

**SCHOOL OF PUBLIC HEALTH, COLLEGE OF HEALTH SCIENCES,
UNIVERSITY OF GHANA LEGON**

TOPIC:

**ASSESSMENT OF PHYSICAL ACTIVITY ON OVERWEIGHT AMONG
SENIOR HIGH SCHOOL STUDENTS IN THE ACCRA METROPOLIS**

**BY
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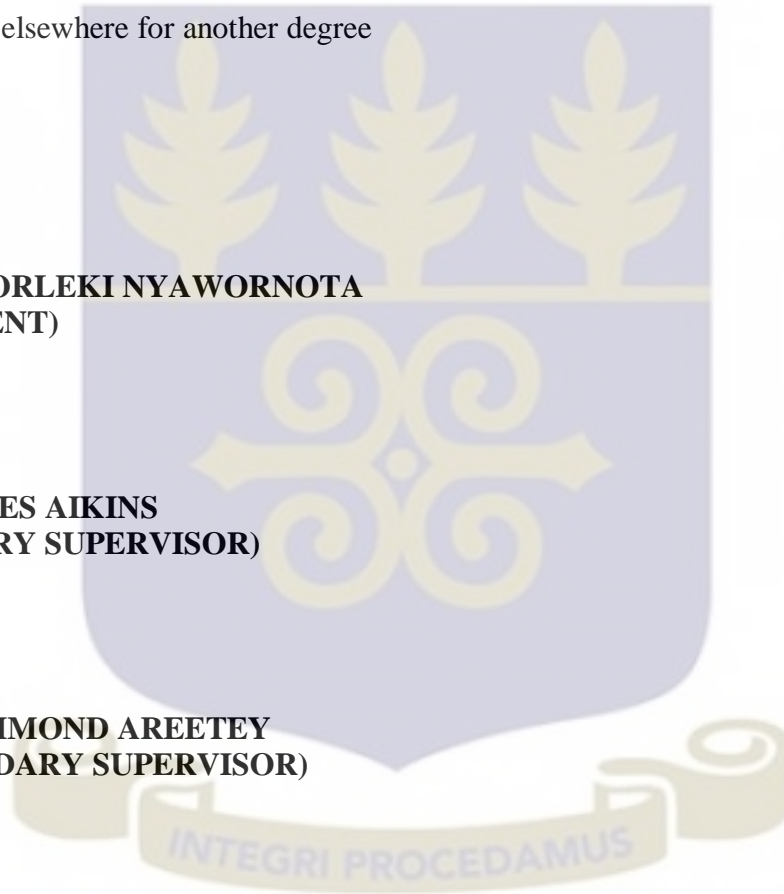
DECLARATION

I VIDA KORLEKI NYAWORNOTA declare that except for other people's investigations/ work which have been duly acknowledged, this work is the result of my own original research, and that this dissertation, either in whole or in part has not been presented elsewhere for another degree

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DEDICATION

I dedicate this dissertation to my dear mother Edna Djabaki Nyako for her love and support throughout my education up to this level.



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The Lord had been very good to me throughout my study and I am very grateful to him for his love and mercy.

I wish to express my sincere gratitude to my primary supervisor Dr Moses Aikins of the Department of Health Policy Planning and Management of the School of Public Health.

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ABSTRACT

Adequate, frequent and appropriately intensity physical activity is an effective means for the primary and secondary prevention of many of today's leading health outcome like overweight, obesity, depression and other chronic diseases. Adolescent overweight is on the increase worldwide. It is estimated that the proportion of overweight school-age children will almost double by 2010. Ghana's National Health Policy (2007), notes that non communicable diseases are increasing in Ghana and identify physical inactivity as one of the factors responsible for the increase. However little evidence on physical activity in adolescents is available in Ghana to support intervention activities. This study aims at examining the relationship between physical activity and overweight among senior high school students in the Accra metropolis.

A school based cross sectional descriptive study was conducted in the Accra Metropolis, among selected senior high schools students. Participants were selected using cluster sampling. Structured questionnaire and anthropometric measurement were employed to gather information for this study. Body Mass Index (BMI) expressed as weight/height^2 (BMI; kg/m^2) was calculated to determine overweight and obese students by comparing respondent BMI against the international reference standard.

The WHO Growth reference standard for children and adolescents chart was used to determine overweight (BMI $\geq +1\text{SD}$ equivalent to 25kg/m^2) and obese (BMI $\geq +2\text{SD}$ equivalent to 30kg/m^2) of students. Data was entered into Epi Info version 3.4.1. Stata for Windows (Statcorp, College Station, USA) was used to conduct the statistical

analysis. A random effect logistic regression model was used to estimate the odds ratio of overweight on moderate physical activity using low physical activity as the reference category.

Out of 444 students, 17% were classified as engaging in low level physical activity, 49% engage in moderate activity, and 34% engage in high level of physical activity. The prevalence of overweight is 11.7% among senior high students in the Accra metropolis (52/444). Overweight prevalence was higher among female students 15.6% compared to male student (4.5%). There was independent association between physical activity (p-value 0.01), sex (p-value 0.001) and age (p-value 0.01) and overweight. The study also found that the risk of overweight was lower among students who engaged in high physical activity compared with low active students.

The study recommends that effective measures like recreational facilities provided for adolescents to engage in physical activity both at home and schools to reduce the risk of overweight.



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LIST OF ABBREVIATIONS



WHO.....	World Health Organization
WHR.....	World Health Report
UNESCO.....	United Nation Educational, scientific and cultural organization
MET.....	Metabolic Equivalent Task
BMI.....	Body Mass Index
IYSPE.....	International Year of Sport and Physical Education
NHANES.....	National Health and Nutrition Examination Surveys
PE.....	Physical Education
PA.....	Physical Activity
SHS.....	Senior High School
SD.....	Standard deviation
CVD.....	Cardiovascular Diseases
AHA.....	America Heart Association
UN.....	United Nations
PES.....	Physical Education and Sports
GES.....	Ghana Education Service
IPAQ.....	International Physical Activity Questionnaire
GSHS.....	Global School-Based Students Health Survey
GSS.....	Ghana Statistical Survey
RHN.....	Regenerative Health and Nutrition

DEFINITIONS OF TERMS

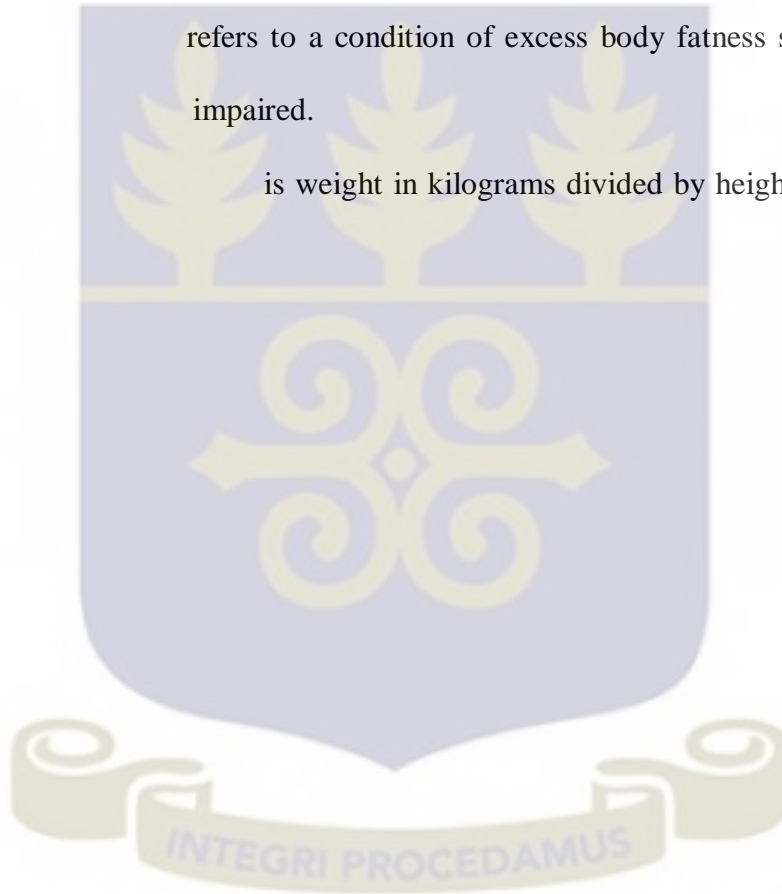
Physical activity is any bodily movement produce by the contraction of skeletal muscle that increases energy expenditure above a basal level.

Physical inactivity is lack of adequate physical activity.

Overweight is an increase of body weight above a standard defined in relation to height.

Obesity refers to a condition of excess body fatness such that health is impaired.

BMI is weight in kilograms divided by height in meters square



CHAPTER ONE

Introduction

1.1 Background

Adequate and regular physical activity (PA) is an important component in the prevention of lifestyle diseases, along with a healthy diet (WHO 2004, WHO 2009, Kosti and Panagiotakios 2006, Chhatwal et. al., 2004, and Taylor et. al., 2005)

Physical activity (PA) is defined as any bodily movement produced by skeletal muscles that result in energy expenditure above resting level (Cavill et. al., 2006). It includes walking, cycling, dance, traditional games, pastimes, gardening, housework, occupational activities, sports and intentional exercise (Cavill et. al., 2006).

According to the United State Physical Activity Guidelines Advisory Committee Report (2008), scientific evidence based on a wide range of well-conducted studies shows that physically active people have higher levels of health-related fitness, a lower risk profile for developing a number of disabling medical conditions, and lower rates of various chronic diseases than do people who are inactive (Anderson *et. al.*, 2005, Pate et. al., 2000 & USA 2008)).

The United State Physical Activity Guidelines Advisory Committee Report (2008), further stated that adequate physical activity (PA) improves glucose metabolism, reduces body fat and lowers blood pressure, resulting in reduced risk of cardio vascular diseases (CVD) and diabetes. Physical activity (PA) can also help manage and mitigate the effects of these diseases (Taylor et. al., 2005) Physical activity may also reduce the risk

of colon cancer by its effects on prostaglandins, reduced intestinal transit time, and higher antioxidant levels (WHO 2009).

However, epidemiological evidence shows that at least 60% of the global population fails to achieve the minimum recommendation of 30 minutes moderate intensity physical activity daily (WHO WHR 2002). Physical activity declines with age, falling off from adolescence, and is associated with overweight and other chronic diseases (Pate et. al., 2005 Biritwum et. al., 2005). Unhealthy lifestyles including physical inactivity and unhealthy diets adopted at a young age are likely to persist into adulthood, reinforcing the occurrences of overweight, obesity and a number of chronic diseases which often reduce the quality of lives (Kosti and Panagiotakios 2006).

In the last 10 years, the number of overweight people in industrialised countries has increased and various bodies have raised concern. For example, the WHO has called obesity an epidemic (WHO 2002). Also in the USA, according to Ogden *et. al.*, 2006, from 1980 to 2002, overweight prevalence in the United State has tripled among children and adolescents. Additionally, Chhatwal et. al., 2004, predicted that more than 12 million adults and 1 million children will be obese by 2010 if no action is taken. These concerns are not unique to the USA and the European countries only, research has further shown that increase in childhood and adolescent overweight and obesity is global (WHO 2002). However, epidemiologically some African countries also have the concerns regarding adolescents who are physically inactive and other related problems associated with lack of physical activity and poor dieting resulting in preventable diseases (WHR 2002, Abubakaria et. al., 2006, Amoah 2003 and Duda et. al., 2006).

A cross-sectional nationwide prevalence study among 10,699 students attending government schools in the nine provinces in South Africa, utilized a two-stage cluster sample design through self-administered questionnaire showed that more than one third (37.5%) of the students engaged in insufficient physical activity (Amosun et. al., 2007).

A research conducted in seven African countries reported that three million out of 20 million people are overweight and obese (WHO 2003). The Ghana demographic health survey of 2008 also reported that overweight is two times higher in urban areas than rural areas (40% compared with 20%) and increases with age, education, and wealth. It also reported that almost half of women (45%) in the Greater Accra region are overweight or obese (GSS 2008).

A study by Seneadza (2008) showed that out of 1133 students examined in the Accra Metropolis, 97 (8.6%) were overweight with 14 (1.2%) being obese. Since some Ghanaians, especially those in the urban setting are adapting to sedentary lifestyle, eating of fast-food, sweets, excessive eating and lack of physical exercise, there is the need to evaluate the prevalence of overweight among adolescents to bring awareness and knowledge about active lifestyles and healthy living to inform the necessary intervention.

In this study, the 2007 WHO international reference standard (body mass index chart) for children and adolescents (5-19years) will be used to identify respondent who are overweight ($BMI \geq +1SD$ equivalent to $25kg/m^2$) and obese ($BMI \geq +2SD$ equivalent to $30kg/m^2$) (Onis et. al., 2007). Thus this study examined the relationship between

physical activities and overweight among selected senior high school students in the Accra Metropolis.

1.2 Problem Statement

Very limited studies have assessed physical activity among adolescents in Ghana. Thus the risk of physical inactivity and overweight among adolescents in Ghana is not widely known. Overweight is a non communicable disease related to inadequate physical activity (MOH 2007), Although some studies have been carried out among adults, there is no in-depth knowledge on adolescent's physical activity and overweight (Biritwum et al., 2005 and Abubakari et.al., 2006). The relationship between physical activity and overweight among adolescents has not been documented in Ghana. The study aims at estimating overweight and determining the pattern and level of physical activity among senior high school students in the Accra Metropolis.

1.3 Justification

This study is justify by the fact that Ghana's disease profile is characterized by a rising number of non-communicable diseases including overweight (MOH 2007), and this study will reveal additional information on adolescent's-specific overweight profile in Ghana The Ministry of Health is currently promoting a new paradigm called regenerative health which is an attempt to shift health care from curative to health promotion. Revelations from this study will highlight awareness of the need for regenerative health adolescent

A major component of the programme is that people should engage in regular physical activities (MOH, 2007). This study will provide information on adolescent's physical activity levels and overweight prevalence, and provide epidemiological information to support intervention activities.

1.4 Conceptual Framework

Figure 1.1 describes the relationship between the risk factors of overweight. The arrows represent the causal effect of the relevant risk factor. Enough scientific evidence shows that demographic, socio-economic and environmental factors exert their effect on overweight directly and through dieting and physical activity, which is also interrelated (Pate et. al., 2005, Gordon-Larsen et. al., 2000, Blair et. al., 1995, Myers et. al., 2004 and GSS 2008). Demographic factors like the physical environment, outdoor space at home/school, recreational facilities, the physical education programme, cultural practice and the presences of TV, video/computers affect the dieting practice of an individual and his involvement in physical activities, and can reinforces over eating, inactivity and overweight (WHO 2003). The socio-economic factors which include parent's social economic status and parent's educational level of an individual and their marital status (Myers et. al., 2004 and GSS 2008) also exert their effect on overweight directly and through dieting and physical activity.

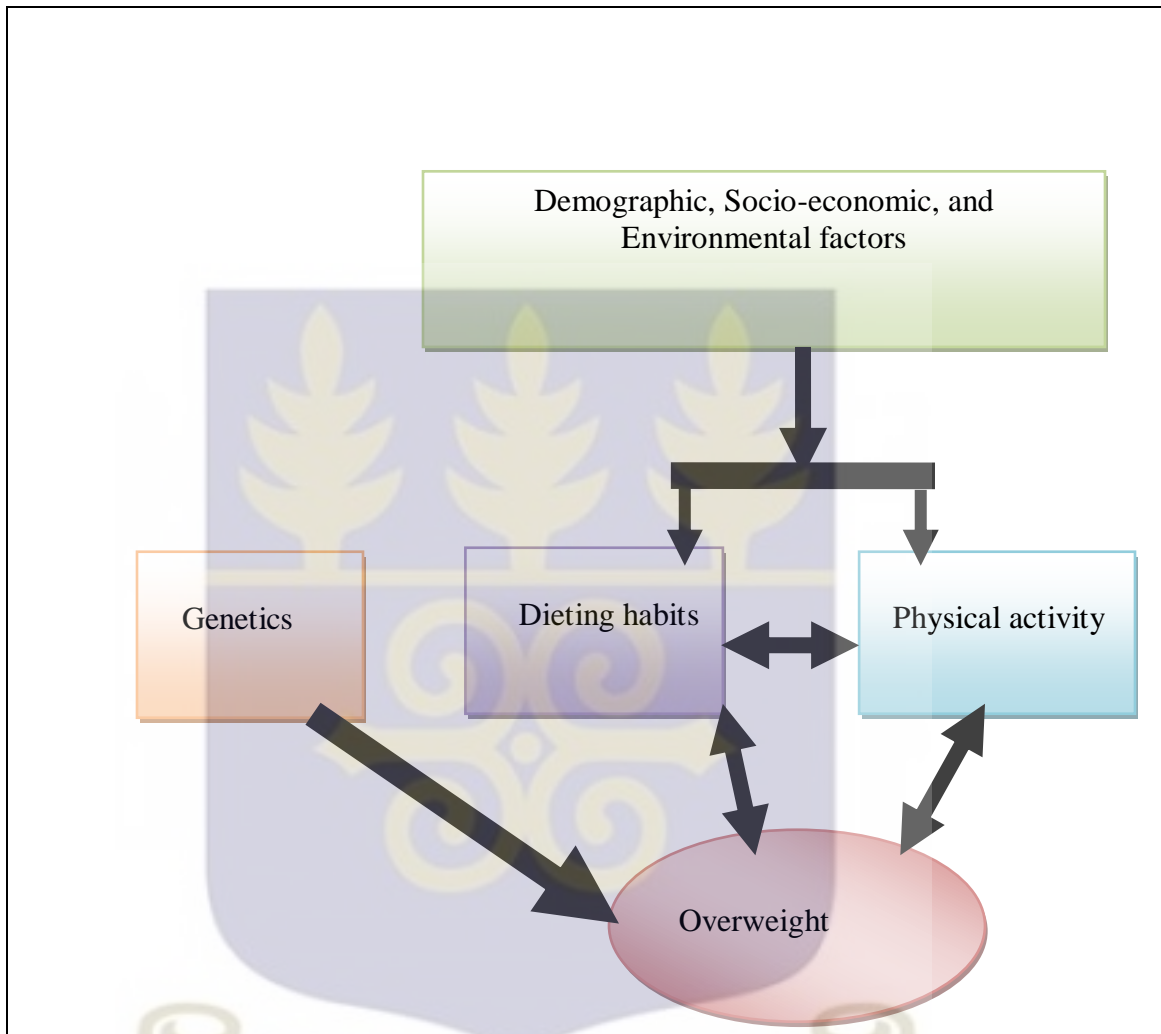
An imbalance energy intake and expenditure will lead to change body composition

In this framework, physical activity, diet and overweight are interrelated, physical activity exert its affect on dieting and overweight. Studies shows that a physically active

individual do not over eat because physical activity does not foster overeating, and that the energy intake is balanced by the activities so it does not induce overweight(WHO 2003).



Figure 1 Conceptual framework for overweight



Dieting affects physical activity as well as overweight and overweight also affect dieting and physical activity. Obesity can develop gradually as a consequence of minor energy imbalance and once the obese state sets in, the body mounts up physiological processes to maintain this state, (Delving, 1997 and Blundell, 1990). This implies that overweight

individuals eat more than is required and exercise less due to the body size which hinders activity resulting energy imbalance. Saxelby (2005) in her book nutrition for life reported that poor eating has a direct impact on health and lead to overweight. Diet and physical activity have been shown to be significantly important in contributing to childhood and adolescent obesity (WHO 2007).

Genetics plays an important role in the body composition of an individual, though lifestyles of the individual may promote overweight, there are some individuals who are predisposed to become overweight because their parents are overweight (Devin, 1997).

The study is more interested in variables found to have evidence of crude association with the overweight. Dieting and other risk factors including physical activity will be investigated for confounding effect.

1.5 Research questions

1. What is the level and pattern of physical activity among senior high students in Accra Metropolis?
2. What is the prevalence of overweight among senior high school students in Accra metropolis?
3. What is the relationship between physical activities and overweight among senior high students in Accra metropolis?

1.6 Research hypothesis

Null hypothesis (H_0): There is no relationship between physical activity and overweight students

Alternative hypothesis (H_1): There is a relationship between physical activity and overweight students.

If the tests significant for this study gives a p-value lower than or equal a p- value of (0.01), concerning the relationship between physical activity and overweight, the null hypothesis will be rejected.

1.7 General Objectives

In general the study examined the association between physical activity and overweight among senior high school students in Accra metropolis.

1.8 Specific objectives

The specific objectives are:

1. To determine the pattern and level of physical activity among senior high schools students.
2. To estimate overweight among senior high students.
3. To determine the relationship between students physical activity and overweight.

CHAPTER TWO

Literature review

The literature review is presented under the following sub-topics:

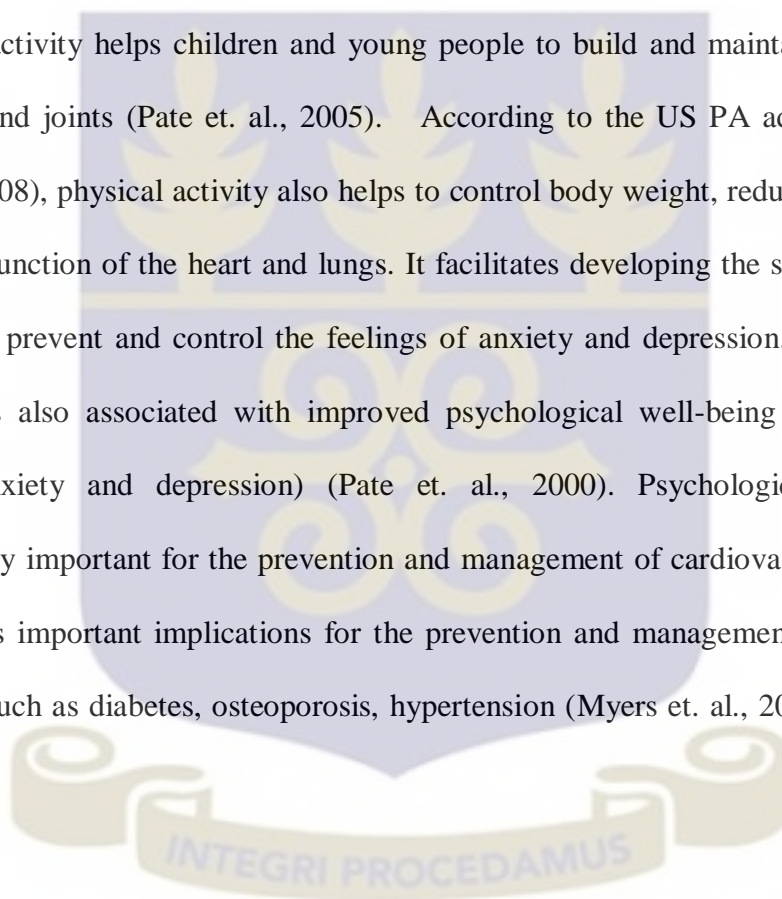
1. Physical activity
2. Demographic, Socio-economic, and Environmental factors
3. Diet
4. Overweight/Obesity

2.1 Physical activity

The WHO World Health Report (2002) describes in detail how a few major risk factors including physical inactivity account for a significant proportion of all deaths and disease in most countries. At least 60% of the global population are physically inactive (WHO 2003). Furthermore in many countries, less than one-third of young people are sufficiently active to benefit from their present and future health (WHO 2003).

Very strong scientific evidence based on a wide range of well-conducted studies shows that physically active people have higher levels of health-related fitness, a lower risk profile for developing a number of disabling medical conditions, and lower rates of various chronic diseases than do people who are inactive (Cole et. al., 2002 and Pate et. al., 2000). Regular physical activity combined with proper dieting ensures long and healthy life (Kosti &Panagiotakos 2006).

There has been accumulated evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases such as cardiovascular disease, diabetes, cancer, hypertension, overweight, obesity, depression and osteoporosis and premature death (Warburton et. al., 2006, Chhatwal et. al., 2004, Advisory Committee Report, US, 2008 and Blair et. al., 1998). Regular physical activity provides young people with substantial physical, mental and social health benefits. Regular physical activity helps children and young people to build and maintain healthy bones, muscles and joints (Pate et. al., 2005). According to the US PA advisory committee report (2008), physical activity also helps to control body weight, reduce fat and develop efficient function of the heart and lungs. It facilitates developing the skills of movement and helps prevent and control the feelings of anxiety and depression. Routine physical activity is also associated with improved psychological well-being (through reduced stress, anxiety and depression) (Pate et. al., 2000). Psychological well-being is particularly important for the prevention and management of cardiovascular disease, but it also has important implications for the prevention and management of other chronic diseases such as diabetes, osteoporosis, hypertension (Myers et. al., 2004 and Jolliffe et. al., 2001).



A more recent review by Warburton et. al., (2006) examined over 150 studies concluded that 'there is irrefutable evidence of the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases (e.g., cardiovascular

disease, diabetes, cancer, hypertension, obesity, depression and osteoporosis (Warburton et. al., 2006).

The global estimate for the prevalence of physical inactivity among adults is 17% (WHR 2002). Most literature available has reported that children and adolescents are more active than adult. In spite of this, concerns have been raised as to whether they are exercising enough to meet the international recommendation of 30 minutes of moderate to vigorous physical activity for at least three days a week so as to derive all the health benefits. According to the Canadian Medical Association, about two-thirds of Canadians are physically inactive, and that physical inactivity is a risk factor for several chronic diseases, and can potentially be a substantial public health burden (Katzmarzyk et. al., 2000). Inadequate Physical activity (PA) puts individuals' lives at risk and become a burden on health budget and the economy of a country as a whole (Brundtland 2002, Philip et. al., 2000, and Duda et. al., 2006, LaFontaine 2006, and Waxman 2003).

A cross-sectional national prevalence study among 10,699 students attending government schools in the nine provinces in South Africa, utilized a two-stage cluster sample design through self-administered questionnaire showed that more than one third (37.5%) of the students engaged in insufficient physical activity (Amosun et. al., 2007).

The intensity and frequency of activities can influence the magnitude of their effects on chronic diseases. Light and moderate activities are associated with lower risk of coronary heart disease and also reduce all cause mortality (Pate et. al., 2005).

Physical activity is classified by most studies into moderate to vigorous activities according to the duration, frequency and the intensity of the activity (physical activity guidelines advisory committee report US, 2008). Duration is the length of time in which an activity or exercise is performed and is generally expressed in minutes. Frequency is the number of times an exercise or activity is performed. Frequency is generally expressed in sessions, episodes, or bouts per week. Intensity refers to how much work is being performed or the magnitude of the effort required performing an activity or exercise.

Individuals who participate in at least 30 minutes of moderate-intensity activity of 5 or more days per week or 20 minutes of vigorous-intensity activity 3 or more days per week, or both are considered to be engaged in regular physical activity.

Moderate-intensity activities include activities like brisk walking, bicycling, gardening, household tasks, or anything else that causes small increases in breathing or heart rate for at least 30 minutes per day at least 5 days per week.

Vigorous intensity activities also include running, aerobics, heavy yard work, basketball, soccer and sports or anything else that causes large increases in breathing or heart rate for at least 20 minutes per day at least 3 days per week.

Other studies categorize participation in physical activity into high, moderate, and low activity patterns. Each activity grouping is assigned a metabolic equivalent task (MET) value (Compendium of Physical Activity 27) developed to categorize activity as low,

moderate, or vigorous (Gordon-Larsen 2000). Higher intensity activities, such as skating, cycling, dance, martial arts activities, and active sports, were assigned 5 to 8 METs and are, thus, considered moderate to vigorous physical activity, Moderate physical activity was assigned 4.0 METs and Walking (low) physical activity 3.3 METs, (Gordon-Larsen 2000 Pate et. al., 2005). Using these values, four continuous scores are defined:

Walking MET-minutes/week is calculated by multiplying 3.3 by walking minutes and the number of walking days, Moderate MET-minutes/week is also calculated by multiplying 4.0 by moderate-intensity activity minutes and the number of moderate days, Vigorous MET-minutes/week is also calculated by multiplying 8.0 by vigorous-intensity activity minutes and vigorous-intensity days. And the Total physical activity MET-minutes/week which is the sum total of Walking, Moderate, and Vigorous MET minutes/week scores.

Several biological mechanisms may be responsible for the reduction in the risk of chronic disease and premature death associated with routine physical activity. For instance, routine physical activity has been shown to improve body composition (e.g., through reduced abdominal adiposity and improved weight control) (Pate et. al., 2000 and Gordon-Larsen et. al., 2000).

Physical inactivity is lack of adequate physical activity and is a major risk factor for many of today's leading causes of ill health (Anderson et. al., 2005, Pate et. al., 2000 and Advisory Committee Report, 2008). The prevalence of physical inactivity increases with

urbanization and with increasing socio-economic status. (Amoah 2003, WHR 2002 and WHO 2007)

Inactivity and activity are said to be important biological determinants of obesity which represent major avenues for treating and preventing obesity. Inactivity, in particular, TV viewing, has been associated with obesity in cross-sectional studies of children, adolescents, and adults. Physical activity habits, and, specifically, inactivity, track significantly from adolescence to young adulthood (Livingstone 2001).

Evidence has continued to accumulate over the past two decades and the relationship between improved health and physical activity is now well established both by individual studies and by a series of systematic reviews that summaries the evidence across all previous studies that have used sound scientific methods, such as randomized clinical trials and cohort (longitudinal) studies (Katzmarzyk et.al., 2006).

Also Body Mass Index (obesity/overweight) rates are increasing among young people as well as among middle-aged adults. This is related in part to lack of physical activity and increasing amounts of time in sedentary behaviors such as watching television, using computers, and excessive use of "passive" modes of transport (cars, buses and motorcycles) (WHO 2007). Physical inactivity is attributable to high BMIs (WHO 2002, WHO 2007).

Participation in sport necessarily involves varying degrees of physical activity. However, some physical activities, such as walking upstairs, would not be counted as sport though they may bring health benefits. What matter are the type, intensity, duration and frequency of physical activity associated with different sports and activities. Sport and leisure activities offer opportunities for physical activity that are enjoyable therefore people are more likely to participate regularly and that provide substitutes for the general decline in physical activity associated with decades of increased mechanization and the growing prevalence of motorized transportation. Physical activity is falling rapidly because of the systematic and highly successful measures by governments and commerce to reduce the need for physical work in the home, in transport and at the workplace (Pate et. al., 2000).

A study of television viewing in the United State by Gortmaker et. al., (1996) estimated that more than 60% of overweight incidence in a population can be link to excessive television viewing. The amount of time spent in front of the television during adolescence has been found to be significantly associated with adiposity (Pate et. al., 2000). Other studies on physical activity, diet and overweight reported of the influence of physical activity on overweight and concluded that the physical activity level of an individual is associated with his weight (Katzmarzyk et.al,) 2006 . Cavalcanti et. al., (2010) in an article on abdominal obesity in adolescents: prevalence and association with physical activity and eating habits, observed that physical activity was significantly associated with the occurrence of obesity in adolescents. Other researchers into overweight and obesity also reported that physical activity have a positive impact in

helping teenagers maintain a healthy weight into young adulthood (Cole et.al., 2002 and Pate et. al., 2000). Although some studies reported that there is association between physical activities and overweight other studies did not record any association between physical activities and overweight (Seneadza 2008).

Adolescents who participate in physical education at school are more likely to maintain a normal weight as young adults, according to a study by researchers at the Johns Hopkins Bloomberg School of Public Health (Pate et. al., 2000). For each weekday of physical education at school the odds of being an overweight adult decreased by 5 percent.

Children and the youth spend a substantial number of their waking hours in school, so it is important that schools provide adequate physical activity (Pate et. al., 2000). Most countries require that students receive minimal amount of physical education whilst some government and national organization such as the centre for disease control and prevention which monitor the physical education programme in the United State (US) also recommend daily physical education throughout the nation (Stenzer et. al., 2004), to create the environment for the involvement of the individual especially the adolescence in physical activities. The skills and knowledge acquired will become useful to them by enabling them to take part in sports and recreational activities.

The world body, UNESCO in collaboration with member states and other relevant and concerned international organization initiated many measures to give practical meaning and recognition to the need value and the place of mass participation in some physical

activities, as a means of promoting and sustaining good health and welfare of people as their inalienable right. Physical activity is a fundamental human right of every individual (UNESCO 2003).

Furthermore The United Nations General Assembly Proclaimed 2005 as the International Year for Sport and Physical Education (IYSPE 2005, UNESCO 2003), in responds to a number of concerns, in particular the alarming situation concerning the place, role and status of physical education and sport (PES) in relation to the fundamental needs of education. Sport and physical education play a vital role at all levels of society. For the individual, sport enhances one's personal abilities, general health and self-knowledge. On the national level, sport and physical education contribute to economic and social growth, improve public health, and bring different communities together. On the global level, if used consistently, sport and physical education can have a long-lasting positive impact on development, public health, peace and the environment.

The America Heart Association (AHA) also stressed on the fact that schools are uniquely positioned to address this critical public health concern of inactivity and the related health problems associated with it. The American Heart Association (AHA) called for schools to expand their role in providing physical activity to children and adolescents (Pate et al 1996).

A major component of the physical education (P.E.) programme in Ghana is that people should engage in regular physical activities. One goal of Physical Education is to provide

opportunity for youth to acquire the knowledge, skills and attitudes necessary for a lifelong engagement in healthful physical activities (GES 2008). How this objective is being met is another area of attention. A balance academic programme in senior high schools should increase physical activities throughout the school days and inculcate the habit of involving in physical activities in the youth of Ghana by providing them with the requisite skills and knowledge.

2.2 Social and Environmental factors associated with overweight and physical activity

Although there are both genetic and environmental causes of obesity, the increase in obesity prevalence is likely to be more closely associated with changes in environmental factors. In developed countries, evidence suggests that obesity is socially distributed, with certain social groups at increased risk (WHO 2004) Some studies have shown that individuals from low social class have lower levels of recreational physical activity and are less likely to consume a healthy or low-fat diet than individuals of high social class.

Studies had linked the physical environment, outdoor space at home/school, recreational facilities, the physical education programme, cultural practice and the presences of TV, video/computers to overweight. Socio-economic factors which include parent's social economic status and parent's educational level of an individual also exert their effect on overweight through dieting and physical activity and these can lead to overweight (MOH 2007, WHO 2007, Pate *et. al.*, 2000, Blair *et. al.*, 1995, Myers *et. al.*, 2004 and GSS 2008).

Silveira et. al., (2006) reported that demographic, epidemiological and nutritional transition processes have different characteristics in different countries and that in Brazil, obesity is ceasing to be associated with relatively high socio-economic status and is becoming a marker of poverty, as in developed countries. Also a study on trends in overweight and obesity among adolescents living in the poorest and the richest regions of Brazil suggested that the problem of overweight affects the entire population irrespective of social status.

A study in Europe on the risk factors of childhood obesity indicated that physical factors and social factors (ethnicity, family size, excessive television viewing, short sleep duration and rearing conditions), have all been associated with adiposity in children and risk of overweight in young adulthood, (Livingstone 2001).

A study among adolescents reported that BMI was associated with ethnicity, gender and food habits but no significant relationship was observed with socio economic factors or physical activity (Gordon-Larsen *et. al.*, 2000).

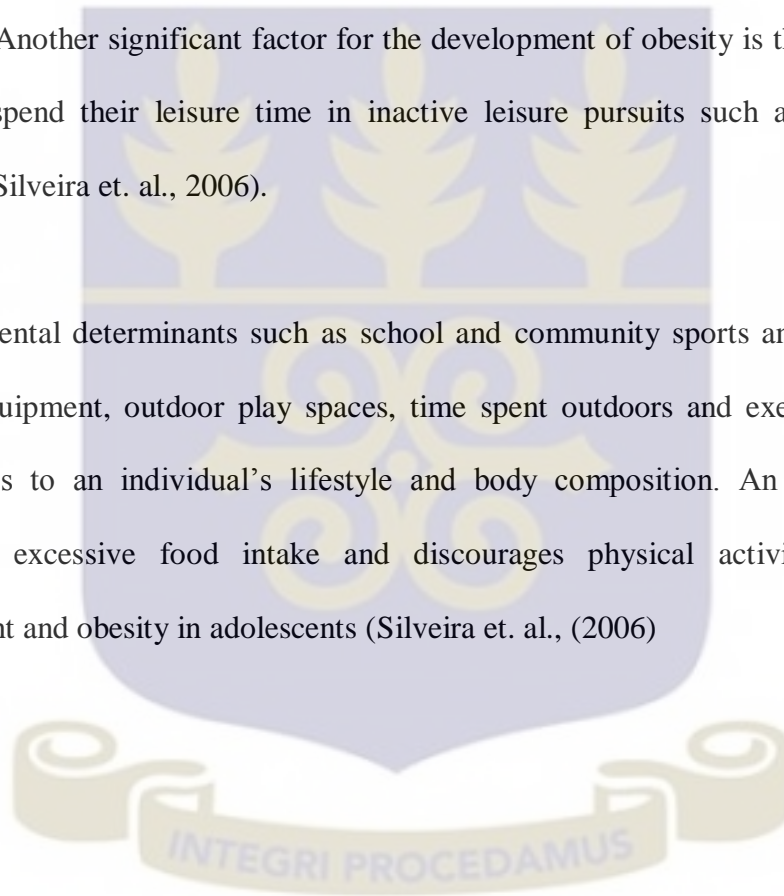
Literature on overweight and obesity attributed recent increase in adolescents' body composition to socio-cultural, economic, education and other environmental factors.

Furthermore ethnicity and cultural practice of an individual had been linked to his body weight.

Adolescents' parents' level of education and socio-economic status was significantly associated with their weight in other studies (Martinez et. al., 1999).

Among the reasons cited for habituation to a more sedentary lifestyle during childhood and adolescence in a study in European are an increase in TV viewing, availability of video and computer games, parental work habits, the increased volume of traffic, parental concern about child abduction and mandatory cut-backs in physical education in schools. Another significant factor for the development of obesity is the extent to which children spend their leisure time in inactive leisure pursuits such as TV and related pursuits (Silveira et. al., 2006).

Environmental determinants such as school and community sports and home access to fitness equipment, outdoor play spaces, time spent outdoors and exercise opportunity, contributes to an individual's lifestyle and body composition. An environment that promotes excessive food intake and discourages physical activity can reinforce overweight and obesity in adolescents (Silveira et. al., (2006)



2.3 Dietary Habits

Dietary patterns influence energy imbalance, thus influencing an individual's weight. The macronutrient content of a diet determines the extent to which excess is stored and about 80% of excess energy may be stored after carbohydrate overfeeding. The capacity for the

storage of carbohydrate is smaller compared to the ultimate capacity of fat, and that dietary fat induces one's appetite thus encouraging an individual to over eat (Seneadza 2008). Over eating has been associated with weight gain (WHO 2007 and Wang Y and Lobstein T. (2006).

In recent times there appear to be a basic shift in dietary pattern induced mainly by shift in income, price and food availability but also by the modern food industry and the mass media (Popkin, 2001). Dietary pattern in developing countries have been influenced greatly by western culture. Eating junk food has become widely accepted. Almost every corner of major streets in Accra (Ghana) has been taken over by fast food vendors. This has affected the dietary pattern in Accra (Seneadza 2008).

Intensive marketing and changing cultural perceptions are contributing to the retreat from our local Ghanaian foods. Healthy adolescents should eat many different kinds of food each day, eat enough for growth and physical activity, choose foods low in fat, sugar and salt, choose snacks well, drink plenty every day, not drink alcohol and take part in regular physical activity.

As noted in a large-scale surveys by WHO on diet, activity and obesity showed that the speed of dietary and activity pattern shifts is high resulting in major shifts in obesity on a worldwide basis and as a result, obesity has shifted towards the poor (WHO 2002).

The nutrition transition and the increase in sedentary behavior are occurring at a much faster pace in developing countries than in developed countries according to the World Health Report (2002). According to the report, several trends suggest that the non

communicable disease problem will grow steadily worse unless urgent action is taken (WHR 2002 and WHO 2003), to regulate the increase.

Consumption of animal fats and unhealthy hydrogenated fats; widespread displacement of nutrient-rich foods (such as fruits, vegetables and legumes) by energy dense, nutrient-poor foods; and increased global consumption of salty, sugary, and fatty foods, all within a context of reduced levels of physical activity (Philip and Jackson-Leach 2006 and Waxman 2003). The scientific evidence is strong that a change in dietary habits and physical activity can powerfully influence several of these risk factors in a population (WHR 2002 and WHO 2003 and Wang and Lobstein (2006).

Sustained behavioral interventions have been shown to be effective in reducing population risk factors. Although an optimal diet is critical, daily physical activity of moderate intensity is well-established as an important determinant for good health, (WHR 2002 and WHO 2003), helping to lower blood pressure, reduce body fat, and improve glucose metabolism.

About 75% of cardiovascular diseases can be attributed to, low fruit and vegetable intake, inactive lifestyle, and tobacco use (WHR 2002). Up to 80% of cases of coronary heart disease, 90% of type 2 diabetes, and one-third of cancers of all types can be avoided by changing to a healthier diet, increasing physical activity, and stopping smoking (WHO 2003).

In all countries, chronic diseases have a major impact on the demand for health services. High costs of treatment, lost productivity, and premature death negatively affect economies and quality of life (WHO 2000). The cost-effective prevention of non communicable diseases should be an important development agenda issue. In both developed countries and many lower middle income countries, patterns of unhealthy behaviors and associated deaths often begin in the more affluent sectors of society (Kosti & Panagiotakos 2006). However, global experiences suggest that in time all major harmful risks to health will cluster in the poorest communities even in many rural areas and become a major contributor to inequities by social class (Katzmarzyk et. al., 2006).

2.4 Overweight and Obesity

Adolescent overweight is on the increase worldwide (WHO 2003). It is estimated that the proportion of school-age children affected will almost double by 2010 (Kosti & Panagiotakos 2006, Chhatwal et al. 2004 and Popkin 2000). Adolescents who are overweight are more prone to be obese when they enter adult life and these individuals are also likely to continue to gain weight in adulthood (Colditz et al. 1995).

Overweight is referred to an increase of body weight above a standard defined in relation to height and obesity also refers to a condition of excess body fatness such that health is impaired. The prevalence of overweight and obesity is rising at an alarming rate worldwide, in most high income countries, developing countries and even poor countries coupled with physical inactivity and unhealthy dieting habit (WHO 2007). Obesity which was once considered a problem only in developed countries, is now drastically on the rise in low and middle income countries particularly in the urban settings.

According to LaFontaine (2006), since the mid-1970s, the prevalence of overweight and obesity among adults and youth has increased dramatically and that data from the 1976-1980 and 2003-2004 National Health and Nutrition Examination Surveys (NHANES) show that the prevalence of obesity (body mass index [BMI] above the 95th percentile on the Centers for Disease Control and Prevention growth charts) among adolescents 12 to 19 years of age, has increased from 5.0% to 17.4% and the prevalence of overweight (BMI between the 85th-95th percentile on growth charts) also increased from 13% to 33%. According to the Zoeller (2009) children and adolescents become more inactive as they mature, and that girls are less active than boys at all ages.

The prevalence of obesity/overweight during childhood and adolescence is increasing rapidly in both the developed and the developing world and has already reached epidemic proportions (Silveira et. al., 2006). The Obesity Task Force of the World Health Organization (2004) estimated that about 10% of young people aged 5–17 years worldwide are overweight, among which 2–3% are obese (Silveira et. al., 2006).

Kosti and Panagiotakos (2006) in their review paper on obesity in children and adolescents in the world reported that the prevalence of obesity has reached alarming levels. The review also reported that overweight/obesity is affecting virtually both developed and developing countries of all socio-economic groups, irrespective of age, sex or ethnicity and that this global average reflects a wide range of prevalence levels with the prevalence of overweight in Africa and Asia averaging well below 10% and in the Americas and Europe above 20% (Kosti and Panagiotakos 2006).

A study on childhood obesity in Europe attributed economic and social changes currently taking place such as a decrease in birth rates, increase in the number of one-parent families, changes in child rearing practices, increased unemployment, as well as the more obvious lifestyle changes in dietary and activity patterns are contributing to the increasing prevalence of childhood obesity (Livingstone 2001). Pate and other childhood obesity experts say that more youths are becoming obese because of addicted to television, video games, and fast food (Pate et. al., 2005)

As cited in Ogden (2002) and Hedley (2004), results from the United States 1999-2002 National Health and Nutrition Examination Survey (NHANES), using measured heights and weights, indicated that an estimated 16 percent of children and adolescents aged 6-19 years are overweight. This represents a 45 percent increase from the overweight estimates of 11 percent obtained in 1988-94. It is widely acknowledged that being overweight is associated with an amplified risk of disease, particularly if body fat is deposited within the abdomen, as suggested by a high waist-circumference measurement.

Relationships between body weight and health are conventionally expressed in terms of BMI (Philip and Jackson-Leach 2002,, WHO 2000,Duda et. al., Biritwum et. al., 2005) Which is calculated as weight (kg) divided by height squared (m^2), and is a simple measurement of body weight in relation to height used to determine if an individual is overweight or obese (Biritwum et. al., 2005). BMI is divided into four categories, underweight ($<18.0kg/m^2$), normal (18 to $24kg/m^2$), overweight (25 to $30kg/m^2$) and obese ($\Rightarrow 30kg/m^2$). Philip and Jackson-Leach 2002 WHO 2000 and Duda et. al., 2003).

Current trends were used to predict the increases in BMI and disease burden that are likely to occur by 2030, assuming that no new measures are taken to counteract the rapid recent increases in body weight in all parts of the world (Kosti and Panagiotakos 2006). On this basis, it is predicted that the burden of disease will increase substantially in most parts of the world, but there will probably be remarkable variations by sub region (Kosti & Panagiotakos 2006).

Risk factor associated with overweight and obesity were changing lifestyles (westernization, increased food consumption, reduced physical activity), genetic factors such as an obese parent age sex, socio economic characteristics and the black race (Seneadza 2008). People who are overweight in childhood are more prone to be obese when they enter adult life and these individuals are also likely to continue to gain weight in adulthood. Such individuals then have up to a 100-fold increased risk of developing type II diabetes compared with normal weight children who do not gain excessive weight once they are adults (Colditz et. al., 1995).

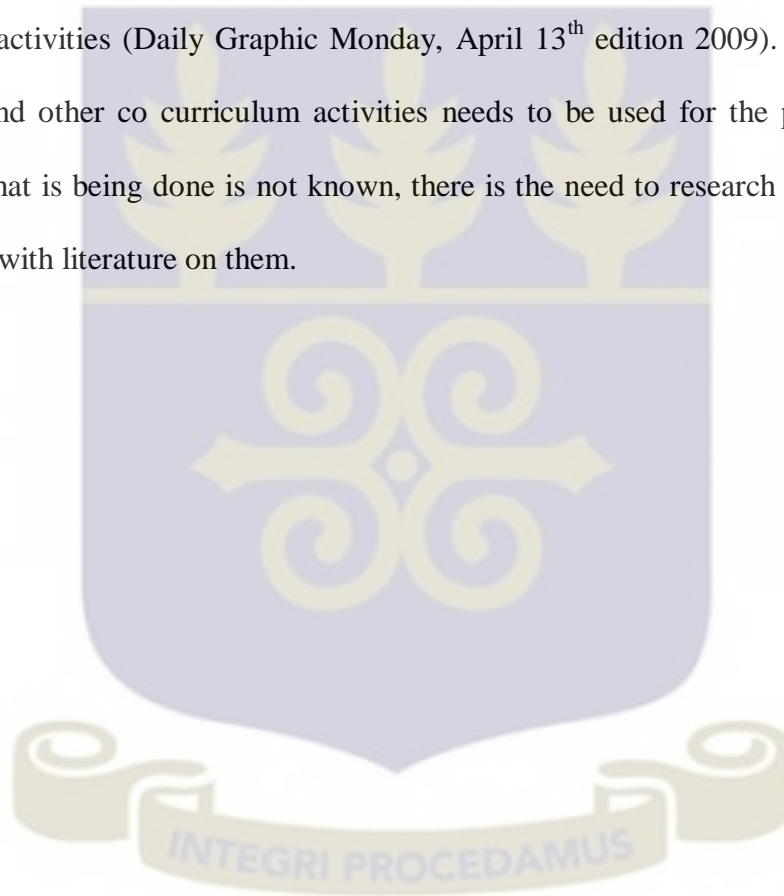
Studies shows that overweight adolescents have a 70% chance of becoming overweight or obese adults, and this chance increases to 80% if one or more parent is overweight or obese (Surgeon General, 2005). Adolescent overweight is a major US public health problem, with prevalence rates increasing for children and inactivity, in particular, TV viewing, has been associated with obesity in cross-sectional studies of children, adolescents, and adults (Surgeon General 1996).

Given that there is now intense concern about escalating rates of overweight and obesity, it is very likely that new public health measures will be adopted to limit this rise, but so far the efforts of millions of people in affluent societies to either slim or limit weight gain seems to have been of only modest success. The challenge is to arrest the current trends towards increases in BMI and, if possible, to reverse the public health burden associated with weight gain. This in turn emphasizes the need to take population-based approaches to preventive strategies for minimizing the hazards of excess weight gain (Philip and Jackson-Leach 2002)

It is now clear that overweight children also have higher blood pressure, serum lipid abnormalities and increasing insulin resistance, all of which are hallmarks of early metabolic disease (Pate et. al., 2000 and Cole et. al., 2006).

As part of efforts to reduce the burden of non-communicable diseases, the Ministry of Health in 2006 initiated the Regenerative Health and Nutrition (RHN) programme, which seeks to reduce the risk of the occurrence of diseases and disorders among individuals, households, and communities, to contribute to the development of a healthier, more productive population that can create wealth for itself and the country. The Regenerative Health and Nutrition programme focuses on four key interventions: diet, exercise, rest, and hygiene. The interventions proposed are central to current international health perspectives on preventing diseases, especially chronic conditions, through a healthy lifestyle (WHO, 2005).

There is the need for stakeholders to concentrate on measures to control the condition in order to reduce the burden of chronic diseases that consume a lot of our health resources and leads to premature deaths. There is the need for an increased awareness, and drastic steps such as the introduction of health walks and healthy life style, promoting more exercising and general healthy living lifestyles. The call by the Minister of Education for the cancellation of extra classes in schools is in the right direction to make way for extra curricula activities (Daily Graphic Monday, April 13th edition 2009). Time for physical activity and other co curriculum activities needs to be used for the purpose, but as to whether that is being done is not known, there is the need to research into those areas to come out with literature on them.



CHAPTURE THREE

METHODS

This chapter presents the methods and procedures used in gathering and processing data for the study

3.1 Type of Study

The study was a cross sectional descriptive design.

3.2 Study Location/Area

The study was conducted in the Accra metropolis. There are 52 private and public Senior High Schools in the Accra Metropolis with a population of about 27431 students (GES 2009). Two senior high schools Labone Senior High School and Social Advance Institute were included in the study.

Labone Senior High School: This is a co-educational (boys and girls) and mainly a day school however there are some boarding students. The school is located around the Osu children's home in the Labone Estates of Accra. It is a government assisted school with a population of 1744 students (GES 2009) and categorized as a grade 'B' school by the Ghana Education Service (GES). The school has a playing field with a multi-purpose court for basketball, volleyball, handball and tennis, used for physical education lessons and games. Physical education is taught in the school with each class having two 40 minutes periods a week. Physical education lessons include both classroom lecture and field activity.

Social Advance Institute: This is a private senior high school located at Adabraka a suburb of Accra city near Legon City Campus. The school is also a co-educational (boys and girls) day school with a population of 541 students (GES 2009) and is categorized as a grade ‘P’ school by the Ghana Education Service.(GES). The school has only a basketball pitch and a tennis court. Students undertake their physical education lessons and games outside the school premises. Social Advance Institute also has two periods of 40minutes each of Physical Education on the time table of every class in the school. Students either do theory lessons in class or go out for practical lessons on a field near the school.

3.3 Sampling

3.3.1 Sample size

The total number of students from senior high schools in the Accra Metropolis is about 27,431. Previous study estimated the prevalence of overweight in this population as 9.8% (Owusu 2007&2008). Therefore, 387 high school children between 15 and 19 years were required to achieve 5% two-sided level of significance. To allow for non response, a response rate of 85% was assumed. Thus, the sample size of 455 ($100/85*387$) students was rounded off to 480 students. The sample size calculation was done using EpiInfo Version 6, Statcalc.

3.3.2 Sampling method

Two stages cluster sampling procedure was use to select respondents for the study. Firstly, two schools were randomly selected from the 52 Senior High Schools in the Accra Metropolis through a simple random sampling.

Six classes from each school were then randomly selected and all students in selected classes were included in the study. Two hundred and forty (240) students from each school were interviewed.

3.3.3 Data Collection Techniques

Structured questionnaire which consist of the international physical activity questionnaire (IPAQ) (the short form), was used for this study. The questionnaire was structured to measure students' background characteristics, lifestyles and involvement in physical activities. Anthropometric measurement of students was also measured by the questionnaire. The international physical activity questionnaire (IPAQ) at the later part of the questionnaire was designed to measure physical activity across all domains of leisure-time, work, transportation, and household tasks. The items on the questionnaire ask respondents to report frequency and duration of walking, moderate-intensity and vigorous-intensity activity performed for at least 10 minutes duration per day. The questionnaire is in appendix 2

4 .3.3.1 Measurements

Measurement of weight in kilogram and height in centimetres were performed by two different persons independently to ensure accuracy. Height was measured using a stadiometer to the nearest centimeters (cm). The person being measured was asked to look straight ahead, stand as tall as possible, and take a deep breath while the measurement was being taken (Kosti and Panagiotakos 2006, Biritwum et. al., 2005). Weight was measured to the nearest 0.1 kg with a personal electronic digital scale (Vohringer Germany since 1921, made in China), equipped with high precision strain gauge sensor with an auto zero resetting. The weighing scale was placed on a flat and hard surface Students were weighed in light clothing, without footwear (Kosti and Panagiotakos 2006, Chhatwal et. al., 2004 and Taylor et. al., 2005).

3.3.4 Quality Control

3.3.4.1 Training of Research Assistants

Five research assistants were recruited and trained on the importance of anthropometric indices such as height and weight and how to measure them. They were also taken through the entire questionnaire to ensure that they had common understanding of each item on the questionnaire in order to explain them to respondents during its administration.

3.3.4.2 Data Cleaning and Entry

The completed questionnaires were checked and serialized. Data was entered twice into Epi Info version 3.5.1 to ensure that data were correctly entered. Any responses to

duration provided in hours were converted from hours into minutes. Missing data from no response were excluded from the analysis.

3.3.4.3 Pre-testing

Pre-testing of the questionnaire was done at the Presbyterian Senior High School La. Twenty questionnaire were administered during the pre testing by the researcher and the research assistants, and the necessary corrections made to five (5) items on the questionnaire that were not clear. The pre testing also allowed researcher to estimate the average duration of each interview and as well plan the data entry.

3.4 Ethical Issues

Ethical approval was sought from the Ghana Health Service Ethical Review Committee. Permission was also sought from Accra Metropolitan Education office as well as Headmistresses of the schools included in the study. Privacy and confidentiality of subjects was upheld by not requesting for names of participants on the questionnaire. The completed questionnaires were stored in a sealed envelope and used purposely for the study only. Voluntary consent (see appendix) was sought from respondent and the benefits of the study were made known to students. There was no conflict of interest on the part of the researcher.

3.5 Data Processing and Analysis

Stata for Windows (Statcorp, College Station, USA) was used to process and analyze the data. All cases in which the sum total of all Walking, Moderate and Vigorous time variables were greater than 960 minutes (16 hours) were excluded from the analysis. This assumes that on average an individual's 8 hours per day is spent sleeping. The 'days' variables can take the range 0-7 days. All walking, moderate and vigorous time variables exceeding 3 hours or 180 minutes were re-coded to be equal to 180 minutes. This rule permitted a maximum of 21 hours of activity in a week to be reported for each category (IPAQ 2005)

3.5.1 Level and pattern of physical activity

The Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) 2005 was used to determine the intensity of physical activity among senior high school students. The weekly minutes of walking, moderate intensity and vigorous-intensity activity were calculated separately by multiplying the number of days/week by the duration on an average day. Reported minutes per week in each category were weighted by a metabolic equivalent (MET) resulting in a physical activity estimate independent of body weight, expressed in MET-minutes/week and computed by multiplying METs by minutes/week. The total MET-minutes per week score was estimated by adding the MET-minutes per week score from each category of walking, moderate and vigorous. (Pate et. al., 1996, Craig et. al., 2003)

3.5.2 Overweight among students

Students were considered as overweight if their (body mass index) BMI-for-age z-score was greater or equal to plus one standard deviation (Onis *et. al.*, 2007). The z-scores were estimated using Stata macro, (2007) developed by WHO to implement AnthroPlus software in Stata (<http://www.who.int/growthref/tools/en/>).

3.5.3 Association between physical activity and overweight

Student's total MET-minutes per week score was classified as high, moderate and low in order to examine the association of physical activity with overweight prevalence. A student's physical activity score was defined as high if the student had at least 7 days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week; as moderate if the student had at least 5 days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-minutes/week; and as low if the student did not meet the conditions for high and moderate. Logistic regression model was used to estimate the odds ratio of overweight on each of the potential risk factors of overweight including physical activity status. Sex, age and diet were considered to be an important potential confounder and were included in the model as factors.

A simple model that explains most of the variability in the odds of overweight (parsimonious model) was constructed. First, a model was produced for each covariate; in this model, each covariate was candidate for inclusion, provided that, when considered singly, the p- value for association with overweight was 0.05 or less. Variables were then removed if the p- value for the likelihood ratio test was more than 0.05 and provided that

removal did not change the coefficients of variables in the model by more than 10%.

Second, the variables in these models were combined in a final model in a similar way.



CHAPTER 4

RESULTS

This chapter presents the results of the study which comprise of respondents background characteristics, pattern and level of physical activity, and prevalence of overweight

4.1 Characteristics of respondent

Table 4.1 describes the characteristics of respondents. The response rate was 100% (480), however due to incomplete responses, 444 fully completed questionnaires were analyzed. Overall, thirty five percent 35% (155) were males and 65% (289) were females, 76% were day students (attending school from home) and the remaining 24% were boarders (living in school accommodation on campus or in a hostel close to the school). Also, 52% of the students reported that their male parents had professional/technical occupation, 24% self employed, 10% traders, 6% engaged in unskilled labour, 2% clerical job and 5% unemployed. Nineteen percent (19%) of students reported that their female parents were professionals/technical workers, 14% self employed, 61% traders, 1% engaged in unskilled labour and 3% unemployed. Furthermore, 15% male and 27% female parents had middle/JHS education and 81% male and 60% female parents also had secondary education or beyond. Ninety three percent (93%) of respondents reported that they do not drink alcohol while 7% reporting they take in alcoholic drinks. Thirty five percent (35%) of respondent take in energy drinks, whereas 65% do not. None of the students interviewed reported smoking or using any drug.

Table 1 characteristics of study participants

Characteristics	Labone		Social Advance		Overall	
	No. (%) of students	Prevalence of overweight	No. (%) of students	Prevalence of overweight	No. (%) of students	Prevalence of overweight
Sex						
Male	90 (42)	5.6% (5/90)	65 (29)	3.1% (2/65)	155 (35)	(7/155)4.5%
Female	126 (58)	16.7% (21/126)	163 (71)	14.7% (24/163)	289 (65)	(45/289)15.6%
Age (Years)						
15	42 (19)	16.7% (7/42)	14 (6)	7.1% (1/14)	56 (13)	(8/56)14.3%
16	56(26)	17.9% (10/56)	44 (19)	22.7% (10/44)	100 (22)	(20/100)20%
17	63 (29)	11.1% (7/63)	70 (31)	11.4% (8/70)	133 (30)	11.3% (15/133)
18	38 (18)	5.3% (2/38)	58 (26)	10.3% (6/58)	96 (22)	8.3% (8/96)
19	17(8)	0% (0/17)	42 (18)	2.4% (1/42)	59 (13)	(1/59)1.7%
Residential Status						
Day	111 (51)	14.4% (46/111)	226 (99)	11.5% (26/226)	337 (76)	(42/337)12.5%
Boarding/Hostel	105 (49)	9.5% (10/105)	2(1)	0% (0/2)	107 (24)	(10/107)9.4%
Ethnicity						
Akan	82 (38)	12.2% (10/82)	94 (41)	13.8% (13/94)	176 (40)	(23/176)13.1%
Ewe	43 (20)	18.6% (8/43)	39(17)	5.1% (2/39)	82 (18)	(10/82)12.2%
Ga/Dangme	58 (27)	8.6% (5/58)	66 (29)	12.1% (8/66)	124 (28)	(13/124)10.48%
Others	33 (15)	9.1% (33)	29 (13)	10.3% (3/29)	62 (14)	(6/62)9.7%
Female carers Educational status						
None	10(5)	0%(0/10)	17(8)	11.8%(2/17)	27(6)	(2/27)7.4%
Primary	8(4)	12.5%(1/8)	20(9)	10%(2/20)	28(6)	(3/28)10.7%
Middle/JSS	54(25)	11.1%(6/54)	66(29)	6.1%(4/66)	120(27)	(10/120)8.3%
Secondary+	144(66)	13.2%(144)	122(54)	13.9%(17/122)	266(60)	(36/266)13.5%
Type of residence						
Owned by parents	147(68)	11.6%(17/147)	133(59)	12.8%(17/133)	280(63)	(34/280)12.1%
Rented	58(27)	12.1%(7/58)	88(39)	9.1%(8/88)	146(33)	(15/146)10.3%
Other	11(5)	18.2%(2/11)	6(2)	16.7%(1/6)	17(4)	(3/17)17.7%
Physical activity score ¶						
Low	43 (20)	20.9% (9/43)	31 (14)	19.4% (6/31)	74 (17)	(15/74)20.3%
Moderate	112(52)	11.6% (13/112)	107 (47)	14% (15/107)	219 (49)	(28/219)12.8%
High	61 (28)	6.6% (4/61)	90 (39)	5.6% (5/90)	151 (34)	(9/151)6%
Total	216(100)	12% (26/216)	228 (100)	11.4% (26/228)	444 (100)	(52/444)11.7%

¶ High = At least 7 days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week; Moderate= At least 5 days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-minutes/week; Low= not meeting conditions for high and moderate

4.2 Dietary habit of respondents

Figure 2 shows the dietary habits of students in the study. Eighty two (82%) of respondents take 3 main meals a day. Apart from Social Advance students where 50% of students take snacks less than two times in a day, less than 50% of students of Labone Senior High School take snack more than 2 times a day. In addition, 60% of students reported eating vegetables less than twice a day. With the exception of Labone Senior High school, 50% of the study population eats fresh fruit less than two times a day. Furthermore, 51% of the total population reported that they consume fried foods twice a day with the remaining (49%) consuming fried food more than two times in a day. Also 52% of the population reported taking sweetened fruit drinks at least twice a day with the remaining (48%) consuming more than two times in a day.

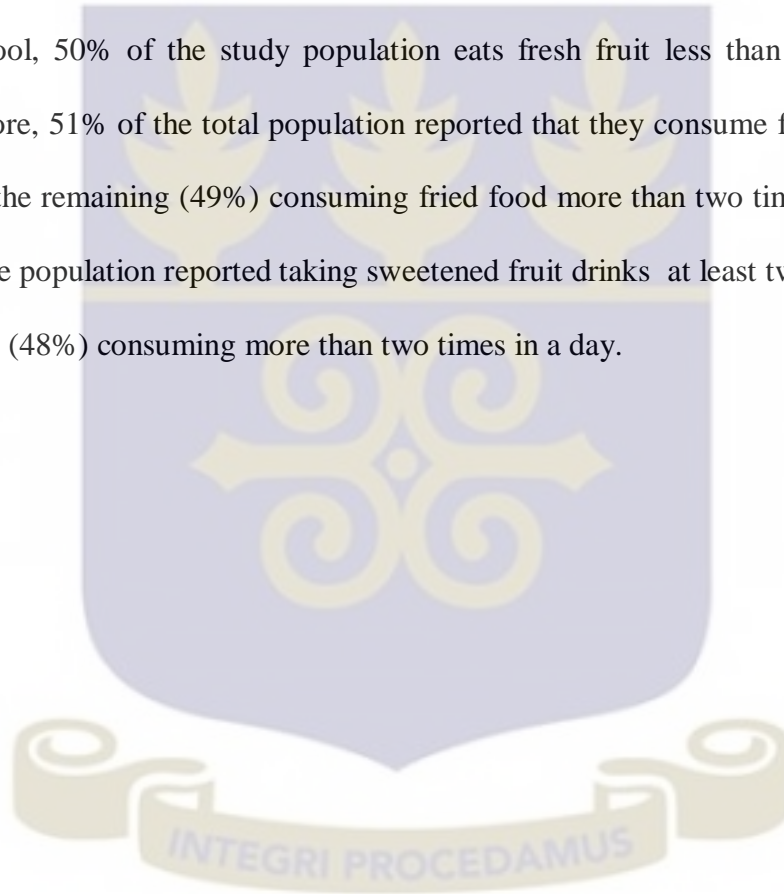
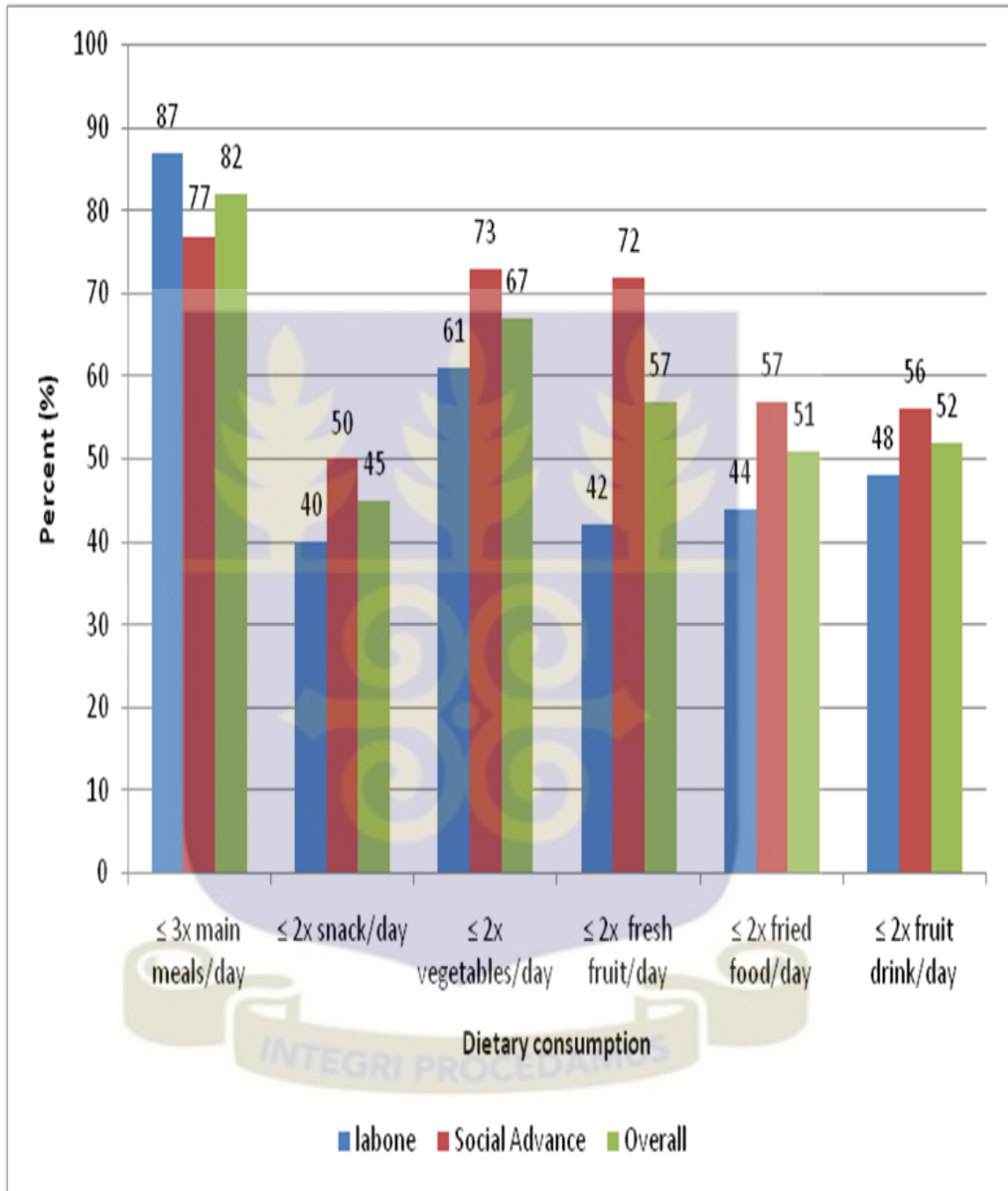


Figure 2 Dietary habit of respondents



4.3 Level and pattern of physical activity among senior high schools students

Approximately 53% of students take part in one or more sporting activities regularly (i.e. three times in a week), whilst 46% do not engage in any sporting activity at all. Figure 3 shows the type of sporting activities respondents take part in. Thirty two percent (32%) of females and 84% of males play football, 25% females and 11% males play volleyball, 39% female and 26% play basketball, 1% female and 4% male engaged in tennis, and 23% females and 7% males play handball. Football was the most frequently played sports.



Figure 3 Students participation in various sporting activities

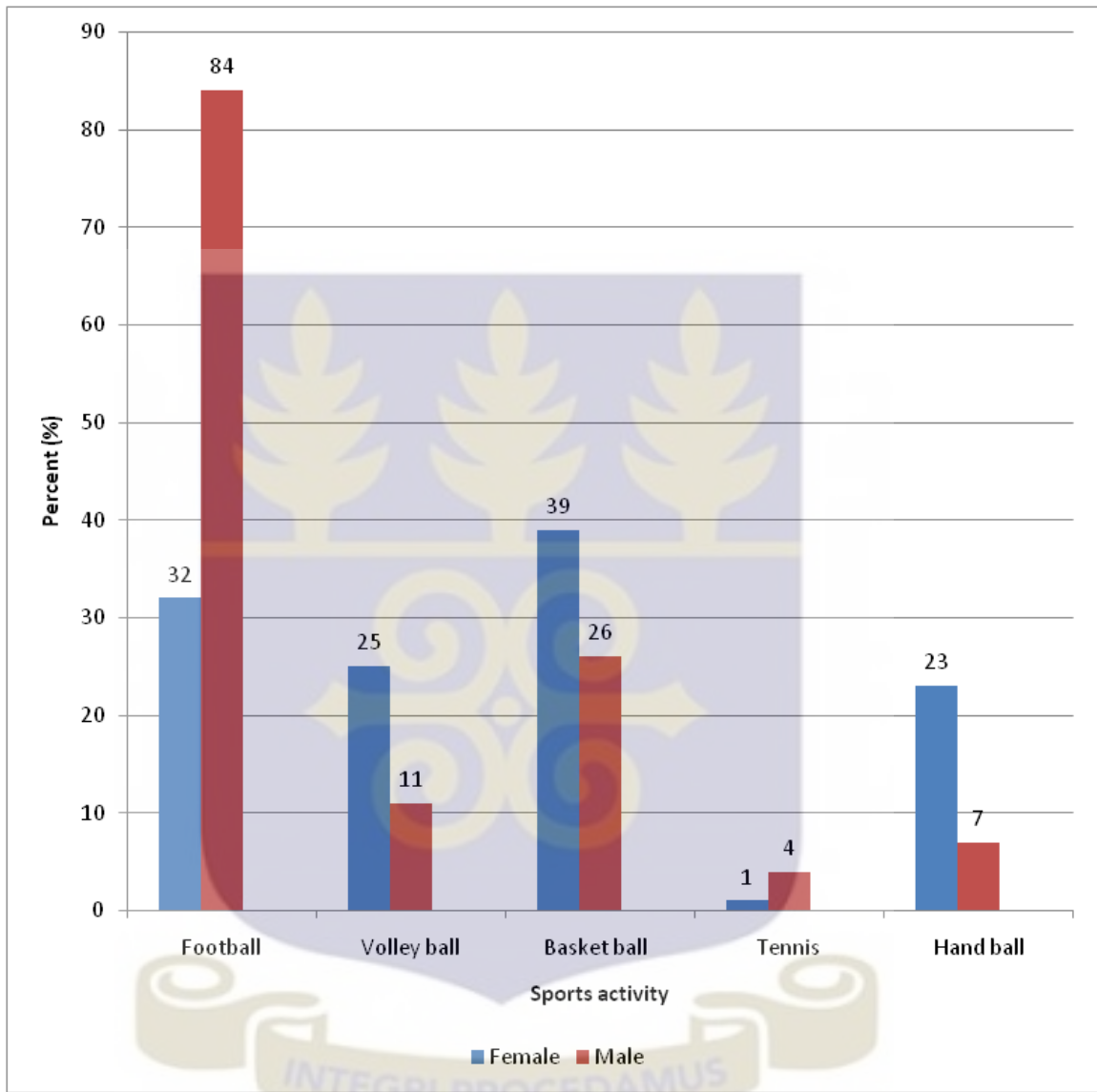


Table 2 shows respondents participation in school teams and nonschool teams setting by sex. Thirty percent (30%) females and 18 % males play one school team only, 22% females and 13% males also play two (2) or more school teams. Furthermore, 15%

females and 16% males play one nonschool team however 6% and 10% play two (2) or more nonschool teams. The result indicated that the school environment creates opportunity for students to engage in competitive sport than the non-school environment, especially among female students.

The results also indicated that 41% of students do not have recreational facilities around where they live, whilst 59% have. Labone senior high school has 6% of students in the school cadet who trains three times in a week whilst Social Advance School does not have a school cadet.

Table 2: Participation in School and nonschool sports teams

No. of teams played	School team		Nonschool team	
	Female	Male	Female	Male
	No. (%)	No. (%)	No. (%)	No. (%)
1	30 (58)	18 (58)	15 (71)	16 (62)
2+	22 (42)	13 (42)	6 (29)	10 (38)
Total	52 (100)	31 (100)	21 (100)	26 (100)

Figure 4 represents the means by which students go to school. Labone Senior High School is a boarding school, with 62% of respondents walking to school, 46% by motor vehicle and 2% by bicycle. Social Advance Institute is a day school with 82% of its students coming to school by motor vehicle, 16% also walk and 2% by means of a bicycle. In all 64% of the respondents pick a motor vehicle to school, 34% walk and 2%

of respondents ride bicycles to school. Seventy percent (70%) females and 56% males come to school by means of a motor vehicle and 28% females and 43% males walk to school. Majority of male students walk to school than female students.

Figure 4 Means of attending school by students

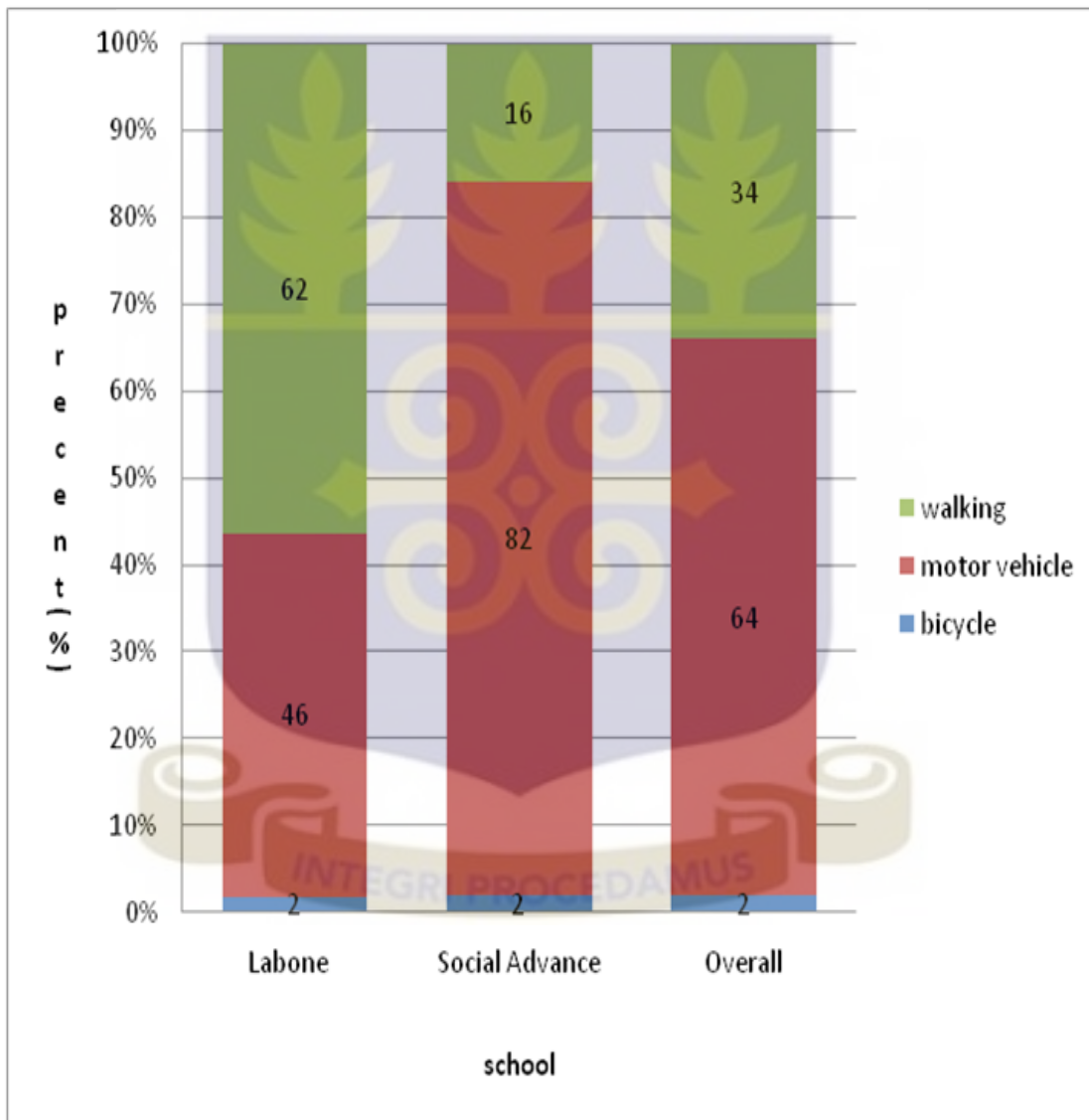


Figure 5 represents the number of hours students spent behind TV/Computer daily. The information from the graph shows that majority of students spent less time behind the TV set/computer. Less than thirty five percent of students spent three hours plus behind the TV/Computer daily.

Figure 5 Time spent with TV/computer per day by students

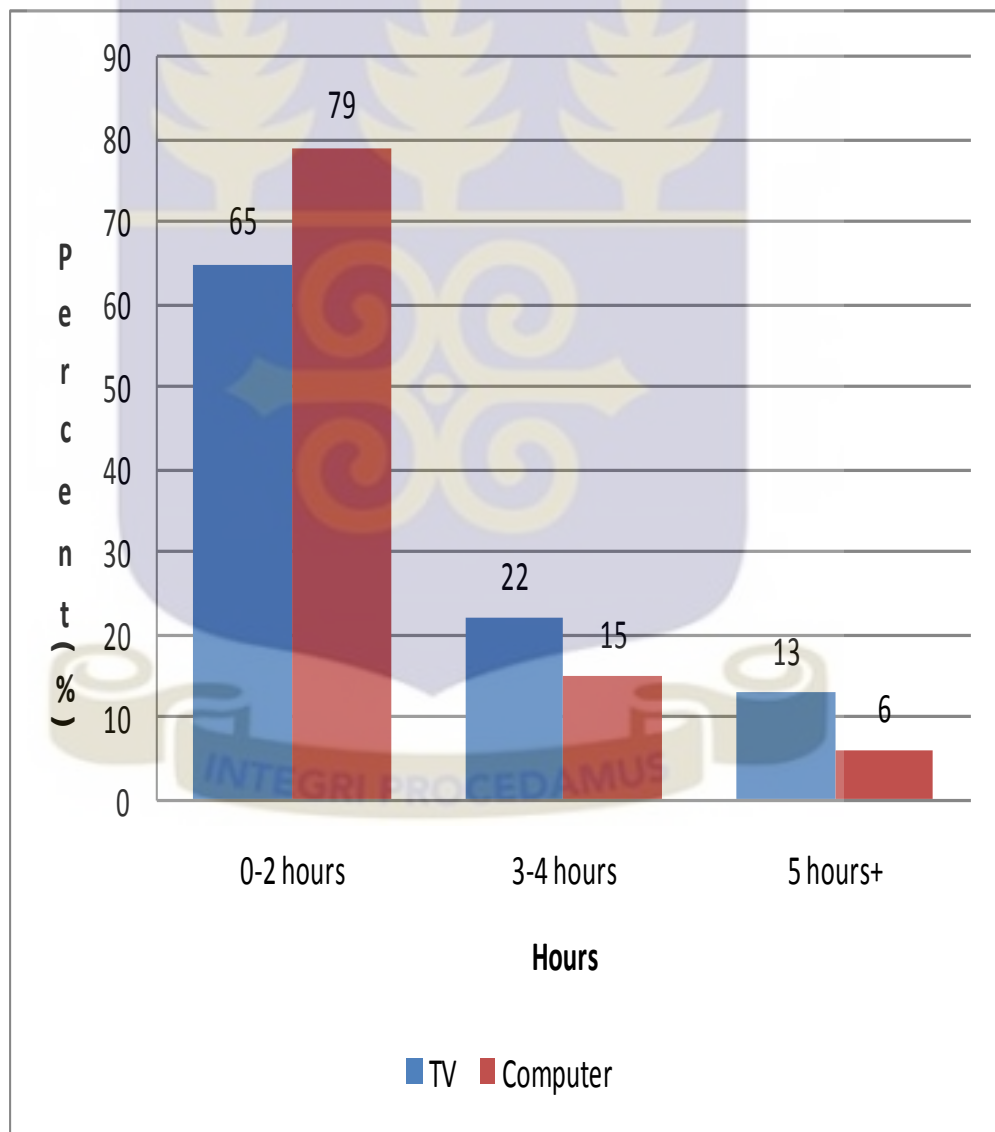


Figure 6 shows physical activity levels of respondents according to sex. Eleven percent (11%) males and 19% female students engaged in low level activity (if the student did not meet the conditions for high or moderate), 43% males and 53% females engaged in moderate level of activity, (at least 5 days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 Metabolic Equivalent Task (MET)-minutes/week) and 45% of males and 27% female students engaged in high level (7 days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week). Majority of students in the study engaged in moderate level of physical activity, with the number of females (52%) outnumbering that of the male population (42%).

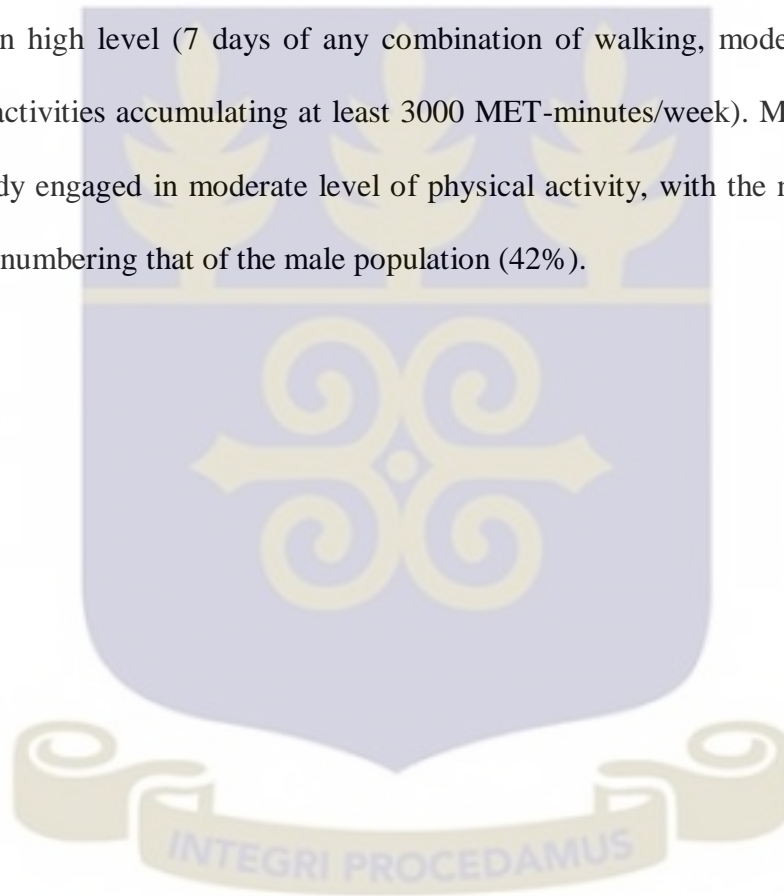


Figure 6 Respondents physical activity level by sex

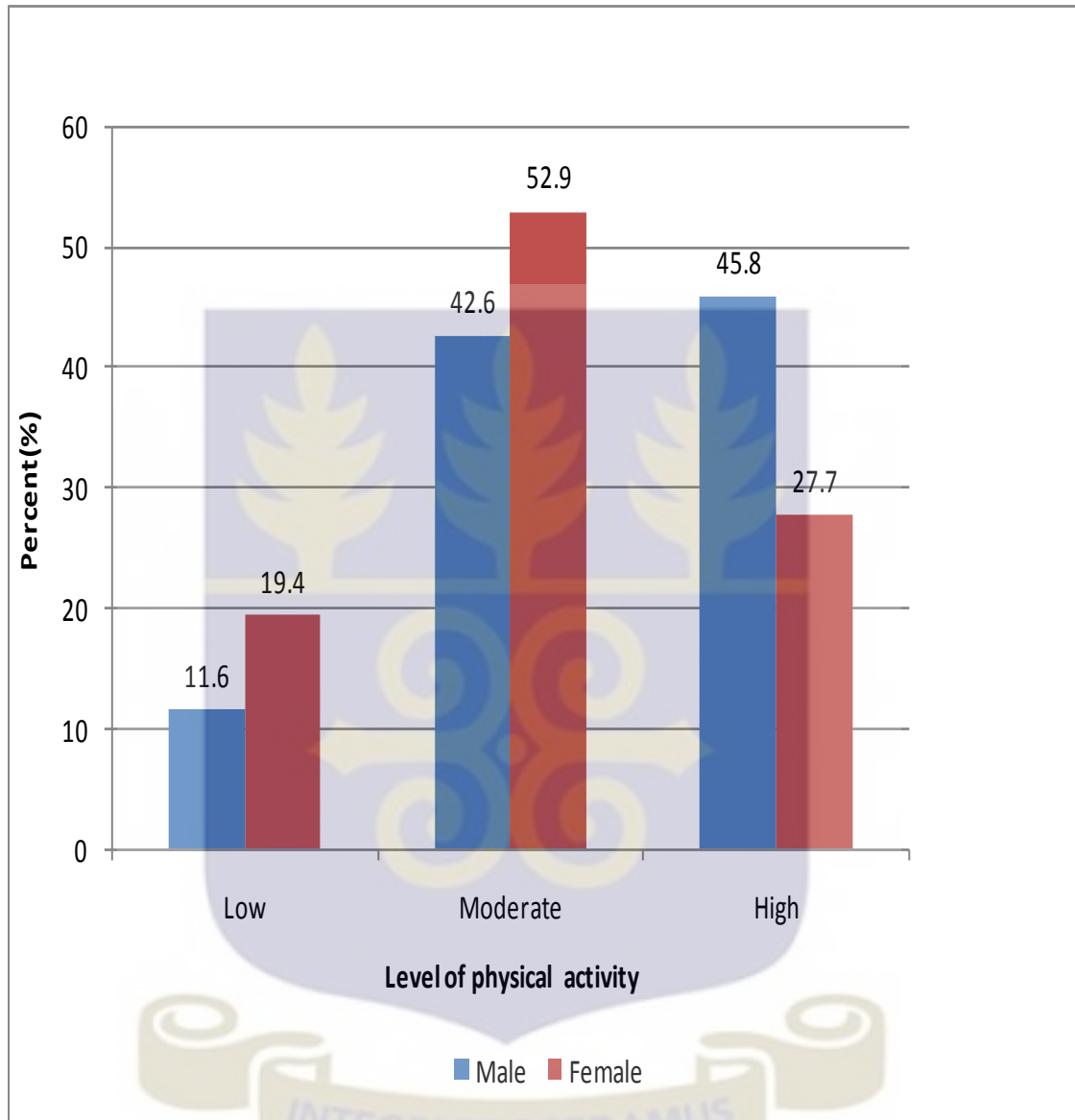


Figure 7 shows students' total MET (Metabolic Equivalent Task)-minutes per week by age and sex. The Total MET- minutes per week of students, increases with age. From the graph, males aged 15years had minimum MET-minutes per week of 1,000MET and

this increased with increase in age with the highest MET-minutes per week of 4,700MET reported among the 18 and 19 years old students. The female group also reported of a similar trend with minimum MET-minutes per week of less than 1,000MET reported among the 15 years age group. This increased with age from 16, to 18 years, with the highest of 3,400MET reported among age 19 years old. The levels among males are generally higher compared with females (Figure 7).

Figure 6 Total Metabolic Equivalent Task-minutes per week of students by age and sex.

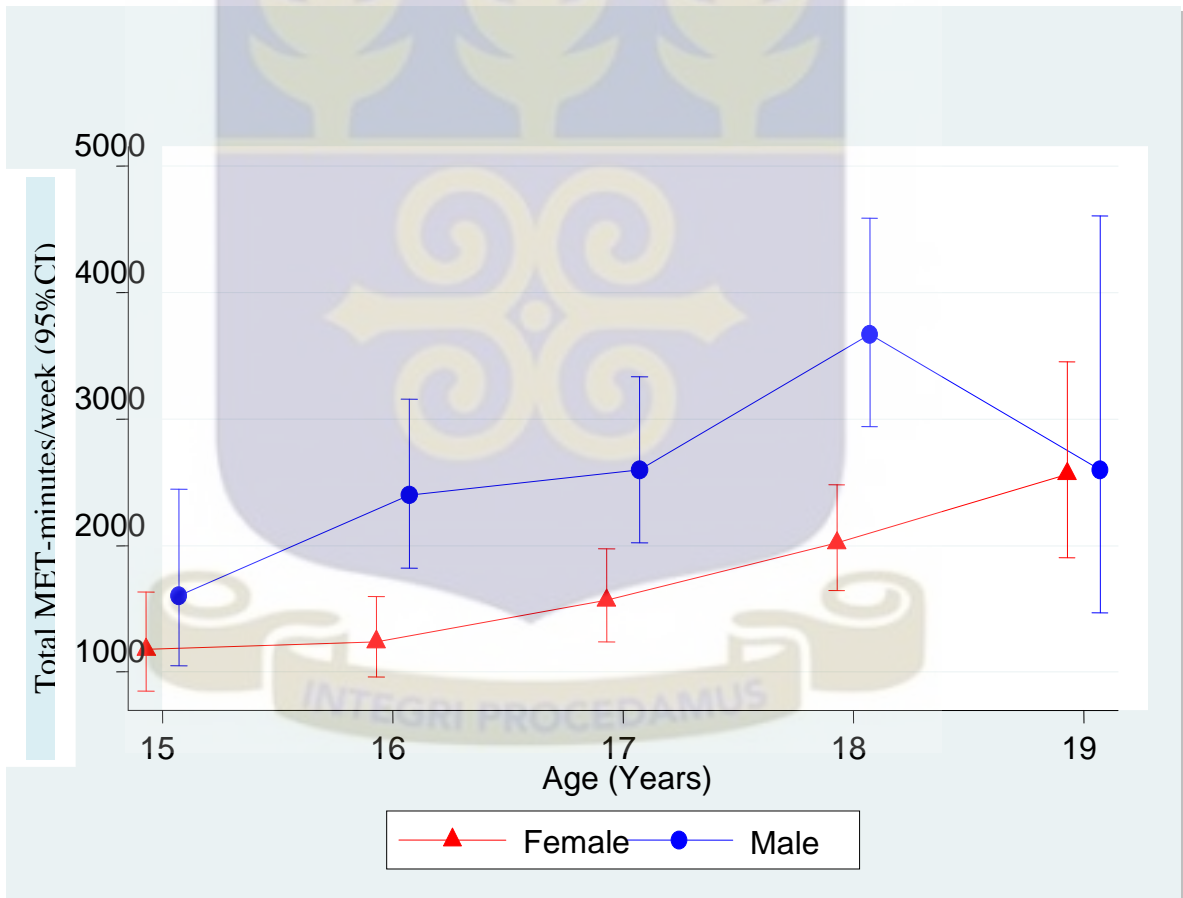
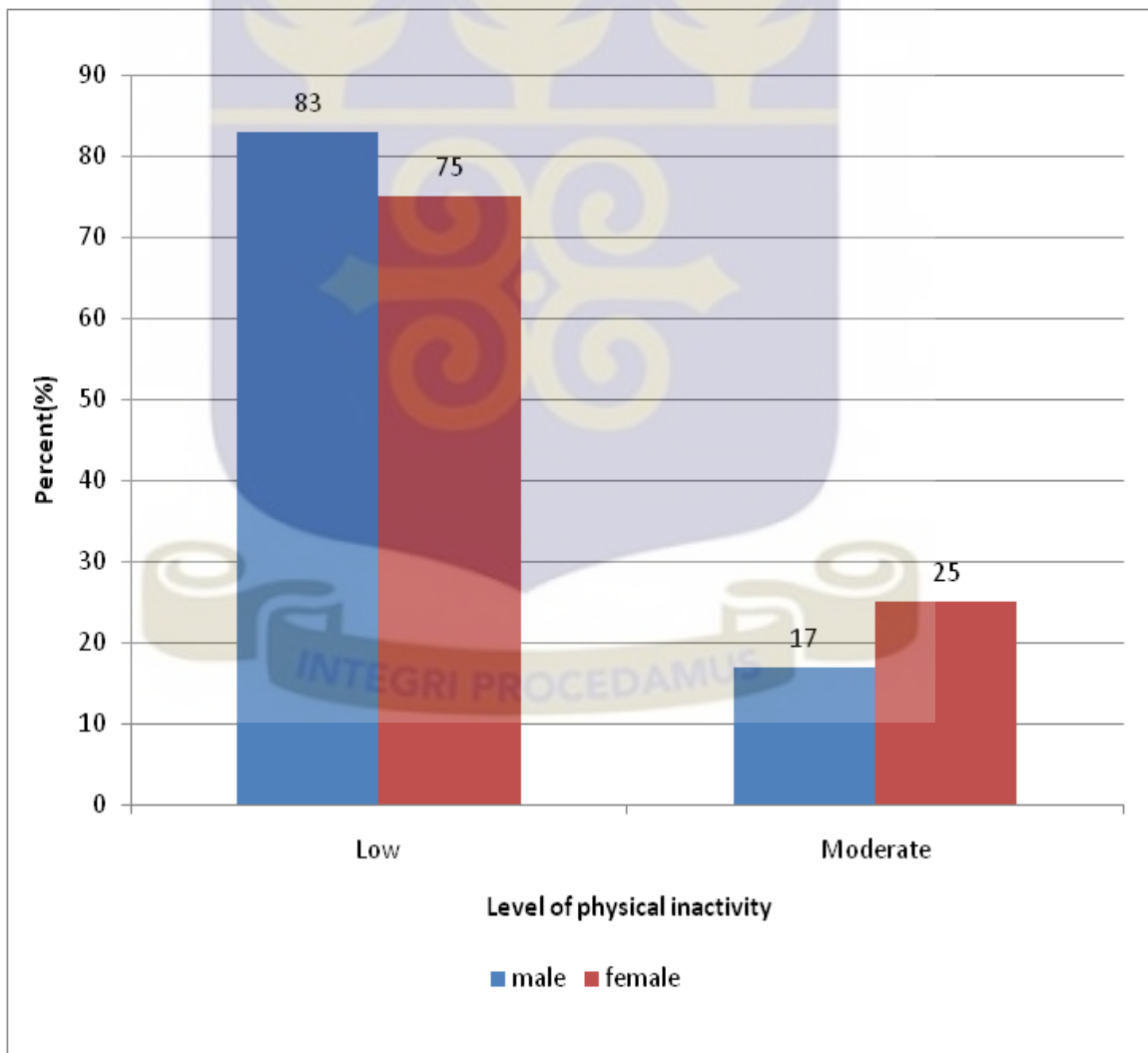


Figure 8 shows the time students spend sitting on weekdays. Majority of students (83% males and 75% females) fall within the low inactivity category. Less than one third of the respondents fall under the moderate level of inactivity. There was no student under the high level inactivity category. The proportion of male students engaged in low inactivity is more than that of female students. However, more female students engaged in moderate inactivity on weekdays than male students.

Figure 8 physical inactivity levels among students (Daily sitting hours)



4.4 Overweight among senior high school students

The prevalence of overweight is 11.7% (52/444) among the study population (Table 3). There was no difference between overweight among Labone Senior High School students (12%) and Social Advance (11.4%) (table1). Overweight was higher among female (15.6%) than males (4.5%). Twenty three percent (23%) of low level of physical activity category are overweight, whilst 12.8% of moderate level of activity and 6% of high level of activity categories are overweight. Higher rates of overweight were reported among 16 years olds (20%), 15years olds (14.3%) and 17 years olds (11.3%) age groups, whereas low rates were reported among 18 years olds (8.3%) and 19 years old (1.7%). Obesity among the study population was 2.9%. The results indicated that out of the total respondents (444), 4% of those involved in low activity are obese, 4% of those who engaged in moderate activity are obese and less than 1% of the respondents who engaged in high level of physical activity were obese. Overweight and obesity was low among students engaged in high level activity and high among the low level activity category.

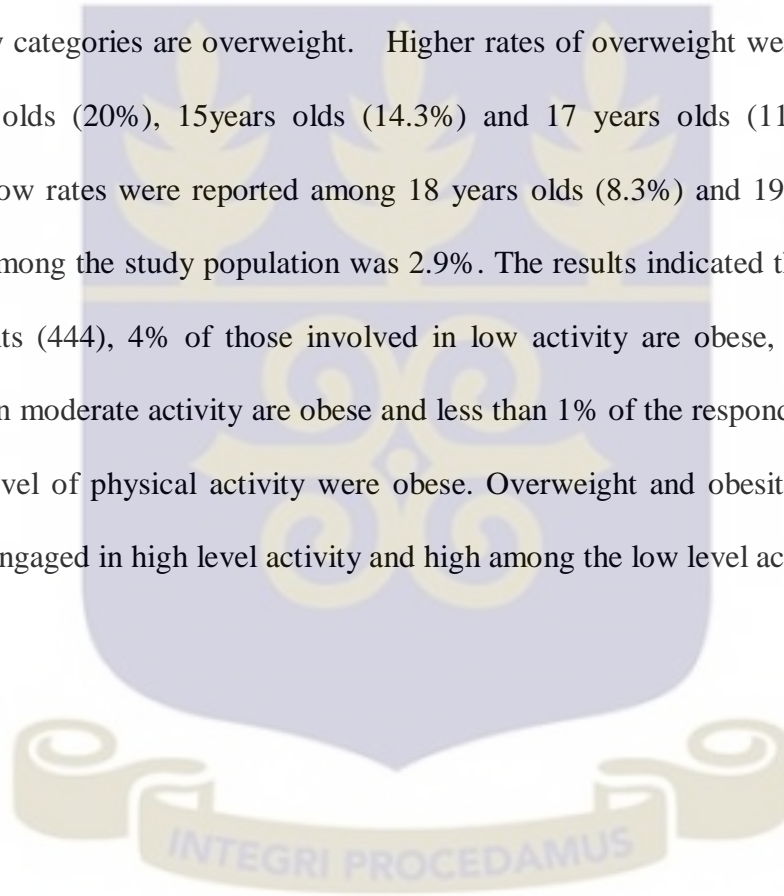


Table 3 Overweight prevalence among respondents

Characteristics	No. (%) of students	Prevalence of overweight
Dietary habit ‡		
Not adequate	239 (54)	27/239(11.3%)
Adequate	205 (46)	25/205 (12.2%)
Sex		
Female	289 (65)	45/289 (15.6%)
Male	155 (35)	7/155 (4.5%)
Age (Years)		
15	56 (13)	8/56 (14.3%)
16	100 (22)	20/100 (20%)
17	133 (30)	15/133 (11.3%)
18	96 (22)	8/96 (8.3%)
19	59 (13)	1/59(1.7%)
Mother's education		
None	27(6)	2/27(7.4%)
Primary	28(6)	3/28(10.7%)
Middle/JHS	120(27)	10/120(8.3%)
Secondary+	266(61)	36/261(3.5%)
Residential Status		
Day	337 (76)	42/337(12.5%)
Boarding/Hostel	107 (24)	10/107(9.4%)
Religion		
Christianity	364(82)	42/364(11.5%)
Moslem	39(9)	5/39(12.85%)
Others	41(9)	5/41(12.2%)
Ethnicity		
Akan	176 (40)	23/176(13.1%)
Ewe	82 (18)	10/82 (12.2%)
Ga/Dangme	124 (28)	13/124(10.5%)
Others	62 (14)	6/62(9.7%)
Physical activity score ¶		
Low	74 (17)	15/74(20.3%)
Moderate	219 (49)	28/219 (12.8%)
High	151 (34)	9/151 (6%)
Physical inactivity †		
Low	341 (78)	40/341(11.7%)
Moderate	98(22)	12/98 (12.2%)
High	0	0

‡ Students who eat both fresh fruit and vegetables at least twice per day

¶ High = At least 7 days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week; Moderate= At least 5 days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-minutes/week; Low= not meeting conditions for high and moderate

† Low = 0-10 sitting hours; medium=11-20 sitting hours; high=21+ sitting hour.

4.5 Relationship between physical activity and overweight

There was evidence of crude association of sex (p-value <0.001), age (p-value<0.01) and physical activity (p-value<0.01) with odds of overweight (Table 4). The result indicated that the sex of a student in this study was highly significant with the odds of overweight (p-value <0.001). The age of a student was also significantly associated with the odds of overweight (p-value <0.01). Physical activity was also significantly associated with the odds of overweight (p-value <0.01). The education level of student's female caretakers, their religious status and ethnicity was not significant associated with overweight in this study. Eating high fruits and vegetables (diet) and inactivity were also not significant with overweight. (Table 4)

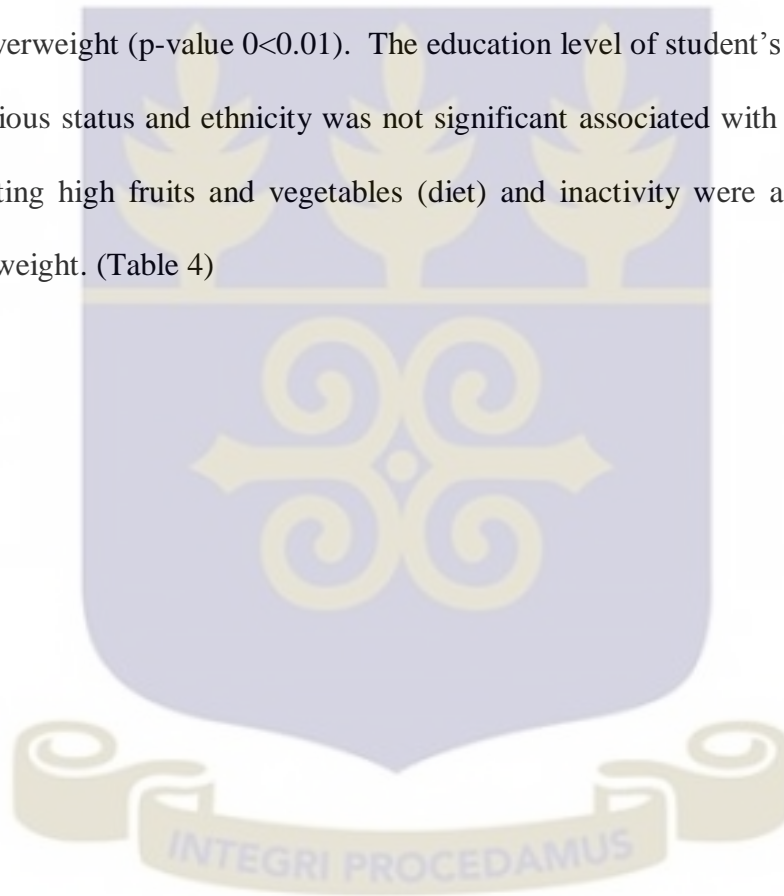


Table 4 Logistic regression of risk factors for overweight among students

Characteristics	No. (%) of students	OR (95%CI) †	P-values
Sex			
Female	289 (65)	1	P<0.001
Male	155 (35)	0.26 (0.11, 0.58)	
Age (Years)			
15	56 (13)	1	P<0.01
16	100 (22)	1.5 (0.61, 3.67)	
17	133 (30)	0.76 (0.30, 1.92)	
18	96 (22)	0.55 (0.19, 1.55)	
19	59 (13)	0.10 (0.01, 0.86)	
Mother's education			
None	27(6)	1	P=0.42
Primary	28(6)	1.5(0.23,9.76)	
Middle/JHS	120(27)	1.14(0.23,5.51)	
Secondary+	266(61)	1.96(0.44,8.62)	
Residential Status			
Day	337 (76)	1	P=0.37
Boarding/Hostel	107 (24)	0.72 (0.35, 1.50)	
Religion			
Christianity	364(82)	1	P=0.97
Moslem	39(9)	1.13(0.42,3.04)	
Others	41(9)	1.06(0.40,2.86)	
Ethnicity			
Akan	176 (40)	1	P=0.86
Ewe	82 (18)	0.92 (0.41, 2.04)	
Ga/Dangme	124 (28)	0.78 (0.38, 1.60)	
Others	62 (14)	0.71 (0.28, 1.84)	
Eat high fruit and Vegetables ‡			
No	239 (54)	1	P=0.77
Yes	205 (46)	1.09 (0.61, 1.95)	
Physical activity score ¶			
Low	74 (17)	1	P=0.01
Moderate	219 (49)	0.58 (0.29, 1.15)	
High	151 (34)	0.25 (0.10, 0.60)	
Physical inactivity ‡			
Low	341 (78)	1	P=0.89
Moderate	98(22)	1.05 (0.53, 2.09)	
High	0	0	

‡ Students who eat both fresh fruit and vegetables at least twice per day

¶ High = At least 7 days of any combination of walking, moderate- or vigorous-intensity activities accumulating at least 3000 MET-minutes/week; Moderate= At least 5 days of any combination of walking, moderate-intensity or vigorous intensity activities achieving a minimum of at least 600 MET-minutes/week; Low= not meeting conditions for high and moderate

‡ low = 0-10 sitting hours; medium=11-20 sitting hours; high=21+ sitting hours

After adjusting for the effect of sex, age and fruit and vegetable intake, high physical activity was associated with overweight. The likelihood of a student been Overweight after adjusting for confounding effect of sex, age and diet now decreased by 63% among students with high physical activity compared with those having low physical activity and (Adjusted OR=0.37; 95% CI: 0.15, 0.95) (Table 4).

Although fruit and vegetable intake was not significant, it was considered as a potential confounder of the association between physical activity and overweight and so it was adjusted in the final model with other variables that were significant (Table 6).

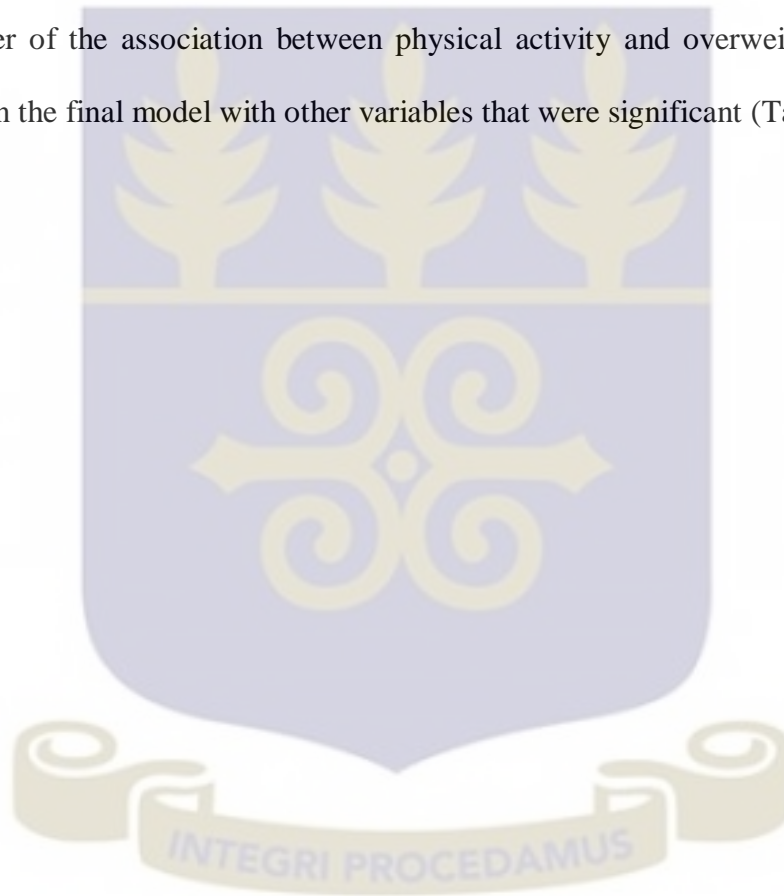
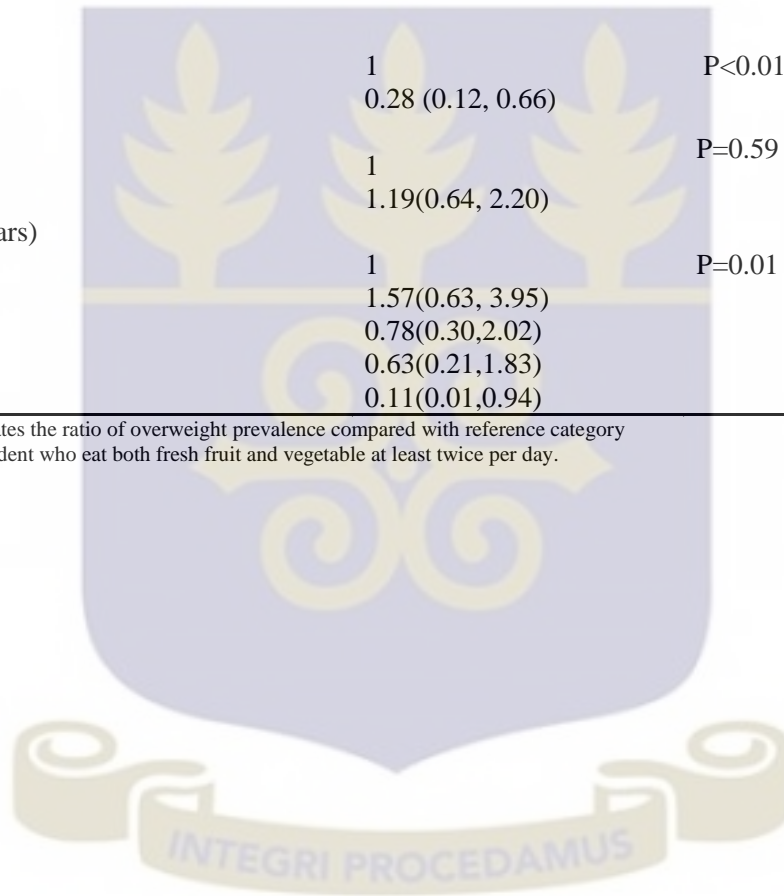


Table 6 Adjusted odds ratios for the association of physical activity with overweight prevalence among students

	Adjusted OR (95%CI) †	P-values
Physical activity score		
Low	1	P=0.01
Moderate	0.61 (0.29, 1.26)	
High	0.37 (0.15, 0.95)	
Sex		
Female	1	P<0.01
Male	0.28 (0.12, 0.66)	
Diet		
No	1	P=0.59
Yes	1.19(0.64, 2.20)	
Age (Years)		
15	1	P=0.01
16	1.57(0.63, 3.95)	
17	0.78(0.30,2.02)	
18	0.63(0.21,1.83)	
19	0.11(0.01,0.94)	

† OR indicates the ratio of overweight prevalence compared with reference category
Diet student who eat both fresh fruit and vegetable at least twice per day.



CHAPTER FIVE

Discussion

This study examined the relationship between physical activities and overweight among senior high school students in the Accra Metropolis. The intent of the study was to provide information on the kinds of physical activities that students do as part of their everyday lives, the intensity and frequency of physical activities and their levels of activities. The study also estimated the prevalence of overweight among senior high students in Accra Metropolis. The results from this study provided epidemiological information on adolescent's physical activity and overweight for necessary public health interventions.

The total number of respondent for the study was 444 students, consisting of 35% male and 65% females. The mean age of the students was 17years. Majority of the students were day student (76%) with 24% boarders. Majority of the respondents in the study were Christians (81.9%) with 8.8% been Muslims. Eighty one percent (81%) of male parents of student in the study had secondary or higher education with 2.5% having no formal education compared to 60% of female parents with the same level of education and 6.1% having no formal education. Majority of respondent's parents had formal education and this reflected in their occupation. About 53% of the male parents and 19% of female parents were into professional/technical occupations with (60%) of respondents female parents were traders whilst 4.5% male parents and 3.2% female parents were unemployed.

The dietary pattern of students in this study is similar to that of GSHS (2008) both reported that more than 50% of senior high school students take fruit and vegetables at least twice a day.

Sporting activities students take parts in regularly for at least 3days/week include football, volleyball, basketball and handball. Most students reported playing football and it is not surprising since it is the most popular sports played in Ghana. There were more male (84%) playing football than females which is also not surprising since boys are noted for engaging in sports than girls who are more into domestic activities at home.. More females engaged in the other sports like volleyball, handball and basketball than the male students and this was surprising because male students are known to engage in sports more than females. Results from the study suggested that the school environment may create the opportunity for students to engage in sports than the non-school/home environments and this was reported by others studies by Gordon-Larsen et. al., 2000, Pate et. al., 2004 and Zoeller 2009.

According to Gordon-Larsen et. al., (2000) on the determinants of physical activity among adolescents, the school and community sports programs have the potential to help youth establish lifelong, healthy, physical activity patterns. They further reported that the school environment provides more opportunity for sports participation (physical activity) than the home/community environment. The findings indicated that majority of sports participants (22%) played on school sports teams compared to only 11% of students who participated on teams run by an organization outside of school. A total of 52% females

and 31% in this study participated in school teams compared to 21% females and 26% males who play in teams outside the school setting. Surprisingly more females (52%) reported participating in school sports teams than males (31%). This is in contrast to more males (26%) participating in sports teams outside the school than females (21%). The plausible reason for this may be the fact that female are not allowed to engage in sporting activities at home since they may be engaged in domestic activities at home, so it is only at school that they get the opportunity to play sports hence more females into school sports than community sports.

Reports on means of transport by students to school shows that more students (64%) take motor vehicle to school with 34% walking and 2% riding bicycle to school. The numbers of hours spent in vehicle contributed to inactivity among students in the study.

Results from the study also showed that, majority of students spent less time behind the TV set/computer. Less than thirty five percent of students spent three hours plus behind the TV/Computer daily. The Ghana 2007 Ghana Global School -Based Students Health Survey also reported that 27% of students spent three or more hours per day sitting and watching television and playing computer games, talking with friends, or doing other sitting activities (Owusu 2007).

The result from the study indicated that 17% of senior high students as engaging in low physical activity. These adolescents did not meet the recommended activity level of 30 minutes of moderate activity for at least three days in a week. More females (19%), than males (11%) were involved in low level activity in the study. The finding is similar to studies The 2007and 2008 Ghana Global School -Based Students Health Survey in Ghana

which reported that more female engaged in low level of activity than males.(Owusu 2008 and 2009). Results from the study also showed that 49% engaged in moderate physical activity with more females (52.9%) involved in moderate activities than males (42.6%). Although a study by Kahan et. al., (2004), also reported that girls tend to participate in more moderate physical activity than males, it is surprising because males normally reported more moderate activities than female. This is in contrast to the GSS 2008 which reported that more males between ages 15-19 years engaged in moderate activities than females of the same age group. The design of the study may have accounted for the majority of females engaged in moderate activities than males. The house hold tasks domain activities reported by females under types of physical activity might have accounted for the high female proportions than males. Girls are noted to engage in domestic activities than boys.

The study reported that 34% students engaged in high level of physical activity (7days /week of 60 minutes moderate intensity to vigorous intensity activity). More male students (45.8%) engaged in high level activity than female students (27.7%) which is normally the case and is not surprising. The high proportion of male students engaged in high level activity in this study than that of female was also reported in studies like the Ghana Demographic Health Survey (GSS 2008) which noted that more males aged 15-19 years engage in high level activity than their female counterparts (GSS 2008). The Global School-Based Student Health Survey also reported that male students are more likely to engage in high activity than female students (Owusu 2008). Studies by Pate et., al, (2005) on Promotion of Physical Activity Among High-School Girls: a Randomized

Controlled Trial reported that Physical activity rates declined precipitously during the high school years and that the rates are consistently lower among adolescent girls than among adolescent boys. Gordon-Larsen et. al., (2000) on the determinants of physical activity and Amosun et. al., (2007), also on physical activity among Public High School students in South Africa, all reported that male students are more active than female students. Livingstone (2001) on Childhood obesity in Europe: a growing concern, said that boys are normally more active than girls and that the discrepancy may be more apparent than real. According to Livingstone (2001), while boys may participate more in higher intensity activities, the difference between the sexes is greatly reduced when moderate activity alone is compared.

The average total MET-minutes per week by age and sex indicated that involvement in physical activity among male students is higher than in female students as reported in other studies. The study also showed that levels of physical activity increases with increase in age among both sexes. Majority of students (83% males and 75% females) fall within the low inactivity category, less than one third of the respondents fall under the moderate level of inactivity. There was no student under the high level inactivity category. The time students spent on weekdays inactivity categorized them into low level of inactivity (0-10 hours/day) moderate inactivity(11-20hours /day) and high inactivity (21+ hours/day) The sitting hours include time spent in school sitting behind the desk, at home while doing home work, and during leisure time which may include time spent reading, sitting behind a desk, or a computer or video game, visiting friends or sitting/lying to watch TV. The proportion of male students engaged in low inactivity was more than that of female students in the study. However more female students engaged in

moderate inactivity on weekdays than male students. The finding on inactivity is similar to that reported by Owusu (2008) in the Global School-Based Student Health Survey (GSHS) of senior high students in Ghana which noted low inactivity among students.

The prevalence of overweight (11.7%) in this study compared to other studies, showed that overweight prevalence keep going up in subsequent studies. Overweight prevalence among students in Accra Metropolis in the last two years was 8.6% (Seneadza 2008). This is similar to the statement that adolescent overweight is on the increased worldwide (WHO 2003). The estimation that overweight among school-aged children will double in the future is an issue to consider (Kosti and Panagiotakios 2006, Chhatwal et. al., 2004 and Popkin 2000). The United States studies on prevalence of overweight among children and adolescents, 1999-2002, also reported that overweight in youth has not leveled off or decreased, and is increasing to even higher levels (Oden 2002)

In the study, the prevalence of overweight among respondents who engaged in low level of activity was 20.3% compared to those engaged in moderate level of physical activity(12.8%) and high level of activity(6%). Overweight rate was high among respondents with low level of physical activity than those who engage in moderate and high activity. This may be due to the fact that they do little or no activity or because they are overweight they are not able to do physical activities. The results from the study indicated that out of total respondents (444), 4.1% of those involved in low activity are obese, 4.1% of those who engage in moderate activity are obese and 0.7% of the respondent who engaged in high level of physical activity are obese. Obesity is high

among respondents with low activity (4.1) than respondents with high levels of physical activity (0.7).

The study further indicated that the prevalence of overweight among 115 male students in this study was 4.5% and that of the 289 female students was 15.6%. The results of this study confirms what other studies in Ghana and elsewhere reported that overweight prevalence is high among females than males (GSHS 2008, Biritwum et. al. , 2005, Pate et. al., 2000 Gordon-Larsen et. al., 2000). Overweight among females aged 15 to 19 years in the 2008 Ghana Demographic Survey was 10.3%, and 11.9% in the Global School –Based Student Health Survey (Owusu 2008), compared to the 15.6% among females in this study which shows an increase in overweight among females and even the male students as well. Females are at a higher risk of being overweight and this is similar to other studies that reported higher levels of overweight among females than males in a given population (Pate et. al., 2000, WHO 2007 GSS 2008 and Owusu 2008). This can be attributed to the higher level of physical activity among males than female adolescents. There was evidence of a significant association between physical activity, sex and age with odds of overweight. The researcher therefore rejected the null hypothesis which states that there is no relationship between physical activity and overweight. This finding is similar to other studies, which demonstrated the link between physical activity and body composition. Pate et., al., (2000) in the study on Sports Participation and Health-Related Behaviors reported that physical activity was significantly associated with overweight, Nogueira (2008) also confirmed this finding with her findings that physical activity was associated with body composition after

adjusting for age and maturation in her study on adolescents. Cavalcanti et. al., (2010) in an article on abdominal obesity in adolescents: prevalence and association with physical activity and eating habits observed that physical activity was significantly associated with the occurrence of obesity in adolescents, also similar to the findings of this study.

After adjusting for the confounding effect of sex, age and diet there was evidence that the odds of overweight can be reduced by 63% among students with high physical activity compared with those having low physical activity and this reduction can be as low as 15% and as high as 85% (Adjusted OR=0.37; 95% CI: 0.15, 0.95; P=0.11). This finding is similar to a study by Nogueira et. al., (2008) on Gender Differences in Physical Activity, Sedentary Behavior and Its Relation to Body Composition in Active Brazilian Adolescents which reported that physical activity level was associated with body composition after adjustment for age and maturation, with differences between genders physical activities is significantly associated with overweight however, other studies did not find such association (Juvenal 2005). Findings on sex and age agrees with other studies on physical activity and overweight which shows that sex and age are a major confounders when it comes to the weight of an individual. Most of the studies reported of high rate of overweight among females than in males. It was therefore not surprising when the results of this study also reported that female students are more likely to be overweight than male students.

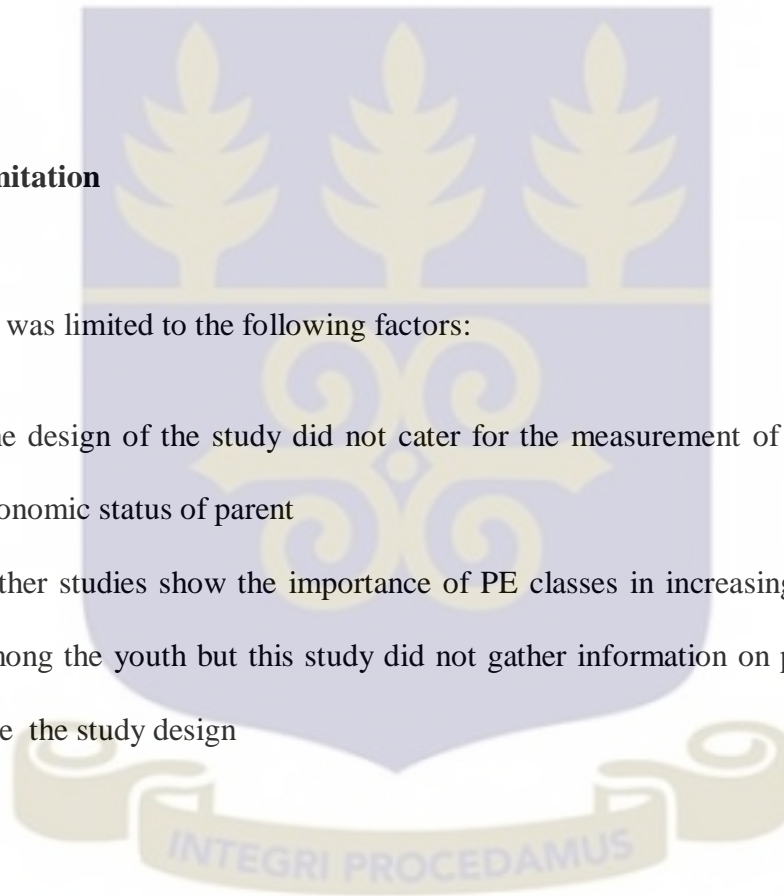
Physical inactivity was not significant with overweight in this study contrary to other studies. Silveira, et. al., (2006) in a case–control study on the Risk factors for overweight

among Brazilian adolescents of low-income families, reported that adolescents inactivity such as TV viewing and related pursuits are significant factor for the development of obesity. Pate et. al., (2004) also reported that TV viewing, time spent on video/computer games and the computer is significantly associated with obesity in cross-sectional studies of children, adolescents, and adults contrary to the findings in this study.

Study limitation

The study was limited to the following factors:

1. The design of the study did not cater for the measurement of income and socio economic status of parent
2. Other studies show the importance of PE classes in increasing physical activity among the youth but this study did not gather information on physical education due the study design



CHAPTER SIX

Conclusion

The result from the study indicated that 49% of students engaged in moderate physical activity, whereas 34% engaged high physical activity and 17% in low physical activity. The results further showed that majority (53%) of female students in the study engaged in moderate activities. More male students (45%) in the study engaged in high level activity. Male students in this study are more active than female students. The study further showed that students with high activity levels (6%) are less likely to become overweight compared to those with low activity (12.8%).

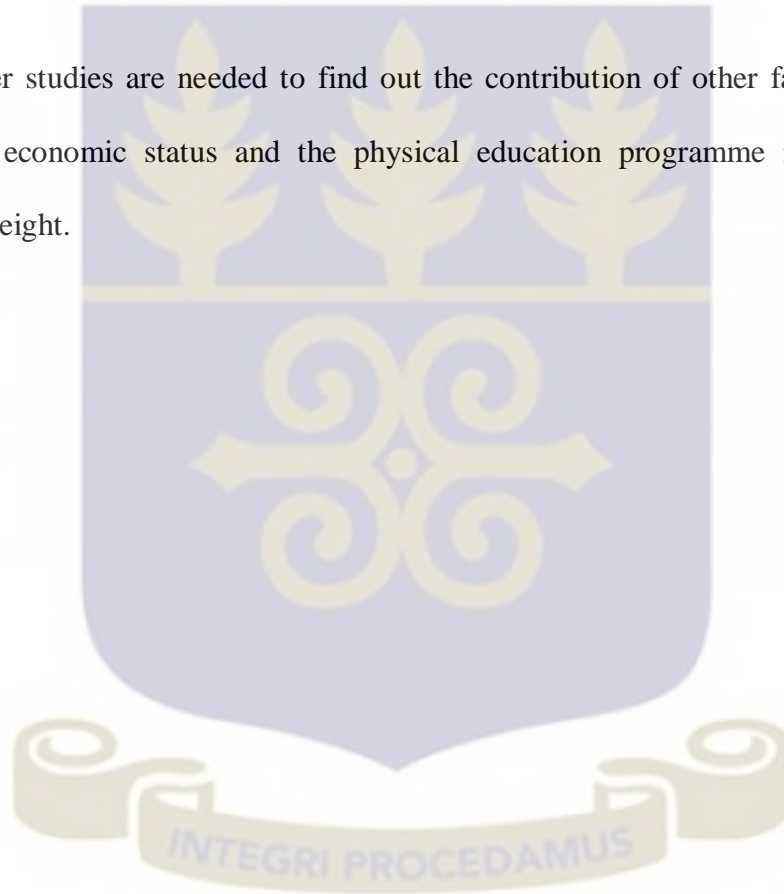
Overweight among senior high students in the Accra metropolis was 11.7%, with female students (15.6%) more likely of being overweight than male students (4.5%). Physical activity was significantly related with overweight among students in the study, after controlling for age and sex.



Recommendations

The following recommendations emerged from the study.

1. Schools, homes and communities should have playing grounds/recreational facilities for students to engage in recreational physical activities
2. Students must be educated to engage in physical activities to curb the prevalence rate of overweight from escalating.
3. Further studies are needed to find out the contribution of other factors like parents socio economic status and the physical education programme in our schools to overweight.



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Appendix 1: Ethical Approval Letter for subjects

CONSENT FORM FOR RESEARCH ON PHYSICAL INACTIVITY AND OVERWEIGHT AMONG SENIOR HIGH STUDENTS IN THE ACCRA METROPOLIS

I am Vida Korleki Nyawornota a student of the School of Public Health, University of Ghana. As part of the master requirement for the award of the Masters of Philosophy of Public Health, am conducting a research on Physical Inactivity and Overweight among Senior High School Students. The objective is to study the level and pattern of inactivity and overweight among students. If you agree to participate in this study i will ask you a few questions about yourself, family and school and then measure your height and weight. The measurements will not be invasive. Any information given will be treated with the utmost confidentiality

Your participation is voluntary and you are free to end the interview or measurement process at any time without any consequences.

I will be happy to answer any question or concern pertaining to the research.

Thank you.

I.....after understanding the purpose of the study, agree to participate.

Signature of respondent.....

Date of interview.....

Signature of interviewer.....

Appendix 2: RESEARCH QUESTIONNAIRE

Questionnaire on physical inactivity and overweight among senior high students in the accra metropolis

Demographic background

Sex

Male

Female

Ageyrs

Religion

Catholic

Anglican

Methodist

Presbyterian

Pentecostal/Charismatic

Moslem

Traditional/spiritualist

No religion

Others specify.....

Ethnic group:

Akan

Ga/Dangme

Ewe

Guan

Mole-Dagbani

Grussi

Gruma

Mande

Others specify.....

Residential status

Boarding

Day

hostel

Male caregiver/parent educational completed

no education

Primary

Middle/JSS

secondary+

Female caregiver/parent educational completed

No education

Primary

Middle/JSS

Secondary

Male parent occupation.....

Female parent occupation.....

Type of residence: own by parent/guardian Rented

Other (specify)

LIFESTYLES OF STUDENTS

How many main meals do you eat a day? one two three more than 3 times

How many times do you eat snack in a day? 0-1 times/day 2-3 time/day

4-5days/day 6-7times/day

How many times per day do you :

-Eat vegetables 0-1 times/day 2-3 time/day 4-5days/day 6-7times/day

-Eat fruit? 0-1 times/day 2-3 time/day 4-5days/day 6-7times/day

-Eat fried food? Like Fried rice, Fried chicken, potato chips, fried turkey tail

0-1 times/day 2-3 time/day 4-5days/day 6-7times/day

-Drink sweetened fruit drink 0-1 times/day 2-3 time/day 4-5days/day

6-7times a week

Do you take in alcoholic drinks? Yes No

Do you take in energy drinks? If yes list them

Do you smoke? Yes No

Have you ever used any of the following drugs? Marijuana, cocaine, List the others

Yes No cannot answer

INVOLVEMENT IN PHYSICAL ACTIVITIES

By what means do you usually come to school? car Bicycle walking

List sports activities you engage in regularly

During the past 6 months, on how many sports teams run by your school did you play?

(Do not include PE [physical education] classes.)

During the past 6 months, on how many sports teams run by organizations outside of your school did you play

How many hours/day do you spend on those activities? At home and

At school.....

How many hours/day do you spend watching TV,

Less than 1 hour /day 1-2 hour/day 3-4 hours/day 5 or more hours /day

How many hours do you spend using the computer or playing video/computer game

Less than 1 hour /day 1-2 hour/day 3-4 hours/day 5 or more hours /day

Do you have recreational facilities close to where you stay like basketball court,

Volleyball court, football field, tennis court, playing ground, beach or social centre?

Yes No

Are you a member of the school cadet? Yes No

If yes how often do you go for training in a week? 1 2 3 4 5

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, fast bicycling, playing small post, 'are you ready', or any sports traditional dance?

_____ Days per week

No vigorous physical activities Skip to question 3

2. How much time did you usually spend doing vigorous physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis?

Do not include walking.

_____ days per week

No moderate physical activities Skip to question 5

4. How much time did you usually spend doing moderate physical activities on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

Think about the time you spent walking in the last 7 days. This includes at school and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

5. During the last 7 days, on how many days did you walk for at least 10 minutes at a time?

_____ days per week

No walking Skip to question 7

6. How much time did you usually spend walking on one of those days?

_____ hours per day

_____ minutes per day

Don't know/Not sure

The last question is about the time you spent sitting on weekdays during the last 7 days. Include time spent at work, at home, while doing home work and during leisure time. This may include time spent sitting at a desk or behind a computer or video game, visiting friends, reading, or sitting or lying down to watch television.

7. During the last 7 days, how much time did you spend sitting on a week day?

_____ hours per day

_____ minutes per day

Don't know/Not sure

ANTHROMETRIC MEASUREMENT

Measurement	1	2	mean
Heightmmm
Weightkgkgkg

This is the end of the questionnaire, thank you for participating.



Appendix 3

Map of Accra Metropolitan Area

