Patterns affecting Child Obesity*

Factor (dietary patterns)	MEAN	SD	LEVEL	RANK
High intake of calorie foods	4.11	1.07	Much aware	1
Low intake of fruits	3.83	1.22	Much aware	2
Frequent snacking	3.78	1.22	Much aware	3

Source: Fieldwork, 2017 t aware- 1.44 =awareless aware; 2.45- 3.44= fairly aware- 4.44much aware; = very much aware.

Table 6 gives an indication that specifically, the high intake of calorie foods (sweets) (mean= 4.11) tends to be a major contributor to dietary patterns ranking as the highest among the factors causing childhood obesity. Additionally, the teachers were aware that children whose intake of fruits was low and frequently snacked on calorie dense foods had a high tendency of acquiring obesity. This finding supports assertions by Biritwum et al., 2005, Brug, 2007; Moy et al., 2004, that intake of high calorie foods, reduced intake of fruits and vegetables and frequent snacking by children could pose as risk factors for obesity.

A further analysis was run on the physical activity of pupils and the result is presented in Table 7 below.

Table 7- Physical Activity Factors *Causing Child Obesity*

Factor (physical activity)	MEAN	SD	LEVEL	RANK
Regularly avoiding P. E. Lessons	2.69	1.34	fairly aware	1
Travelling mostly in cars	2.15	1.50	Less aware	2

Regularly avoiding school chores	2.04	1.44	Less aware	3
Extensive viewing television	2.03	1.54	Less aware	4

Source; Fieldwork, 2017 [t aware 1.44 =awareless aware; 2.45= fairly aware much aware; = very much aware]

Table 7 also shows that, although teachers were fairly aware of the fact that pupils' regular avoidance of physical education lessons could result in the development of obesity, they had limited knowledge about factors like travelling mostly in cars, regular avoidance of school chores and extensive time spent on watching television as risk factors that can cause obesity.

However, related studies by Hancox and Poulton (2006) is in line with this finding where they identified increased time spent in watching television as a cause of the decrease in physical activity level of children. This could be the result of the increase in rate of child obesity. Sahoo et al. (2015) also indicated in their study that, today most children travel to school cars and this is affecting the physical activity levels of children and thus leading to obesity. The finding also revealed that some children regularly avoid physical education lessons, as well as school chores and that poses as a risk factor of obesity. This is however in line with the study by Greenleaf and Weiller (2005), where they indicated in their study that, physical education teachers were of the opinion that, children with healthy weight have better physical, social interactions, cooperation and reasoning abilities other than their peers who were overweight. This could be a reason why they regularly avoided physical education lessons and school chores.

#### **Research Question Four**

**What intervention strategies can teachers use in supporting child obesity?**

This research question sought to examine the various intervention strategies that teachers can use in supporting childhood obesity among the primary school pupils in the Cape Coast metropolis. In allTable 8 presents the summary of the school-based intervention strategies that teachers can adopt in supporting childhood obesity.

Table 8- School-**Based** *Intervention Strategies to Control Childhood Obesity*

Strategy	Yes		No		Sometimes	
	N	%	n	%	n	%
Playing ground for children	113	85.6	19	14.4	-	-
Children play during break periods	112	91.7	11	8.3	-	-
Existence of qualified P. E. teachers	53	39.8	80	60.2	-	-
Existence of periods for P. E. lessons	108	81.8	24	18.2	-	-
Teachers who use P. E. periods for other lessons	47	35.6	51	38.6	34	25.4
Existence of lessons on healthy eating	32	24.1	67	50.4	34	25.6
Existence of school policy guiding the type of foods sold on school premises	95	72.0	37	28.0	-	-
Foods, sweets and drinks allowed in the classroom	12	9.1	111	84.1	9	6.8
Existence of stores or snack bars in the school that sells sweets and beverages	89	67.4	43	32.6	-	-

The school have regulation regarding the sale of foods	81	61.8	35	26.7	15	11.5
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Source: Fieldwork, 2017

n=Frequency

Table 8 shows the various school-based intervention strategies to control childhood obesity. These strategies range from physical activity-based strategies to dietary-based strategies. According to Khambalia et al., (2012), intervention components in the school setting associated with a significant reduction of weight in children included long-term interventions with combined diet and physical activity. From Table 8, it can be observed that 85.6% of the teachers indicated that there is a playing ground for children. This facility allows the children in the primary school to engage in physical activities. This is collaborated by majority (91.7%) of the teachers interviewed who indicated that children are allowed to play and run around during break periods.

This strategy can be effective in controlling childhood obesity because Durant et al., (2008) report that physical activity interventions resulted in significantly reduced weight compared with control conditions. They however argue that interventions aimed at increasing physical activity must be done concurrently with dietary intervention to significantly ensure reduction in body weight. In similar vein, majority (81.8%) of the respondents indicated that there is the existence of periods for physical education lessons in their school. However, there is the need to appoint physical education professionals. This is due to the fact that 60.2% of the respondents indicated that the school lacks qualified physical education professionals to ensure the effectiveness of

physical education lessons and therefore 35.6% of the teachers use these periods to teach other lessons.

Furthermore, other school-based intervention strategy to control childhood obesity may be classified under nutrition-based strategies. The impact of school-based policies on controlling childhood obesity cannot be overemphasized. From Table 8, 72% of the respondents agreed that there is the existence of school policy that guides the type of foods sold on school premises. This implies that majority (72%) of teachers believe that this policy will ultimately ensure that the school have regulation regarding the sale of foods. This will result in the sale of foods that only controls obesity in children rather than encourage it. This finding is consistent with the assertion by Bray and Popkin (1998) who posit that many strands of evidence suggest a causal link between the consumption of high-caloric foods containing high levels of fat and/or sugar and the development of obesity.

Although, 67.4% of the respondents indicated that there are stores or snack bars in the school that sells sweets and beverages, majority (84.1%) of them agreed that no foods, sweets and drinks are allowed in the classroom during lessons. This strategy helps to control the amount of food taken by these primary school children as a means of controlling childhood obesity. This is due to the fact that, according to Blundell and MacDiarmid (1997), passive over-consumption of high-fat foods and sweets, in particular, has been linked with a higher frequency of obesity. Notwithstanding, 50.4% of the respondents indicated that there are no teaching periods for teaching healthy eating habits and eating healthy foods.

To further indicate intervention strategies that teachers can use to support children with obesity is shown in Table 9.

Table 9- Teacher-based *Intervention Strategies to Control Childhood Obesity*

Strategy	Yes		No		Sometimes	
	n	%	n	%	n	%
Teachers include healthy eating and food choice in their lessons	41	31.3	22	16.8	68	51.9
Allowing children to stand when answering questions	119	88.8	1	.7	14	10.4
Allowing children to walk to submit exercises	77	57.5	3	2.2	54	40.3
Encouraging children to walk and play during break times	69	52.3	17	12.9	46	34.8
Allowing them to stand for a few minutes during lessons after sitting for long periods	68	51.5	3	2.3	61	46.2
Foods and sweets are used as rewards for children	10	7.6	73	55.3	49	37.1

Source: Fieldwork, 2017

n=Frequency

Table 9 presents the summary of the teacher-based intervention strategies that teachers can adopt in controlling childhood obesity. From Table 10 some of the strategies put in place to support the control of childhood

obesity among primary school children include allowing children to stand when answering questions . 88.8% of the teachers confirmed this. Again, 57.3% of the teachers indicated that they allow children to walk to submit class exercises instead of passing them while sitting. This ensures that the children engage in some physical activity of some sort. Similarly, 51.5% of the respondents as a means of contributing to the control of child obesity, allow them to stand for a few minutes during lessons after sitting for long periods. Besides, majority (52.3%) of the teachers encourages children to walk and play during break times.

On the other hand, more than half (51.9%) of the teachers interviewed indicated that they either do not or sometimes include healthy eating and food choice in their lessons. Few, that is, 31.3% do include healthy eating and food choice in their lessons. Besides, although 37.1% of the teachers agreed that they sometimes give food and sweets as rewards for good work done, more than half, 55.3% disagreed. The latter's assertion is consistent with Schulze et al., (2004) who posit that increased usage of sugar-sweetened beverages has been found to cause weight gain and incidence of type 2 diabetes in young and middle-aged women. Malik et al. (2013) collaborated the above findings by doing a systematic review of prospective cohort studies and randomized controlled trials (RCTs). They found that consumption of sugar-sweetened beverages promotes weight gain in children and adults. Hence, in order to avoid this trend, 55.3% of the teachers resort to other forms of rewards other than giving food and sweets.

#### **Research Question Five**

**What challenges do teachers face in controlling childhood obesity?**



This research question sought to examine the various challenges teachers face in controlling childhood obesity among primary school pupils in Cape Coast. Table 11 presents the summary of the challenges teachers face in controlling childhood obesity.

In the implementation of school-based child obesity intervention programs, teachers face a number of challenges. Respondents were asked to indicate the challenges they encounter in implementing school based strategies aimed at supporting primary school children with obesity. Table 10 presents the views of the teachers.

Table 10-

*to- Challenges Teachers face in Supporting Childhood Obesity*

Challenges	Frequency	Percent
Financial Constraints	25	18.7
Time Constraints	13	9.7
Lack of cooperation from parents and children	75	56
Opposition from food and beverage vendors	15	11.2
Uncooperative attitude of school authorities	4	3
Lack of recreational facilities for P. E. lessons	2	1.5

Source: Fieldwork, 2017

From Table 10 more than half (56%) of the respondents indicated that lack of cooperation from parents and children with obesity is their major challenge in supporting children with obesity in primary school. This according to them is due to the fact that face because some parents buy sweets for their wards. Again, some primary school pupils may themselves buy from outside, sweets and carbonated drinks that are banned from being sold in the

school. Some of the pupils do this before reporting to school, whereas others do it on their way home after school. Similarly, 18.7% of the teachers stated that financial constraint was another challenging factor faced by teachers in supporting childhood obesity in primary school. According to them, some of the parents may not be able to pay for foods that contain all the right amount of nutrients for the children. This finding is consistent with Fagen et al., 2014 who document that lack of funds and policy change are some of the challenges to the successful implementation of obesity intervention programs.

Also, teachers (11.2%) identified opposition from food and beverage vendors as another challenge. This is in line with the assertion by the social ecological theory where it identified in the exosystem, an individual's external environment such as the availability of unsafe foods (high calorie foods and beverages) as a factor that can directly or indirectly affects the individuals choices and pose as a barrier in the control of obesity. (Boompleng et al., 2013). Time factor (9.7%) is another constraint to the successful implementation of the various school-based strategies in support of child obesity in primary schools. 9.7% of the teachers opine that if the time periods for physical education should be increased the challenge will be the extension of time spent in school. This may result in more tiredness on the part of the pupils and teachers. This finding is consistent with Barlow and Dietz (1998) and Bolton et al, (2012) who reports that lack of engagement and insufficient implementation time was a challenge to the implementation of child obesity control programs.

Furthermore, the least of the challenges mitigating against strategies by teachers in supporting children with obesity in primary schools are

uncooperative attitude of school authorities (3%) and lack of recreational facilities for physical education lessons (1.5%). This is due to the fact that some school authorities may be more interested in finding students with special abilities and not checking students with obesity. Again, they may not be willing to forgo the earnings that accrue to the school from the sale of such obesity enhanced foods. This finding is also consistent with the findings of Penhollow and Rhoads, 2013, where they identified the school, peer groups, family etc. as external factors that play a major role in the individual's development of obesity. They indicated that, the relationship between the individual and what is found in their social system more specifically the surroundings and the attitude and beliefs of those around can greatly influence the possibility of developing obesity.

## **CHAPTER FIVE**

## **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **Introduction**

This chapter deals with the summary, conclusions and the recommendations of the study and areas for further studies.

### **Summary**

Child obesity is a serious nutritional challenge that is growing at alarming rates worldwide. It therefore needs immediate attention to control its rapid growth. The purpose of this study was to investigate the potency of using teachers to reduce childhood obesity among primary school pupils in Cape Coast.

Descriptive survey design was used for the study. The population included teachers and pupils in the primary schools and the sample for the study was 133 teachers and 317 pupils obtained from randomly selected schools. The lottery method was used to select the schools both private and public in which teachers and pupils were selected. The primary one to six teachers of the selected schools were purposively selected for the study. Also, pupils in primary four to six were randomly selected to take part in the study. This was done because those pupils were in the upper level of the primary school and it was assumed they will better understand the requirements for the study.

The main instruments used for the study was anthropometric measures and questionnaire which was designed with the assistance of my supervisors. It comprised of closed-ended and open-ended type of questions.

The research questions that guided the study were:

1. What is the prevalence of obesity among primary school children in Cape Coast?
2. How do teachers perceive childhood obesity?
3. Which factors are teachers aware to cause obesity among primary school children in Cape Coast?
4. What intervention strategies can teachers use in supporting childhood obesity?
5. What challenges do teachers face in controlling childhood obesity among primary school pupils in Cape Coast?

Data collected were analysed by means of descriptive statistics using the Statistical Product for Service Solutions version 21. The analysed data were presented in figures and tables using frequencies and percentages.

### **Key Findings**

The results of the study revealed that the prevalence of obesity among primary school pupils in the Cape Coast metropolis was growing at an alarming rate of 5% with those at risk of obesity growing at an alarming rate of 9%. It was also revealed in the study that although most previous studies done on the prevalence of child obesity showed high prevalence among the female subjects, this study showed a high prevalence among males. This implies that, childhood obesity is prevalent among primary school pupils in the metropolis particularly among the male subjects and thus requires immediate intervention to control its growth.

The results of the study also revealed that, most teachers despite the cluster of school they taught in had a good perception about child obesity, indicating that, teachers had knowledge about this nutritional challenge even though a few of them, with the basic level of education had a very poor

perception about child obesity. However, they did not have the knowledge and skills to use their potency to support children with obesity.

It was also evident from the study that a majority of the teachers were very much aware of dietary patterns as a major factor contributing to the development of obesity among the primary school pupils. They identified high intake of calorie dense foods, low consumption of fruits and frequent snacking as key causal factors of obesity among pupils.

On the issue of strategies teachers could use in supporting children with obesity, they identified the following as key in helping to reduce child obesity;

- i. The existence of a playing ground for children and allowing them to play during break periods to keep them physically active. Also the existence of periods for physical education lessons on the academic calendar could serve as a means of keeping the pupils physically active.
- ii. Appointing a qualified P.E teacher could help greatly in keeping the pupils physically active.
- iii. Allowing pupils to stand when answering questions during lessons, walking to submit their exercises, as well as standing for a few minutes during lessons after sitting for long periods during lessons.
- iv. Prohibiting foods, drinks and sweets in the classroom and also avoiding such food items as rewards for children.
- v. Banning the sale of calorie dense foods on school premises
- vi. Teaching healthy eating and food choices as a lesson could also serve as a strategy for teachers to control the dietary behaviours of pupils which tends to be the major contributing factor of child obesity.

Finally, the respondents also identified inadequate knowledge about intervention strategies, lack of adequate time in implementing intervention

strategies and lack of support from school authorities as challenges they may encounter in supporting children with obesity.

### **Conclusions**

Based on the findings of this study, it can be concluded that obesity is prevalent among primary school pupils at an alarming high rate of 5%. Also it was apparent from the findings that, pupils who were at risk of being obese were also very high especially among the male subjects. This posed a more challenging future of child obesity if not controlled immediately.

Again, it can be said that teachers had a good perception about child obesity which shows that they had knowledge about the nutritional challenge. This could facilitate their willingness to implement intervention strategies in supporting child obesity such as; enforcing policies on banning the sale of high calorie foods in schools, prohibiting foods and sweets in the classroom, helping pupils to be physically active by allowing them to play during break periods, walking to submit class exercises and also standing frequently to answer questions or after sitting for long periods. It was also evident that teachers were aware of the factors that were likely to cause obesity among the primary school pupils. This can help them to know how best to help the children who are obese or at risk of being obese. Even though, some teachers identified challenges that they were likely to encounter in trying to support children with obesity which could affect the effective implementation of intervention strategies. However, it is required that teachers are equipped with tools (strategies) to help support child obesity to reduce the growing rate of child obesity in the Cape Coast metropolis or the country as a whole.

### **Recommendations**

Based on the findings from the study and the conclusion, the following recommendations were made:

1. Teachers in the primary schools must be equipped with in-depth knowledge on various strategies they can implement in supporting children with obesity. Though it was revealed in the study that teachers already had various ways they were using to keep children active and healthy, the researcher believes that they still needed more knowledge in intervention strategies that could help reduce child obesity.
2. The Ghana Education Service must develop a model or organise training sessions on intervention strategies to use and how to effectively use them to help reduce the growth of child obesity. This will equip teachers to use their power to implement those strategies effectively and help to reduce the growing challenge.
3. Qualified physical education teachers must be employed especially in the primary schools to help keep them physically active.
4. School authorities must also ensure that in developing the academic calendars' for the school, they must include periods for teaching healthy food choices and eating habits. This will help increase the knowledge of children to make healthy choices with respect to foods and snacks.
5. School authorities must also develop and enforce policies regarding the sale of foods and snacks on their school premises. And ensure that healthy foods and snacks are available to the children. This will send better signals to the pupils as to the choices they make on foods and snacks.
6. Parent and Teacher Associations must be sometimes focused on helping pupils to reduce risk factors that lead to obesity. This can be done efficiently



when parents agree and enforce interventions laid down to help curb obesity by the schools or teachers.

7. Schools can include in their curriculum periods or topics on healthy eating and food choices. Or can set up educational fun clubs that enlighten children on healthy living, good food choices or dietary behaviours and also importance of keeping physically active.
8. The study must also be replicated on a larger population of both teachers and pupils.

Workshops and seminars must be organised for both teachers and school authorities to educate them on intervention strategies to implement to help curb the rate of obesity.

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## **APPENDICES**



## APPENDIX A

**Table for Determining Sample Size from a Given Population**

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	292
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
98	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	1103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note, -- *N* is population size.

*S* is sample size.

Source: Krejcie, R. V. & Morgan, D. W. (1970). Determining Sample Size for Research activities. *Educational and Psychological Measurement*, 30, 607 – 610.

**APPENDIX B**  
**QUESTIONNAIRE FOR TEACHERS IN PRIMARY SCHOOLS IN**  
**THE**  
**CAPE COAST METROPOLIS**

**UNIVERSITY OF CAPE COAST, COLLEGE OF EDUCATION**  
**DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION**

This questionnaire is intended to find out strategies for managing child obesity in the Central region. The result will be very helpful in getting information for the education on how teachers can support in managing child obesity. You are one of the few people in this metropolis that have been selected to participate in the study and your prompt completion of the questionnaire will contribute immensely. Your responses will be used for academic purpose only. It will be confidential and your anonymity is assured. Thank you in advance.

Nancy Sekyi- Whyte. (MPhil. Home Economics)

**Section A: Background Information**

Instruction: Please tick (✓) the response which corresponds with your background information.

1. Gender: Male [ ] Female [ ]
2. Level of education..... Basic [ ] Secondary [ ] Tertiary [ ]
3. Cluster: Public [ ] Private [ ]
4. What class (es) do you teach? .....
5. How many children are in the class.....

**Section B: Teachers perception about child obesity**

In this section am trying to find out your opinion on child obesity and your level of concern on the challenge. Please tick (√) your response in line with the number which best indicates your level of agreement. The numbers have the following corresponding meaning;

0= No understanding 1= Poor understanding 2= Somewhat fair understanding

3= Fair understanding 4= Advance understanding 5= Very advance understanding

Child Obesity	Levels of understanding					
	0	1	2	3	4	5
1. Child obesity is a common nutritional challenge in Ghana.						
2. Child obesity is a condition where a child's BMI is above the normal weight and height for his/her age						
3. Knowledge about child obesity can be found in books, journals, on social media, surfing the internet, etc						
4. One can identify a child as obese by the appearance, dietary practises, physical activity level, etc						
5. It is a serious medical condition that needs immediate attention.						
6. Obesity in children is perceived						

as normal and is accepted by society						
7. As teachers we should all be concerned and involved in helping reduce this challenge.						

### Section C: Teachers perception on the factors causing child obesity

**Instruction:** Below is a table with the list of factors likely to cause obesity among children in the basic in the Cape Coast metropolis. On a six-point scale please select the number which mostly agrees with your opinion. For each of the statement, indicate with a tick (✓) the one that best indicates your opinion.

0 = No perception 1= Poor perception 2= Weak perception 3= Fair perception  
4 = Strong perception 5= Very strong perception

	Factors causing child obesity	Level of Agreement					
A	Biological	5	4	3	2	1	0
16.	Age						
17.	Gender						
18.	Hereditary (genetics)						
19.	Having overweight/obese parents						
B	Socio demographic	5	4	3	2	1	0
20.	Occupation of parents						
21.	Educational level of parents						
22.	Area of residence						
C	Dietary patterns	5	4	3	2	1	0

23.	High intake of calorie dense foods						
24.	Low intake of fruits and vegetables						
25.	Frequent snacking						
<b>D</b>	<b>Socio economic background</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
26.	Children from low income homes						
27.	Children from high income homes						
<b>E</b>	<b>Level of physical activity.</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
28.	Travelling mostly to school in cars						
29.	Extensive viewing of television						
30.	Regularly avoiding Physical Education periods						
31.	Regularly avoiding school chores						

#### **SECTION D: Available Intervention strategies**

33. Do you have any strategy that you use to help reduce obesity in children?

Yes [ ] No [ ]

34. Does your school have a playing ground for children?

Yes [ ] No [ ]

35. Are children allowed to play and run around during break periods?

Yes [ ] No [ ]

36. Does your school have a qualified Physical Education teacher?

Yes [ ] No [ ]

37. Does your school have periods for Physical Education lessons?

Yes [ ] No [ ]

38. Do you use this period to teach other lessons?

Yes [ ] No [ ] Sometimes [ ]

39. Does your school have teaching periods for teaching healthy eating habits and eating healthy foods?

Yes [ ] No [ ] Sometimes [ ]

40. As a teacher do you include in your lessons topics about healthy eating and food choice?

Yes [ ] No [ ] Sometimes [ ]

As a teacher do you do any of these to encourage children to be active?

***PLEASE TICK (✓) WHERE APPROPRIATELY***

ACTIVITY	YES	NO	SOMETIMES
41. Allowing children to stand when answering questions			
42. Allowing children to walk to submit class exercises instead of passing them while sitting			
43. Encouraging children to walk and play during break times			
44. Allowing them to stand for a few minutes during lessons after sitting for long periods			

45. Does the school have any regulation regarding the sale of foods?

Yes [ ] No [ ] Sometimes [ ]

46. Are foods, sweets and drinks allowed in the classroom during lessons?

Yes [ ] No [ ] Sometimes [ ]

47. Do you use foods and sweets as rewards for children?

Yes [ ] No [ ] Sometimes [ ]

48. Are there stores or snack bars in the school that sells sweets and beverages?

Yes [ ] No [ ]

49. Is the school responsible for operating the stores or snack bars?

Yes [ ] No [ ]

50. Does your school have any policy(ies) that guides the type of foods sold on school premises?

Yes [ ] No [ ]

**SECTION E: Likely Challenges Teachers May Face**

51. What are the likely challenges you may face when implementing these strategies?

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

**Thank you very much for participating in this study.**

**APPENDIX C**

UNIVERSITY OF CAPE COAST  
COLLEGE OF EDUCATION STUDIES  
FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION  
DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

Direct 03320-91097 :  
Telegrams & Cables: University, Cape Coast



University Post Office  
Cape Coast, Ghana

Our Ref: VTE/IAL/V.2/50

22<sup>nd</sup> May, 2017

TO WHOM IT MAY CONCERN

INTRODUCTORY LETTER

We have the pleasure of introducing to you Ms Nancy Sekyi-Whyte who is an M.Phil student of this Department.

We would be very grateful if you could provide her with information and necessary assistance she need for her thesis on the topic "**Strategies for Managing child Obesity Among Primary Schools in the Cape Coast Metropolis**".

We are counting on your usually cooperation.

Thank you.

Yours faithfully,

Dr. (Mrs.) Christina Boateng  
HEAD OF DEPARTMENT

APPENDIX D



# GHANA EDUCATION SERVICE

*In case of reply the  
Number and date of this  
Letter should be quoted*



METROPOLITAN EDUCATION DIRECTORATE  
P. O. BOX 164  
CAPE COAST

REPUBLIC OF GHANA

Tel. 03321-32514/32676  
Fax 03321-32676  
Email: capecoastmeo@yahoo.com  
My Ref. No GES/MD/EPI.VOL.4/98  
YourRef.No.

8<sup>th</sup> May 2017

HEADTEACHERS CONCERNED  
CAPE COAST METROPOLIS  
CAPE COAST ✓

## INTRODUCTORY LETTER MS. NANCY SEKYE-WHYTE (UCC)

The above named is an M.Phil students from the Vocational and Technical Education, College of Education Studies; University of Cape Coast who is conducting a study on the topic '*Strategies for managing child obesity among primary school children in the Cape Coast Metropolis*'. Permission has been granted her to undertake the study in your school as one of the selected schools.

You are hereby entreated to ensure that the study will not interfere with normal teaching and learning activities. Please find attached copy of the selected schools and accord her the necessary assistance to ensure a successful exercise.

Thank you.

STEPHEN RICHARD AMOAH (MR)  
METRO DIRECTOR OF EDUCATION  
CAPE COAST

## APPENDIX E

**INFORMED CONSENT FOR THE STUDY ON  
STRATEGIES FOR MANAGING CHILD OBESITY  
AMONG PRIMARY SCHOOLS IN CAPE COAST.**

PARENT'S NAME:.....

WARD'S NAME: .....

**INTRODUCTION**

Your ward has been invited to participate in the study on strategies for managing obesity among primary school children. The aim of this study is to find out the prevalence of obesity among primary school children and how it can be managed. The information may assist us develop strategies that could be useful in managing child obesity in schools.

Participation in this study is voluntary. Your ward will not be affected by your refusal to let him/her participate in the study. The procedures involved in the study are simple and safe. It involves measuring the weight and height of the child. These procedures would not cause any physical, mental or emotional harm to your ward. All personal information gathered in the study will be kept confidential.

If you have any problems or questions about this study you should please contact principal investigator;

Nancy Sekyi- Whyte 0244168497.

**CONSENT**

I have read about this study and understood its nature. I hereby consent to permit my ward to take part in this study.

SIGNATURE/THUMB PRINT OF THE PARENT/ GUARDIAN.....

DATE.....

SIGNATURE OF INVESTIGATOR

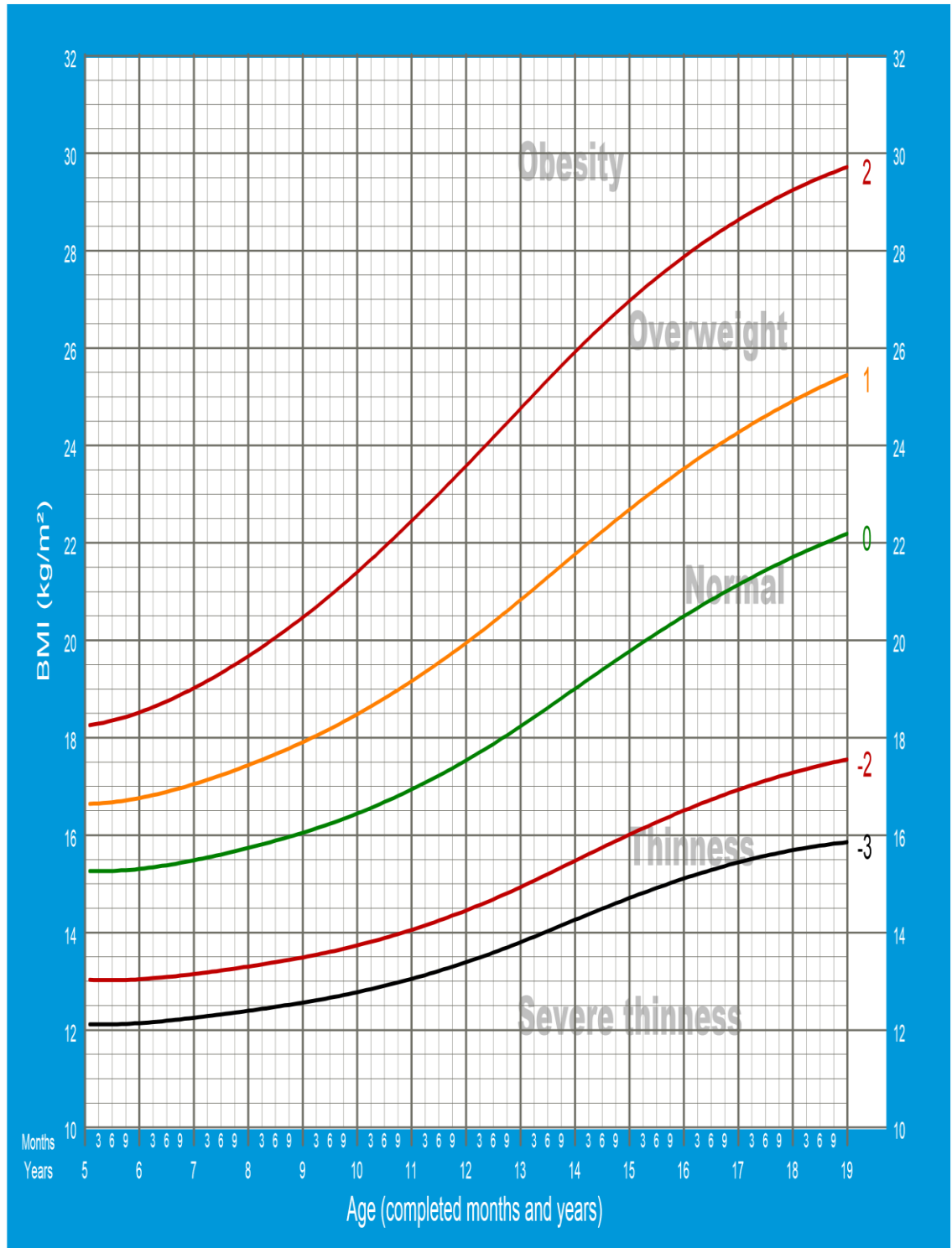
DATE.....

**APPENDIX F**

# BMI-for-age BOYS



5 to 19 years (z-scores)



# BMI-for-age GIRLS

APPENDIX G

2007 WHO Reference

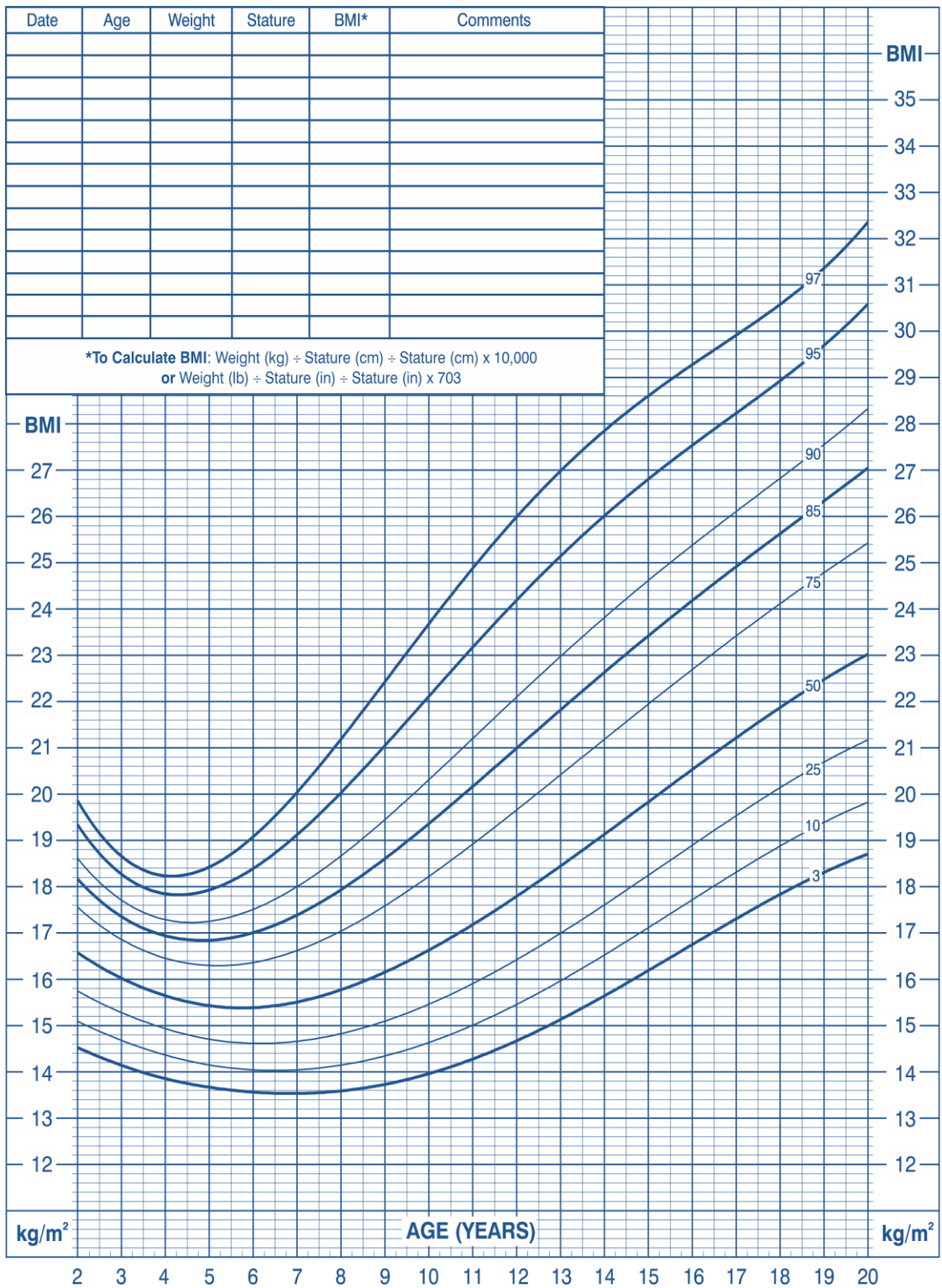


5 to 19 years (z-scores)

**2 to 20 years: Boys**  
**Body mass index-for-age percentiles**

NAME \_\_\_\_\_

RECORD # \_\_\_\_\_



Published May 30, 2000 (modified 10/16/00).  
SOURCE: Developed by the National Center for Health Statistics in collaboration with  
the National Center for Chronic Disease Prevention and Health Promotion, 2000.  
<http://www.cdc.gov/growthcharts>

**APPENDIX H**

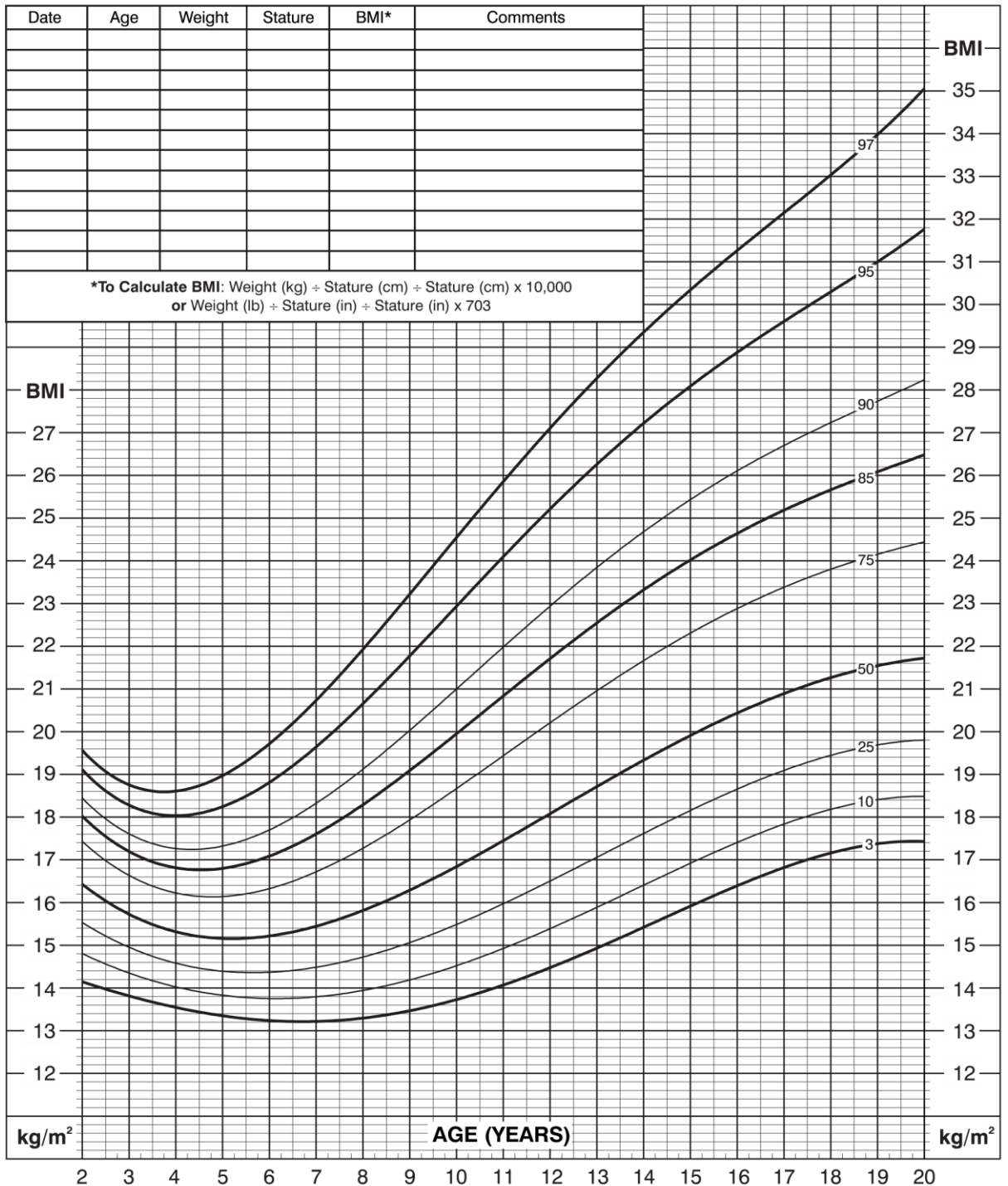


## **APPENDIX I**

**2 to 20 years: Girls**  
**Body mass index-for-age percentiles**

NAME \_\_\_\_\_

RECORD # \_\_\_\_\_



Published May 30, 2000 (modified 10/16/00).  
 SOURCE: Developed by the National Center for Health Statistics in collaboration with  
 the National Center for Chronic Disease Prevention and Health Promotion (2000).  
<http://www.cdc.gov/growthcharts>



**APPENDIX J**

## TABLE OF INFERENCE

	Score	Interpretation
Perception of Teacher	0.0 – 0.44	No Perception
	0.45 – 1.44	Very Poor Perception
	1.45 – 2.44	Poor Perception
	2.45 – 3.44	Good Perception
	3.45 – 4.44	Very Good Perception
	> 4.45	Extremely Good Perception
Factors Causing C. O	0.0 – 0.45	Not Aware
	0.45 – 1.44	Poor Awareness
	1.45 – 2.44	Less Awareness
	2.45 – 3.44	Fairly Aware
	3.45 – 4.44	Much Aware
	>4.45	Very Much Aware

## APPENDIX K

UNIVERSITY OF CAPE COAST  
INSTITUTIONAL REVIEW BOARD SECRETARIAT

