**REGIONAL INSTITUTE FOR POPULATION STUDIES (RIPS)**

**UNIVERSITY OF GHANA**

# PERCEIVED BODY WEIGHT AND ACTUAL BODY MASS INDEX (BMI) AMONG URBAN POOR COMMUNITIES IN ACCRA, GHANA

**BY**

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# ACCEPTANCE

Accepted by the Faculty of Social Sciences, University of Ghana, Legon, in partial fulfilment of the requirements for the award of MPHIL POPULATION STUDIES

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Date……

## DECLARATION

I hereby declare that this work is my own research undertaken under supervision except for references made to other researchers' work which have been duly acknowledged. Also, this work has neither in part nor whole been presented for another degree elsewhere.

……..……

GRACE AGYEMANG FREMPONG

(CANDIDATE)

DATE …….

# DEDICATION

This piece of work is dedicated to my lovely family for their invaluable contribution and support to my life.

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# ABSTRACT

Body weight (especially overweight and obesity) are of global concern because of their health implications. Notwithstanding the health implications, the prevalence rates continue to increase in both developed and Low and Middle Income Countries (LMICs). The rising prevalence of overweight/obesity is attributed to changing behavioural practices such as reduced physical activity and poor dietary behaviours. Being underweight is associated with high levels of malnutrition, starvation and poverty. Weight misperception can also result in large numbers of individuals with weight problems failing to understand the need for weight control. The aim of the study was to examine the association between perceived body weight and actual body mass index among residents in Ga Mashie and Agbogbloshie. It was a cross-sectional survey conducted on a sample of 700 adults aged 15-59 years. It was based on data from the second round of Edulink Urban and Poverty survey conducted in three poor urban communities in Accra, Ghana in 2011 by the Regional Institute for Population Studies (RIPS). Chi-square tests and multinomial logistic regression analysis were used to analyse the data. Basically, respondents misperceived their weight. Although misperception of body weight was found in each category of body weight, underestimation and overestimation of weight was higher among respondents who perceived themselves as underweight and obese (79% and 45% respectively). Even though a sizeable proportion of respondents misperceived their weight, they did nothing about it. The perceptions people had about their weight influenced their dietary behaviour but not their engagement in physical activity. While 78.3% of those who perceived themselves to be overweight belonged to the category of high dietary diversity score, 93.5% of them were physically inactive. Perceived weight remained significantly associated with actual BMI even after controlling for some confounders. Other variables that predicted BMI were sex, age, marital status and type of occupation. Males are less likely to be overweight or obese compared to females (Odds Ratio=0.415 (p=0.002) and 0.072 (p=0.000) respectively). Based on the finding of the study, it is recommended that there should be a continual sensitization of the regenerative health policy on healthy diet especially among women. Intervention programs should also target adults.

# Table of Contents

Title Page

# List of Tables

**Tables** **Page**

## List of Figures

# CHAPTER ONE

## 1.1 Background to the study

Body weight (especially overweight/obese) has become an important global public health concern because of its health implications (World Health Organization (WHO), 2002). Excess body weight (overweight/obesity) is associated with serious health implications, including increased risk for cardiovascular and other chronic disorders. Although the risks associated with overweight or obesity are known, its prevalence continues to increase in many countries (Inoue et al., 2007; WHO, 2002; Flegal, 2006). WHO (2008) global estimates showed that more than 1.4 billion adults aged 20 years and over, were overweight. Of these overweight adults, over 200 million men and about 300 million women were obese.

In addition, the global prevalence of childhood obesity is also on the increase, 22 million children under age 5 globally have been classified as overweight (Rocchin, 2002). Data from 2008 WHO Global Database on BMI shows a high prevalence of over-nutrition in sub-Saharan Africa. In 25 out of 33 countries, the percentage of the adult female population with a BMI >25 was 19.8 %. In Ghana, between 1993 and 2008, national obesity rate increased from 10 to 30 %. The highest rate was recorded in the Greater Accra Region at 45 % (GSS et al., 2009). Besides, other studies such as Amoah (2003a) in two urban areas (a high and a low class) and a rural suburb of the Greater Accra Region reported that the overall crude prevalence of overweight and obesity in Accra was 23.4% and 14.1% respectively among adults aged 25 years and above.

However, in the presence of rising excess body weight, underweight (BMI < 18.5) has also been observed (Cheung et al., 2011). Results from the 2007–2010 National Health and Nutrition Examination Survey (NHANES), indicated that 1.7% United States' adults aged 20

years and over were underweight. The 2008 WHO Global Database on BMI again reports that 14.5 % of the adult female population in Sub-Saharan Africa is underweight. In Ghana, 9 % of women were found to be chronically malnourished or underweight. However, stunting rates among children have remained roughly the same over the past 25 years, with the most recent rates reported to be 28 % (GSS et al., 2009). It is therefore likely that overweight and obesity rates have increased in children.

The rising prevalence of obesity in Africa is attributed to changing behavioural practices such as sedentary lifestyles and consumption of food high in saturated fat, salt and sweetened food and beverages which have high energy value (WHO, 2011; Agyei-Mensah and de-Graft Aikins, 2010; Caballero, 2007; Prentice, 2006). The poor in deprived and low-status areas consume more cheap food items, such as refined carbohydrates, polished grains and frozen meat products and hence increase the incidence of obesity (Dake et al., 2010). On the other hand, the problem of underweight is faced in Sub-Saharan Africa because of high levels of malnutrition, starvation and poverty (WHO, 2006).

Regardless of whether a person is underweight, overweight or obese, behavioural change is one key aspect of weight control (Brener et al., 2004). Theoretical models of health behaviour change emphasize the necessity of perceiving oneself ‘at risk’ as a prerequisite to behaviour change (Gregory et al., 2008; Inoue, 2007 et al., 2009). Yet, many people tend to misperceive their weight. Weight perception is said to be a determinant of nutritional habits and weight management (Strauss, 1999).

A person’s attitude influences his or her behaviour and is a link between knowledge and practice (Faber and Kruger, 2005). Perceptions people have about their weight may play an important role in their actual body size. Accurately perceiving one’s weight is considered an

important cue for action and change and has been linked to greater motivation to engage in healthy lifestyle behaviours (Brener et al., 2004; Maximova et al., 2008).

### 1.2 Statement of the problem

Misperception of body weight can overlook actual body weight, thereby becoming a barrier to weight control (Brener et al., 2004). The problem is not only that some overweight and obese persons perceive themselves as having normal body weight, but also some thin and normal weight persons feel fat. For instance, normal weight persons who perceive themselves as overweight are at increased risk for eating disorders such as anorexia nervosa-"an emotional disorder characterized by an obsessive desire to lose weight by refusing to eat; hence, a distorted image of the body" and Bulimia nervosa or binge eating disorder- ''an emotional disorder involving an obsessive desire to lose weight, in which bouts of extreme overeating are followed by depression and self-induced vomiting, purging, fasting or excessive exercise" (Jaffari et al., 2011. p.32).

Also, some fat people who think they are normal weight and do not control their weight through dieting and other weight control strategies may further exacerbate their weight problems. Misperception of body weight may in effect contribute to the prevalence of weight problems (underweight, overweight and obese).

Weight problems are alarming because they are linked to a substantial increase in the risk of morbidity and mortality globally (Flegal et al., 2005). They are associated with negative social and emotional effects such as low self-esteem, depression, behavioural and learning problems which affect human health and development (Cook et al., 2007).

Being underweight is associated with health effects such as reduced stamina, irregular menstruation and poor cognitive development. These can impair the immune system which consequently leads to frequent sicknesses and deaths (WHO, 2002; Uthman and Aremu, 2008). Obesity is a well-known risk factor for various chronic diseases. As a result, an increase in its prevalence implies a subsequent rise in chronic diseases such as diabetes, hypertension and some cancers, particularly in urban areas of Africa (Ziraba et al., 2009).

Although chronic diseases affect both developed and developing countries, poor nations are increasingly, taking the greatest burden. Age specific mortality rates resulting from chronic disease in Sub-Saharan are higher compared to other regions of the world (WHO, 2005). The Africa region is anticipated to lose at least a cumulative US$4.0 billion to chronic disease by 2015 all of which drains a nation's resources (Nutrition at a glance, Botswana).

Ghana, like many African countries, faces a double burden of communicable and non-communicable diseases (de-Graft Aikins, 2007; Birks, 2012). While Ghana continues to deal with the problem of infectious disease and under-nutrition, there is a rapid rise in chronic disease risk factors such as overweight and obesity at the same time. Managing chronic diseases in Ghana is very expensive and hence pushes individuals and families into poverty. Urban poor residents being victims of the double burden of disease face extreme poverty (Agyei-Mensah and de-Graft Aikins, 2010). The health systems of the nation are threatened because of the continued threat of infectious diseases. Chronic diseases are noted to affect the most economically productive age group and thus therefore have implications for quality of life of the human resource and consequently the nation's Gross Domestic Product (GDP) and national development (WHO, 2005;de-Graft Aikins, 2010b).

In the light of the foregoing discussions, the present study seeks to answer the following questions: What socio-demographic variables determine BMI in the study areas? How do individuals perceive their weight? Is there an association between perceived weight and actual BMI? Does perceived weight determine an individual's weight control practices?

### 1.3 Objectives

The general objective of the study is to examine the association between perceived weight and actual BMI among residents in Ga Mashie and Agbogbloshie

**Specific objectives include:**

- To describe the socio-demographic characteristics of respondents
- To examine the correlation between individuals' characteristics and actual BMI
- To find out if perceived weight determines an individual's weight control practice
- To make recommendations based on findings

### 1.4 Rationale of the study

Individual's perceptions, beliefs and knowledge can contribute in varying degrees to the performance or non-performance of health related behaviours (Crossley, 2000). Perceptions and knowledge about body weight therefore become important determinant in weight management. Behaviour change advice given to underweight, overweight and obese people may go unheeded if they do not consider themselves to have such weight problem (Kuchler and Variyam, 2003). The Trans-theoretical Model of behavior change suggests that people are able to progress from pre-contemplation to contemplation stage when they are aware of the situation (weight status); the awareness about the situation will make them to contemplate making a behaviour change (Prochaska et al., 2002). To effectively manage

weight problems and reduce morbidity and mortality levels, perceptions about weight status must be taken into consideration (Yan et al., 2009). Weight perception is of public health concern because it can result in large numbers of individuals with weight problems failing to understand the need for weight control (Kuchler and Variyam, 2003).

This study is significant because it will bring to light the weight control practices of people who correctly perceive their weight, as well as those who misperceive their body weight. This will increase understanding of what people do about their weight; their dietary practices and engagement into physical activity. This will consequently help in developing strategies to help achieve a normal or healthy body weight and eventually achieve a healthier population.

The government of Ghana has an agenda of transforming the nation into a middle income country by 2015. The strategy for achieving this includes the development of human capital; hence, focusing on health issues particularly the double burden of disease and the role of overweight and obesity. Also, the Regenerative Health and Nutrition (RHN) Programme instituted in Ghana aims at transforming the health, life and development of Ghanaians by reducing the risk of occurrence of diseases and disorders in the population (MOH, 2007). Findings from this study will provide interventions which will contribute to the attainment of a healthier population; the study is therefore timely.

There is consensus in the literature about Africans embracing fat, although new evidence suggests variations. Therefore, it is important to carry out detailed studies that highlight differences across and within cultures. Studying perceived weight and actual weight among urban poor Ghanaians will bring out individual differences within the cultural context. To reduce the growing number of overweight/obese people in the population, and attain a healthy population, it is important to first understand if there are problems with weight

perception in Ghana as have been observed globally. This will enhance knowledge and understanding of body mass index (BMI) and its management.

Notwithstanding the fact that much research has been done on weight status using BMI categorised by the WHO, little is known about perceived weight and actual BMI in urban poor communities in Ghana. Existing works on BMI focused mostly on women. Although women are affected most, men may not be free from becoming overweight or obese. Looking at both genders will deepen understanding of body weight.

Accra is an important case study for understanding perceived weight and BMI in Ghana. This is because over- nutrition is on the increase and is a major problem (Amoah, 2003b). While affluent communities experience higher risk of over-nutrition, urban poor residents are vulnerable of under-nutrition and over- nutrition. These factors make it very essential to conduct community based studies in urban poor settings (Agyei-Mensah and de-Graft Aikins, 2010).

### 1.5 Organization of the study

Chapter one presents the background of the study, including the statement of the problem, research questions, objectives, rationale of the study as well as the organization of the chapters of the study. The second chapter consists of the literature review, conceptual framework and hypotheses. Chapter three comprises the methodology and limitations of the study. Chapter four shows a description of the characteristics of the study population in the form of frequencies, %ages and tables. Chapter five covers a bivariate analysis which involves a cross tabulation of the background characteristics with the dependent variable. Chapter six consists of a multinomial logistic regression analyses which determines the

associations between the background characteristics and BMI. Finally, Chapter seven presents a summary, conclusion and recommendations of the study.

# CHAPTER TWO

## Literature review and conceptual framework

### 2.1 Weight perception and Body Mass Index (BMI)

Obesity is a concept viewed differently across cultures. The institutionalised cultural practices and the internalisation of cultural norms may influence people's perception about their body weight. While obesity is abhorred in the western world, in most African cultures a fat woman is seen as beautiful (Dake et al., 2010; Holdsworth et al., 2004). While western countries attach a social stigma against fat (Prentice, 2006), this psychological break is missing in African countries (de-Graft Aikins, 2010a). There is a presumed cultural valuation of fatness as a sign of prosperity, beauty, health and prestige in some Sub-Saharan African (SSA) populations. It signifies strength, wealth, beauty and also makes one look respectable (Renzaho et al., 2012; Puoane et al., 2010; Shaibu et al., 2012; Amoah, 2003b).

There is a cultural perception in Gambia that obesity is a characteristic of the elite group, and hence signifies prosperity (Siervo et al., 2006). A similar perception is seen in Cape Town where increased body size is a reflection of well-being, especially among the married. Marital harmony was perceived to be the cause of increased body weight (Mvo et al., 1999).
Thinness on the other hand, is mostly linked to poverty and illness while increasingly rapid weight loss is associated with HIV/AIDS (Kruger et al., 2005; de-Graft Aikins, 2006; Shaibu et al., 2012). These societal perceptions may drive people into weight control practices that may help them meet the societal standard (Abubakari, 2008).

Some ethnic groups in SSA embrace cultural practices that encourage female obesity such as pre-marital "fattening rooms" of Nigeria (Iloh et al., 2010). In Moroccan Saharawi culture, a study by Rguibi and Belahsen (2006) which questioned women about their desired body size

and diet practices indicates that majority of women (90.4 %) wanted to gain weight hence used a fattening period of at least 40 days of overeating and special traditional meals, with a reduction of2 physical activity. Overweight or obese women further did not perceive themselves as being too fat because socially, fatness was considered as a beauty criterion. As a result, they were not concerned about their weight. This possibly puts them at risk for further weight gain and associated health consequences (Faber and Kruger, 2005; Rguibi and Belahsen, 2006).

Weight misperception has been observed in some societies. Bhanji's et al.'s (2011) study among overweight and obese adults in Pakistan indicates that a higher (73% and 50% respectively) proportion of individuals in the overweight and obese underestimated their weight status: they were bigger than they perceived themselves to be. In Tanzania, four fifth (78%) of overweight and obese failed to perceive their weight as being too high (Muhihi et al., 2012). A study among adults in the Seychelles reported that 54% of overweight participants and 18.8% of obese participants underestimated their body size (Alwan et al., 2010). Olubukola and Olubukola (2012) found underestimation and overestimation of weight respectively among underweight and overweight students. Thirty one % of students thought they were overweight whereas the BMI confirms that 18% is actually overweight. Also, 5.5% out of 15.5% who believed they were underweight were actually underweight.

Underestimation and overestimation of weights contribute to denial of current weight being a health risk and thus contributes to increase in health problems associated with underweight and obesity due to a failure to adhere to advice on weight control strategies (Field et al., 2001; Gregory et al., 2008). Brener et al. (2004) in the US reports that adolescents who are overweight but fail to perceive themselves as such are unlikely to engage in weight control practices such as dieting and exercise that might help them to lose weight. In Morocco,

individuals who underestimated their weights wished to gain more weights while those who overestimated their weights wished to lose weight. Cheung et al. (2007) reported among adolescents in Hong Kong that, those who considered themselves overweight may try to lose weight using diet control, physical activity or medications. This may translate into the reduction of body weight whereas those who perceive themselves as having a normal weight may do nothing about their weight hence may become overweight or obese (Lemon et al., 2009).

Weight misperception could be a result of a peer and family effect. People base their weight status perceptions on the weights of significant others. Weight-teasing of thinness by family members and peers have also been found to be a correlate of problematic weight related outcomes and disordered eating behaviors. Individuals who were teased frequently about their slim body sizes were about ten times more likely to binge eat as compared to those whose family members did not tease them. Eating too much may eventually increase BMI status (Neumark-Sztainer et al., 2010).

It is also obvious that groups attach different values to a particular weight status (Powell and Kahn, 1995). The views people have about themselves are greatly influenced by how they imagine others perceive their appearance and personality (Hoover, 1984 cited in Kemper et al., 1994). That is, development of self-image involves the imagined appearance of oneself to others, the imagined judgment associated with how one appear to others, and feelings of pride or embarrassment resulting from those perceptions. Individuals will compare and contrast themselves to others in their society and choose behavioural styles biased by the extent to which they are motivated to comply with the social norms (Hoover, 1984 cited in Kemper et al., 1994).

The media also promote images of unrealistic body shape and serve to perpetuate people's dissatisfaction with the way they look (Tiggerman, 2003; Cohen, 2006). Each form of media serves a different purpose and it seeks to inform, convince, entertain, and change the individual (Jaffari et al., 2011). The importance the media place on the thin and smart ideal body figure may be responsible for body size overestimations that females in particular make. Most people specifically young adults desire to be slim and smart hence concerned about their weight, shape or body image (Anderson-Fye and Becker, 2004 cited in Jaffari et al., 2011). A study in the US by Field et al. (1999) found that the frequency of reading fashion magazines was positively associated with dieting or exercising to lose weight among preadolescent and adolescent girls. Also, Taveras et al. (2004) in the US found among adolescents who wanted to look like models engaged in higher physical activity and healthy eating behaviors. In order to look like celebrities, they develop eating disorders and engage in too much physical activity; hence they become very underweight.

## 2.2 Overview of BMI

There are different anthropometric measures for defining body weight. These include measures such as BMI, waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-stature ratio (WSR) (The Decoda Study Group, 2008). Waist circumference and waist-to-hip ratio are used to estimate abdominal fat which is usually used to express central obesity. They are used to distinguish between fatness in the lower trunk (hip and buttocks) and fatness in the upper trunk (waist and abdomen areas). Waist circumference and waist-to-hip ratio are mostly used to predict the risks of cardiovascular diseases (Gibson, 2005).

BMI is an internationally recommended indicator of overweight and obesity in both children and adults (WHO, 1995a cited in Gibson, 2005). It is the most commonly used measure for assessing the prevalence of general obesity. BMI is used in large-scale nutrition surveys and

epidemiological studies as a measure of overweight and obesity (Gibson, 2005). Amongst adults, body sizes are categorised as underweight (<18.50 kg/$m^2$), normal weight (18.50 kg/$m^2$- 24.99 kg/$m^{2)}$, overweight ( 25.00 kg/$m^2$- 29.99 kg/$m^2$) and obese (≥ 30.00 kg/$m^2$). However, obesity can be further grouped into obese class I (30.00-34.99 kg/$m^2$), obese class II (35.00-39.99 kg/$m^2$), and obese class III (≥ 40.00 kg/$m^2$), specifying the severity of obesity in a population (WHO, 2000).

The same anthropometric measurements are used for children and adolescents but after the computation, percentiles are used to determine the BMI status. Those below the fifth percentile (<$5^{th}$) are termed underweight. Normal weight comprise those from the $5^{th}$ percentile to less than $85^{th}$ percentile ($5^{th}$ to < $85^{th}$); overweight are those from $85^{th}$ to less than $95^{th}$ percentile ($85^{th}$ to <$95^{th}$ percentile) while those equal to or greater than the $95^{th}$ percentile (≥ $95^{th}$) are obese (Gibson, 2005). BMI measurements are easy, quick and more precise than waist circumference and waist-to-hip ratio measurements. It is an independent index of body fat; that is all subjects with the same BMI have the same relative fatness irrespective of their age, sex or ethnicity (Gibson, 2005).

### 2.3 Global context of BMI

Body weight problems, particularly overweight and obesity, have become issues of great concerns. Overweight and obesity have increased due to poor dietary practices such as the consumption of fatty and energy-dense foods, caloric sweeteners and reduced physical activity. These are linked to structural factors such as urbanization, industrialization and globalization (Bray and Popkin, 1999; WHO, 2000; Popkin, 2006). W.H.O (2006) global projections indicate that about 1.6 billion adults (age 15years and over) were overweight and at least 400 million adults were obese in 2005. Additionally, over 20 million children under

the age of 5 years are overweight globally. WHO further projected in 2006 that by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese.

WHO (2006) also attributes the problem of underweight in SSA to the consumption of foods deficient in macronutrients (protein, leading to protein-energy malnutrition), micronutrients (electrolytes, minerals and vitamins, leading to micronutrient deficiency) or both. For instance, the poor consume a lot of carbohydrates. Such foods are mostly consumed due to the problem of poverty and food scarcity (WHO, 2006).

### 2.4 Socio-demographic Characteristics and BMI Status

Studies have shown that some socio-demographic, cultural and behavioural factors contribute greatly to the disparity in the prevalence of body weight. Globally, men and women face different risks of obesity. Since 1971, average body mass index (BMI) has increased more rapidly in women than in men (Wang, 2009). In 138 of 194 countries for which the WHO reports obesity statistics, women were more than 50 % more likely to be obese compared to men (WHO, 2011). Barrett and Hoffman (2011) attributed the higher BMI for females to early maturation while Case and Menendez (2009) explained that poverty in childhood and greater access to resources in adulthood, lead women to be at significantly greater risk of obesity than their men counterparts. Notwithstanding these explanations, it is also possible that women engage in less rigorous activities compared to men. Women of reproductive ages are also more likely to be obese compared to men due to different eating patterns as a result of child birth.

Although body weight varies by sex, it is said to be related to a specific stage of life. As one matures in age, one is supposed to progress to a larger body size and weight. That is, weight tends to increase with age (Abakhail et al., 2002; Boyington, 2008; Muhihi et al., 2012). A

meta-analysis study by Abubakari et al. (2008) among adult West African populations supports this. It shows that obesity increased with age until mid-age (45–54 years) when it started to decline. Also, results from a qualitative study conducted by Boyington (2008) among African-American girls showed that individual's current weight was contrary to their weight during elementary school. That is, they looked much bigger compared to elementary school times. According to Tufano et al. (2004), the association between obesity and age can be explained, in part, by parity and postmenopausal status.

Another factor which is said to have an association with BMI is marital status. Marriage confers health benefits by providing protection; this is termed the marriage protection hypothesis. Married people are healthier because they have a spouse, who can monitor their health behaviors, care for them when they are ill and who will likely discourage them from engaging in risky behaviours. Marriage again provides social support and financial resources that promote health by providing access to better nutrition and health care (Waldron et al., 1996). In contrast, other studies have shown higher BMIs among married individuals. Jeffery and Rick (2002) observed weight gain among married people and weight loss in those who got divorced. Likewise, in India Poluru and Mukherjee (2010) found 11 % of married women being either overweight or obese. Further, Biritwum et al. (2005) found among Ghanaians that obesity was more common among married women than unmarried.

Marriage also increases cues and opportunities for eating. Married people have a tendency to eat together which reinforces each other to increase the intake of foods (Jeffery and Rick, 2002). Also, it is possible that married women are more likely to have children and thus the increased weight gain upon getting married may be partly caused by pregnancy. Child birth could lead to a permanent increase in weight even months or years after giving birth (Cawley, 2006). In addition, maintaining an ideal weight is expensive. In order to achieve an ideal

body weight, many people engage in costly time-consuming activities such as exercising and preparing healthy meals. Once a relationship has been established, vigilance in the monitoring of one's weight may reduce (Averett et al., 2008)

Formal education is said to be one of the media that greatly influence the attitude, social, economic and physiologic behaviors of people (Caldwell, 1980; Anyanwu et al., 2010). Grossman and Kaestner (1997) in their work "Effects of Education on Health" concluded that years of formal schooling is the most important correlate of good health. Formal education helps people choose healthier lifestyles by improving their knowledge of the relationships between health behaviors and health outcomes. They are therefore better endowed in making improved choices that affect health. Educated individuals make better use of health-related information than those who are less educated. Education provides individuals with better access to information and improved critical thinking skills (Kenkel, 1991).

There is a higher possibility for highly-educated persons to have knowledge to develop healthy lifestyles and have more awareness of the health risks associated with being obese (Yoon, 2006). For example, the highly educated are more likely to exercise and to obtain preventive care such as flu shots and vaccines. They are therefore less likely to smoke, drink a lot, to be overweight or obese or to use illegal drugs (Cutler and Lleras-Muney 2006). Michael Grossman's demand for a health model, developed in the 1980s, hypothesised that "schooling raises a person's knowledge about the production relationship and therefore increases his or her ability to select a healthy diet, avoid unhealthy habits and make efficient use of medical care" (Kemna, 1987 cited in Devaux et al., 2011. p.125 ).

A cross-sectional study conducted by Webbink et al. (2008) in Australia found negative relationship between education and the probability of being overweight. The authors found

that a year of education reduces the probability of being overweight. The year of schooling can be equated with level of education. This is because the year of schooling increased as one moves from one level to another on the educational ladder. A study on the Ibos of Nigeria by Anyanwu et al., (2010) also found an inverse relationship between education and obesity. Obesity was worse for all females of the various education groups but worst for those in the least educated group. Amoah (2003b) and Biritwum et al. (2005) in Ghana on the other hand found that subjects with tertiary education had higher rates of overweight and obesity than did those without tertiary education. Therefore, Education may not always reduce one's obesity level. That is, having knowledge about health related issues may not necessarily translate into attitude.

The relationship between socioeconomic status and BMI has been inconsistent. Some studies suggest that higher socioeconomic status is positively associated with the BMI while others report otherwise. Tharkar and Viswanathan (2009) found that children aged 8 to 15 years in an urban India community belonging to the higher income levels had higher body weight. Ziraba et al, (2009) suggest that obesity in the developing world is no longer a problem of high SES but increasingly for those of low SES. Thus, higher income individuals have the lowest prevalence of obesity (Drenowski and Darmon, 2005). National surveys in Brazil found that while in 1989 obesity in adults was more prevalent in the higher socioeconomic status, in 1999, higher obesity prevalence was observed among the lower socioeconomic status.

Also, in the US, higher BMI has also been observed among children and adolescents from the low income families (Strauss and Pollack, 2001). The reason is that individuals in higher SES are more likely to have flexibility in the choice of diet and physical activity pattern. For instance, they have better access to healthier lifestyle including the purchase and intake of

low-fat, high-quality foods such as fruits, vegetables, lean meats, and low-fat dairy products (Stunkard, 1996; Chang and Chariska, 2003; Martín et al., 2008).

Occupation is also known to have an association with BMI. Allman-Farinelli et al. (2010) analysing the Australian Health Survey (2005) reported that males in transport and production work had a higher BMI whereas those in professional, clerical, sales/services, trades and labouring occupations had lower BMI. He explained that transport and production work demand long sitting hours with little opportunity for physical activity. A study among Australian workers also reports a strong association between occupational sitting time and obesity (Mummery et al., 2005). Overweight and obesity were also high among Ghanaian housewives, professionals, managers and entrepreneurs and low in unskilled workers, farmers, fishermen and students. A relatively high proportion of farmers, fishermen, unskilled workers, shop assistants and pensioners were underweight.

Gueorguieva et al.(2011) using a national data from the US indicated that individuals who were in service and other blue-collar occupations such as mechanical, construction, production, labourers had significant increases in their BMI status after retirement, whereas those in white-collar occupations (example, professional, managerial) demonstrated no change in their BMI patterns after retirement. Blue-collar occupations often involve physically demanding tasks, in effect; the cessation of physical activity after retirement brings about increase in BMI.

Another contributing factor to BMI is the media. Tiggerman (2003) reported that television watching is associated with overweight or obesity. This is because long hours of television viewing may be a marker of being physically inactive. Also, the media promote foods, which are high in fat and calories. These foods are nicely packaged and come with enticing

advertisements hence attracting people to its consumption. Consequently, people who take such foods put on more weight (Jade, 2002 cited in Jaffari et al., 2011). On the positive side, the media is effective at promoting physical activity as a healthy means of weight control.

A positive relationship is said to exist between alcohol and BMI (Biritwm et al., 2005). Alcohol restrains the body's ability to burn fat. The liver converts alcohol into acetate, which is released into the bloodstream and used by the body as an energy source. As acetate levels rise, the body begins to burn more acetate and less fat (Leibowitz, 2007 cited in French et al., 2011). It is a high-calorie beverage that interferes with metabolic function and cognitive processes (French et al., 2010). Alcohol intake can affect a person's ability to evaluate the costs and benefits of behaviours such as eating and exercise that affect body weight (Field et al., 2010). There is increase in body weight when energy derived from alcohol is added to that from food. Alcohol also stimulates metabolism, which can lead to overeating and subsequently lead to weight gain (French et al., 2010).

A study among Ghanaian adults reported that those who had never drank alcohol had the lowest levels of overweight and obesity (Amoah, 2003b). Wannamethee and Shaper (2003) using the British Regional Heart Study (BRHS) found that the prevalence of men with a high BMI increased significantly with the intake of alcohol even after controlling for potential confounders. They therefore concluded that heavy alcohol intake (≥30 g/d) increases weight gain and obesity regardless of the type of alcohol consumed. People trying to lose weight are therefore often advised to moderate or avoid alcohol because of its relatively high combustible energy value.

The direction and the magnitude of association between smoking and body mass index are not consistent. Obesity has been shown to be less among smokers than non-smokers

(Biritwum et al., 2005). Cigarette smoking is said to be helpful in weight control; it is often thought of as a way to control appetite and weight. Albanes et al. (1986) used the second National Health and Nutrition Examination Survey (NHANES II) and reported that cigarette users weighed less and were thinner than non-smokers. Similarly, a community-based study in Delhi shows an inverse relationship between smoking and BMI. The proportion of overweight and obese participants was higher among non-smokers as compared to smokers while smokers were underweight.

In Central Thailand, it was reported that those who currently smoke had significantly lower BMIs than never smokers or those who had quit smoking (Jitnarin et al., 2008). In the US NHANES II data, a lower BMI was observed in the current smokers as compared to non-smokers. This is because Nicotine decreases food intake and increases energy expenditure. The odds for smokers being underweight were about 30 % greater than among non-smokers. Generally, smokers weigh on average 6 to 9 pounds less than non-smokers (Chhabra and Chhabra, 2010). On the contrary, a Financial Valuation and Risk Management (FINRISK) study found that, smokers were more likely to be obese as compared to never-smokers (Lahti-Koski, 2002 cited in Chhabra and Chhabra 2010). Another study by Uglem (2011) among 739 eligible recruits from the Norwegian National Guard showed a higher average BMI (24 kg/m2) among current smokers than non-smokers (23 kg/m2).

Although non-genetic factors are important, it is unlikely that these factors alone can fully explain BMI. Higher BMI tends to run in families, suggesting a genetic cause (Goedecke, 2005). A review of familial resemblance suggests that genetic factors explain 50–90 % of BMI (Maes et al., 1997). A Finnish Twin Study on Aging (FITSA) conducted by Ortega-Alonso et al. (2009) showed that the evolution of BMI from middle to old age was, to a large extent explained by genetic influences. Genetic influences on BMI level were also partially

responsible for the increasing trend in BMI with age. Separating genetic from other influences on obesity is often difficult. Compounding the effect of genetic factors is parental influences.

Parents can influence the body weight of children directly and indirectly (Stunkard, 1996). The diet of parents especially the mother predicts children's obesity (Tremblay and Lariviere, 2009; Reisch et al., 2012). Parents especially mothers may encourage children who are formula fed to finish the bottle and may as well attempt to restrict children's eating. Parents also appear to be strong influences on physical activity in childhood. For example, in a qualitative study by Renzaho et al. (2012) among refugees and migrants from Africa living in Australia, parents restricted their children's involvement in physical activity because of the belief that being active will promote weight loss. Physical activity is beneficial for physiological fitness and improved health outcomes and not necessarily for weight loss.

### 2.5 BMI studies pertaining to Africa

Obesity and overweight, which were once problems of developed countries, have now become a major public health concern in developing countries, particularly in urban areas (WHO, 2000; Caballero, 2007; Popkin and Gordon-Larsen, 2004). Urbanization has been linked to increased risk of obesity and chronic disease in Sub-Saharan Africa; therefore, most urban populations have higher obesity rates than rural populations. Increased global access to technology has introduced televisions and computers as well as cars, labour saving devices and mechanised tools especially in cities both in homes and workplace. These, therefore, increase obesity risks (Renzaho et al., 2006).

Shifts in occupation, which are partly due to urbanization and globalization, have implications for obesity rates in SSA. Urban jobs (managerial/professional, clerical etc) are

more sedentary than rural jobs (mostly agricultural), leading to drops in physical activity at work. People in urban occupation are therefore more likely to become obese (Scott, 2012). A study carried out in Cameroon indicated that obesity in men increased as jobs became more professional, with physically demanding jobs appearing to protect people from overweight and obesity (Fezeu et al., 2005). Abdulai (2010) cited in Scott (2012) found that in Ghana women who engaged in farm or garden work were significantly less likely to be overweight compared to those who were not employed. Amoah (2003b) further revealed that among housewives, professionals, managers and entrepreneurs, overweight and obesity levels were high. However, obesity levels were low among unskilled workers, farmers, fishermen and students.

Gender disparity of BMI is so prevalent that many BMI surveys do not include men, and those that include men mostly find lower male obesity prevalence (Amoah, 2003b, Biritwum et al., 2005, Alwan et al., 2010). Holdsworth et al. (2004) attributed women's higher prevalence of obesity to pregnancy and child birth. Lockwood (1995) added that in Sub-Saharan African countries, post- partum inactivity span from several weeks to as long as two years. The intake of breast milk inducing foods coupled with support and care from extended family during post-partum period reduces the physical activity levels of mothers and this increases the risk of gaining weight. Obesity is six times as common in women as in men in Ghana, in Morocco four times, and in South Africa three times as common (Pretince, 2006) .

The prevalence of obesity in urban West Africa more than doubled (114 %) over the past 15 years, and this increase in prevalence was accounted for almost entirely by women (Abubakari et al., 2008). In South Africa, Dugas et al. (2009) found that among a sample of young adults in a peri-urban settlement, about half of the women were overweight or obese but, none of the men were overweight. Also, a study in Tanzania found that women had 4.5

the odds of being obese compared to men (Njelekela et al., 2009). Also, higher rates of underweight in adult males compared with females have also been reported among black South Africans. The prevalence of obesity in South African women was almost four times that in men (Steyn et al., 1998). Again, a meta-analysis study conducted by Abubakari et al. (2008) among West African populations found women to be more likely to become obese compared to men.

Obesity has been linked to socioeconomic status in Sub-Saharan African countries, as it affects mostly higher-income groups (Amoah, 2003b; Agyei-Mensah and de-Graft Aikins, (2010). A study among seven African populations including Ghana reported that women of higher socio-economic status (household wealth and education) were more likely to be overweight or obese than their poorer counterparts (Ziraba, 2009). Fezeu et al. (2005) found a positive association between SES and BMI in Cameroon and stated that the relationship may not be true for all developing countries. A study by Mbada et al. (2009) in Nigeria found an inverse relationship between SES and BMI. Individuals in the lower SE strata had a greater BMI and a higher prevalence of overweight and obesity.

### 2.6 BMI in the Ghanaian context

The prevalence of overweight and obesity is higher among urban dwellers than in rural residents whereas underweight is higher in rural than in urban residents (Amoah, 2003b; Agyemang et al., 2008). Rural residents had lower BMI because of the high propensity of becoming manual workers with relatively high levels of job-related physical activity. On the other hand, urban dwellers engage in less physical activity but consume foods which have high calories (Amoah, 2003b). This finding in a way gives credence to the westernization and urbanization theory. Benkeser et al. (2012) added that women who spent the first 12 years of

their childhood in an urban environment were at increased risk for overweight and obesity and at decreased risk for desiring to be heavier.

In Ghana, as in much of Africa, women are disproportionately affected by obesity than men. Obesity rates among women have tripled over 15 years: from 10 % in1993 to 30.5 % in 2008 (GSS et al., 2009). Amoah (2003a) found that the prevalence of obesity in Accra women was almost four times that in males. Additionally, an obesity prevalence study conducted among the University of Ghana primary school pupils found obesity prevalence of 17.5 %, with higher prevalence among girls (19.7%) compared to boys (15.6%) (Mohammed and Vuvor, 2007 cited in MOH, 2007).

Across the country, overweight and obesity have been prevalent among older, urban married, highly educated and high income women (Dake et al., 2010). de-Graft Aikins (2010) explained that obesogenic cultures associated with pregnancy and childbirth further pose greater risk for weight gain among women in sub-Saharan Africa. Some Ghanaian women believed traditional breast milk-inducing foods, particularly palm-nut soup are fattening. New mothers also receive assisted child care from their relatives during the immediate postpartum period. This reduces their physical activity levels during the period. The regular consumption of fattening foods and decreased physical activity to a larger extent explains the excessive weight gain of women. Social pressures may partly be responsible for the increasing rates of overweight and obesity in Ghanaians. Ghanaian men generally prefer overweight and obese women to thin ones. Fatness is associated with beauty in women and success in the case of both sexes (Amoah, 2003b).

BMI also increases with age among Ghanaians. Duda et al. (2007) observed that obesity increases after age 50 until 70 years where its prevalence reaches 45.9%. Obesity prevalence

however decreases after the age of 70 years. Amoah (2003) reported that obesity increased with age up to 64 years while Biritwum et al. (2005) reported that the prevalence of obesity increased by age up to 60 years. However, Benkeser et al. (2012) stated that due to the increased risk for disease and early death in obese persons, it is likely to have fewer obese persons in the oldest age group.

There are also ethnic differences concerning BMI. For instance, a study conducted by Amoah (2003b) showed that underweight was least prevalent among the Akan ethnic group whereas overweight and obesity were highest among the Akan and the Ga. Biritwum et al. (2005) similarly found higher levels of obesity among Ga Adangbe, Ewe and Akan (14.6 %, 6.6% and 6.0 % respectively). They explained that the high obesity rates among the Ga could be due to the high carbohydrate intake and sedentary lifestyle.

### 2.7 Physical activity and BMI

The health benefits of a physically active lifestyle are well documented, and there is evidence to suggest that physical inactivity is a major risk factor for obesity (Weinsier et al., 1998). A physically active lifestyle has been shown to reduce genetic predisposition to obesity by 40 %, and thus, the risk for obesity-related diseases (Li et al., 2010 cited in Finni et al, 2011). Although physical activity is an established component in the management of many chronic diseases, its levels tend to progressively decline with increasing age (Schutzer and Graves, 2004). Appropriate physical activity is necessary at all ages for physiological fitness, that is, the capacity for everyday physical effort and movement without undue fatigue or discomfort.

Adults are advised to achieve a total of at least 30 minutes of leisure-time physical moderate activity, either in one session or in multiple sessions of at least 10 minutes duration, on five or more days of the week (150 mins per week). Moderate activity can be achieved through

walking, cycling, gardening and housework, as well as various sports and exercises (Department of Health, England, 2004 cited in The Health and Social Care Information Centre, 2012).

Regular physical activity can improve health outcomes irrespective of whether individuals achieve weight loss (Schutzer and Graves, 2004). Nonetheless, Leisure-Time Physical activity has been found to be inversely associated with obesity (Larsson et al., 2012). However, physical activity in conjunction with a healthy diet is more effective at controlling weight than either exercise or diet alone (Astrup, 1999; Macera et al., 2003).

Malinauskas et al. (2006) reported that 80 % of 185 US female college students who perceived themselves as overweight and were consciously trying to lose weight engaged in physical activity strategies. Lemon et al. (2009) also reported that Massachusetts employees used different weight control strategies such as diet, physical activity and a combination of both diet and physical activity. Fifty-one % of the employees used dietary strategies while another 51% used physical activity strategies like walking, going to a gym or fitness centre and doing other recreational activities. Forty-three % however reported using both dietary and physical activity strategies to control their weight. A study by Duncan et al. (2011) among overweight and obese US adults indicated that men who misperceived their weight were 32 % less likely to engage in physical activity or meet physical activity recommendation compared to men who accurately perceived themselves as overweight. Also, as compared to women who accurately perceived their weight, those who misperceived their weight were 26 % less likely to be physically active. They explained that people who misperceive their weights are less likely to attempt weight loss; hence more likely to engage in behaviours that increase the likelihood of experiencing weight gain.

Similarly, a study by Cheung et al. (2007) found a significant relationship between perceived weight and weight control behaviors such that individuals who perceived themselves as overweight were more likely to exercise and restrict caloric intake. Again, a qualitative study by Renzaho et al. (2012) among refugees and migrants from Africa living in Australia also reported that parents restricted their children involvement in physical activity because of the perception that being physically active will promote weight loss. Brener et al. (2004) showed that among high school adolescents in the US, overweight adolescents who did not perceive themselves as such were unlikely to engage in weight control practices like physical activity and healthier eating. This put them at risk of a higher BMI.

**2.8 Dietary behaviour and BMI**

Diet is a fundamental factor that determines health outcomes (Wang et al., 2008). Certain types of foods and eating habits such as snacking, binge-eating, and eating out can contribute to excessive weight gain and obesity (WHO / FAO (2003). Increased total caloric intake has been observed to have a direct link with development of overweight and obesity (Misra and Khurana, 2008). In view of this, Americans were advised to decrease the calories they consumed (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010).

A cross-sectional study among Dutch men and women found that individuals who perceived themselves as overweight and obese restricted the intake of caloric diets as a means of weight control (Blokstra et al. 1999). Also, Lemon et al. (2009) reported that 59 % of 899 Massachusetts employees who perceived themselves overweight and trying to lose weight used dietary strategies such as low-fat diet. Again, majority (80%) of female college students in the United States used dieting strategies such as eating or drinking low fat or fat free versions of foods/drinks for weight loss. They believed they would have increased in weight

if they had not dieted (Malinauskas et al., 2006). Likewise, a study by Fields et al. (2010) among adolescents and young female adults who wanted to reduce weight in the US reported that limiting calories, fat, or snacks and sweets together with frequent exercise resulted in significantly less weight gain. Additionally, in Ghana, 17.7 % of women who tried to decrease weight did so by eating less food or food with fewer calories (Benkeser et al., 2005).

Generally, people who were most successful at achieving and maintaining a healthy weight did so through eating of less fat and energy-dense foods and being physically active (Lowry, 2005; WHO, 2000). Excessive consumption of fat is believed to cause weight gain because it is the most energy dense macronutrient. Also, fats are often said to add greater flavour to foods, which could lead to greater consumption of fatty foods (Willett, 1998). A study by Jackson et al. (2007) in Cameroon, Jamaica and the UK showed that energy intake was positively associated with overweight in urban Cameroon; greater protein intake was also associated with overweight among men in the UK and Jamaican women, while Greater carbohydrate intake decreased likelihood of obesity among men in the UK.

Additionally, frequent consumption of sugar sweetened beverages has been noted to be associated with weight gain; sugar is full of calories but contains few nutrients (U.S Department of Agriculture, 1992). Zienczuk et al. (2012) reported that Canadian individuals who consumed high-sugar drink were at risks of having higher BMI levels. A study by Ludwig et al. (2001) among school children in four Massachusetts communities found that the odds ratio of becoming obese among children increased 1·6 times for each additional can or glass of sugar sweetened drink that they consumed every day. They explained that consumption of sugar-sweetened drinks could lead to obesity because of incomplete compensation for energy consumed in liquid form. Malik et al. (2006) similarly found significant positive associations between the intake of sugar-sweetened beverages and

overweight or obesity. According to the authors, sugar-sweetened beverages provide little nutritional benefit hence increase weight gain.

However, it is widely accepted that the consumption of fruits and vegetables are important components of a healthy diet and could prevent overweight/ obesity and a range of diseases (Agudo, 2004). He et al. (2004) found an inverse association between the intake of fruits and vegetables and risk of obesity or weight gain among middle-aged women in the US. That is, an increase in intake of fruits and vegetables lowered risk of becoming obese.

Plotnikoff et al. (2009) also found among Canadian adults that fruit and vegetable consumption was significantly lower in the obese group than in the healthy-weight groups. Eating fruits and vegetables can help both adults and children achieve and maintain a healthy or normal weight. They are generally high in water and low in fat, giving them a relatively low calorie density (kcal/g). Most fruits and vegetables are major suppliers of a number of nutrients that are under consumed, including, potassium, fibre, and vitamins A, C, and K. The World Health Organisation recommends fruits and vegetables as part of a daily diet (U.S. Department of Agriculture and U.S. Department of Health and Human Services, 2010).

Notwithstanding the above arguments, healthy diets are said to be those that are most varied. As a result, food diversity is emphasized by the Food Guide Pyramid and the United State Department of Agricultural (USDA). Dietary diversity is considered a measure of food intake and a good indicator of nutritional quality diet (Dop et al., 2008; Savy et al., 2005, Kennedy, 2009). The Food Guide Pyramid advices that the intake of food in one food group most of the time cannot provide the needed nutrients required to maintain good health and nutritional status. Consuming a wide variety of foods among and within food groups is recommended to

help ensure adequate intake of micronutrients and calories to maintain and improve one's nutritional status (FAO/WHO, 2002 cited in Kennedy, 2009; Savy et al., 2005).

Eating variety of food groups provides the energy, protein, vitamins, minerals and fibre needed for good health (USDA, 1992). According to Krebs-Smith et al. 1987 (as cited in Mirmiran et al., 2004) the consumption of different foods reduces risk of developing a deficiency or excess of any food nutrient. Consequently, dietary diversity is associated with better health especially with reference to children and adult body weight (Savy et al., 2005; Kennedy, 2009). A study in rural Western Kenya among children 12-36 months of age revealed that dietary diversity based on a count of individual foods consumed was significantly associated with weight-for-age, height-for-age, and weight for-height Body Mass Index (Onyango et al., 1998 cited in Kennedy, 2009).

Results from a study among Iranian female youth showed an inverse association of dietary diversity score (DDS) with obesity and abdominal adiposity. The probability of obesity decreased as food diversity increased. Individuals in the lowest quartile of the DDS had the highest risk for being overweight (Azadbakht and Esmaillzadeh, 2010). Similarly, a study by Savy et al. (2005) in Burkina Faso found a higher (22.8%) prevalence rate of underweight among women who belonged to the category of low dietary scores compared to those in the high dietary diversity score (9.8%).

### 2.9Theoretical framework

This study is guided by theoretical models of health behaviour change. A central theme underlying most behaviour change models is that a person needs to have favourable perception of the behavioural issue in order to make a successful behavioural change (Baronowsk et al., 2003). For example, the Knowledge-Attitude-Behavior Model also asserts

that some level of knowledge is needed to develop healthier attitudes and consequently healthy behavior change (Baronowsk et al., 2003). The Trans-theoretical Model also states that a change from pre-contemplation to contemplation stage depends on whether or not a person perceives there is a problem or need for behaviour change (Prochaska, 2002).

Another behaviour change model, the Social Cognitive Theory, is governed by perception and the desire to achieve positive outcomes and avoid negative ones. The Theory of Reasoned Action, for example, proposes that an attitude towards performing behaviour is a function of the beliefs that one holds regarding the behaviour (Fishbein and Ajzein, 1975 cited in Wang et al., 2008). Thus, individuals are more likely to display behaviour if they hold favourable attitude or perception towards performing the behaviour (Conner and Sparks, 2005 cited in Wang et al., 2008; Hale et al., 2002). The theory further emphasizes the relationship between the individual and the social world. Individual's belief and behavioural intentions are shaped by the social context in which one finds himself or subjective norms related to the behaviour. Interpretation of health may make sense in relation to a particular social and cultural context (Ogden, 1996 cited in Crossley, 2000). For instance, People's perception about their body sizes may be affected by parental and peer group influences.

## 2.10 Conceptual Framework

From the review of literature it has been observed that some socio-demographic variables including age, sex, education, marital status and place of residence have an association with BMI status (see Fig1.1)

The participation of women in physical activity is relatively low compared to men. Also, their reproductive cycle during their reproduction years increases their likelihood to be overweight or obese (Al- Nauaim et al., 1997). Therefore, females are expected to be more likely to be overweight / obese compared to males. It has been documented that as individuals mature in age, their body sizes increase (Muhihi et al., 2012). Respondents between the ages of 45-59 years are expected to have higher BMI compared to those between the ages of 15-24 years.

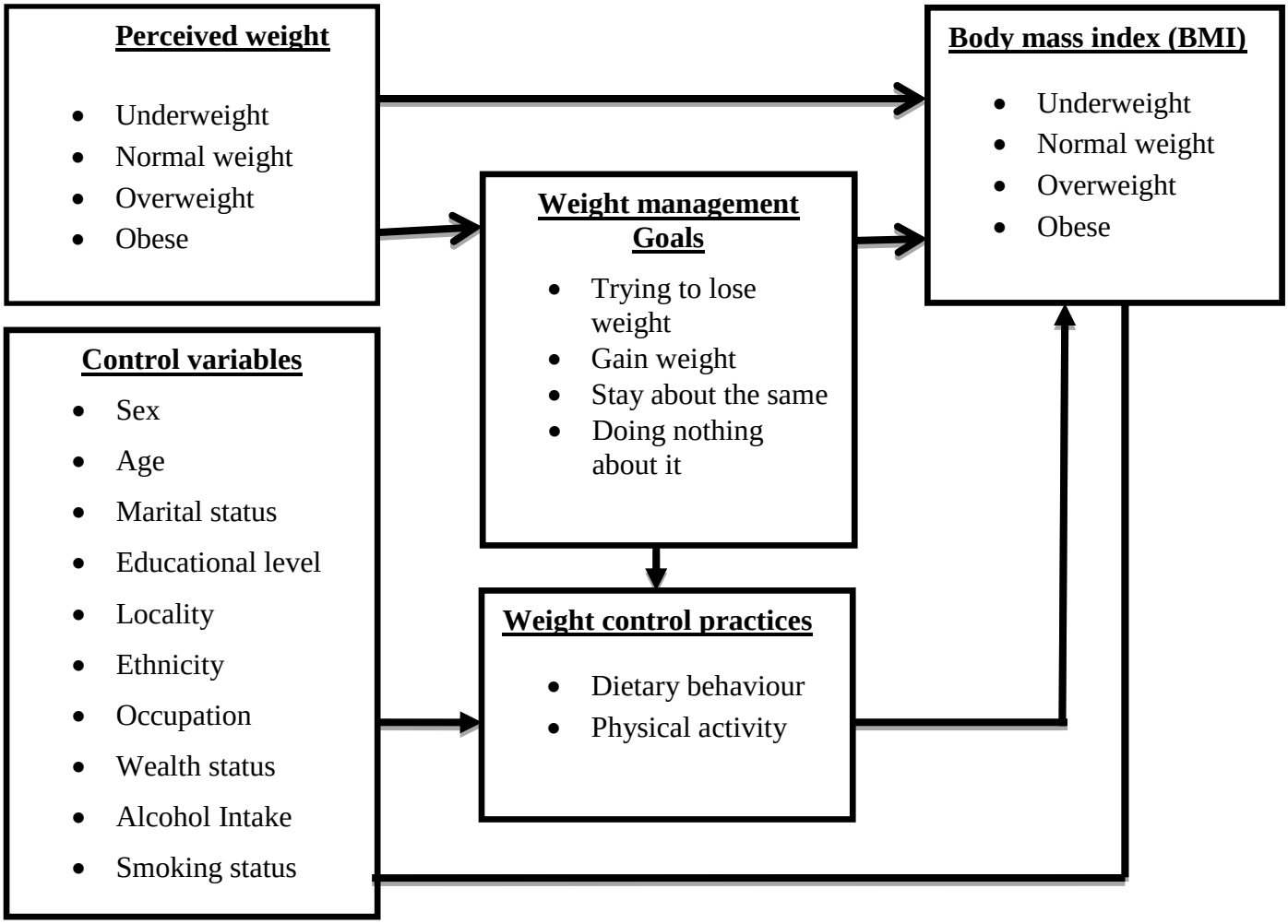
Education helps people choose healthier lifestyles by improving their knowledge of the relationships between health behaviors and health outcomes. They are capable to make better choices that affect their health (Kenkel, 1991). It is therefore expected that highly educated individuals will have normal BMI compared to those with no formal education.

With respect to marriage, Ziraba et al. (2009) argues that individuals who are obese are less likely to attract potential partners hence never married persons are less likely to be obese. Married individuals, who are no longer concerned about attracting partners, may allow their BMI to rise (Averett et al., 2008). In view of this, married individuals are expected to have higher BMIs than those never married. In Ghana, dietary practices could differ depending on the type of staple food consumed by the diverse ethnic groups. Food habits and taboos pertaining to a particular ethnic group could also affect the dietary practices of these ethnic groups. For instance, the Ga and Akan ethnic groups who consume more carbohydrate foods are expected to have high prevalence of overweight/ obesity.

Alcohol consumption is a known risk factor of obesity. Alcoholic beverages provide calories but little or no nutrient (USDA, Food Guide Pyramid). As a result, alcohol may contribute to body weight gain and development of obesity (Suter, 2005 cited in Wang et al., 2010).

It is also documented that cigarette smoking has a weight controlling effect. That is, smoking is helpful in controlling appetite and body weight. The absence of smoking or smoking cessation may result in significant weight gain (Lycett et al., 2011). It is expected in the present study that respondents who smoke will have underweight BMI compared to non-smoker

**Fig. 1.1 Conceptual framework of Perceived weight and Actual body weight**




**Source: Author's construct, 2013**

## 2.11 Research hypotheses

The study proposes the following hypotheses:

- Respondents who perceived themselves to be underweight are less likely to be underweight compared to those who perceived themselves to be normal weight.
- Males are less likely to be overweight or obese compared to their female counterparts.
- Respondents who smoke regularly are more likely to be underweight than non-smokers.

# CHAPTER THREE

## Methodology

### 3.1.1 Sources of data

The present study is a cross-sectional-quantitative work based on the second round of EDULINK Urban Health and Poverty Project. It is a population–based survey by the Regional Institute for Population Studies (RIPS), Ghana. The survey was part of a project called the Population Training and Research Capacity for Development (PopTRCD), which was a collaborative project. The data touched on a variety of issues, including health. Questions about Body Mass Index (BMI), perceptions about weight, physical activity and diet among others were asked.

### 3.1.2 Study Population

The survey is a cross-sectional data collected among three urban poor communities located in Accra (capital town of Ghana). The study communities are: James Town, Ussher Town and Agbogbloshie. James Town and Ussher Town are large neighbourhoods of Ga-Mashie area of Accra. Ga mashie is made up of people around the beach and extends inland to cover areas such as James Town, Ussher Town, Adedenkpo and Old Fadama. It is populated mainly by traders and fishers and most of the inhabitants are in the lower-socioeconomic group. The indigenous people of Ga Mashie are Ga-Dangme which is an ethnic group in the Greater Accra Region of Ghana (Gocking, 2005). Agbogbloshie community is also a suburb of Accra which has one of the largest markets in the Accra metropolis area. It is a migrant community with people from the various regions of Ghana residing in the community; it is basically a multi-ethnic community. Agbogbloshie is a densely populated community with structures

ranging from wooden kiosks to block houses. It is bordered to the north by Graphic Road, south by the squatter community of old Fadama, west by the Korle Lagoon and East by Accra Railway Corporation.

### 3.1.3 Sampling Design

The sample was drawn from 29 enumeration areas (EAs), each with 40 households making up a total sample size of 1160 households spread across the three communities. There were eight EAs from James Town, sixteen from Ussher Town and five from Agbogbloshie. The number of EAs in each locality was proportionate to the population size of that locality. In each household chosen, the head of the household responded to the household questionnaire after informed consent was obtained. Individual questionnaires were administered to females between the ages of 15- 49 and males between the ages of 15- 59. The data were collected using an interviewer-administered questionnaire.

### 3.1.4 Sample size

A total sample of 974 individuals was eligible to be interviewed for the individual questionnaire but only 700 respondents whose anthropometric measurements were taken from the sample of the study.

### 3.1.5 Definition of term

***Perception*** is an idea, a belief or an image you form as a results of how you can see or understand something (Oxford Dictionary, 2013)

### 3.1.6 Categorization of variables

*Perceived weight*

The perception people had about their weight was assessed using Duda et al's (2007) culturally adapted prototype Figural Stimuli for Ghanaian women and men. The body images were developed using computerized body morph assessment tools (Adobe Photoshop and Abrosoft Fanta Morph3). The Duda et al's figural stimuli consist of a series of 12 silhouette images of men and women whose weight ranges from extremely thinness to morbidly obese. The following question was asked to ascertain the perception respondents had about their current weight. ''How do you perceive your weight?" Using the numerical responses to the question, a four-category variable of the various BMI measures (underweight, normal weight, overweight and obese) was created based on the various cut-off points. Figural stimuli with numerical values 1-3 constituted underweight, images 4, 5 and 6, normal weight, 7 and 8-overweight while 9, 10, 11 and 12 constituted obese category (see Appendix C).

**Intermediate variables**

Weight management goals (trying to lose weight, gain weight, stay about the same or doing nothing about it) and weight control practices (dietary behaviour and physical activity) were used as intermediate variables. Respondents were asked "are you now trying to lose weight, gain weight, stay about the same or you are not trying to do anything about your weight?" Options given were: Lose weight, Gain weight, Stay about the same and do nothing. The same categorization was used for the present study.

Weight control practices include dietary behaviour and physical activity; these were also used as intermediate variable. In relation to dietary behaviour, dietary diversity score was

used as a measure of food quality. Dietary diversity score is a measure of food consumption which looks at individuals' access to a variety of foods. It does not take into consideration the quantity or portion sizes as well as the frequency of food consumed. Besides, no additional score is given if food is eaten more than once within the 7 days (Kennedy et al., 2010; Kennedy, 2009**).** In the present study, a total of 82 food items which were grouped into 9 categories, namely: Starchy foods, Pulses, milk and diary, egg, meat and fish, fruits, vegetables, fat and oils, sugar and sugary foods. If an item in a food list is consumed, a score of 1 is given; otherwise a score of 0 is assigned. All food items that had a score of 1 were considered to have a score of 1 in a particular food group, otherwise a score of 0. The scores of each food group were added together to obtain a final dietary diversity score. For instance, a respondent who ate all the food groups had a dietary diversity score of 9.

**Food Item Score (FIS)**
- 1, if consumed
- 0, otherwise

**Food Group Score (FGS**)
- 1, if food item is consumed
- 0, otherwise

**Dietary diversity score** $=\sum_{n=1}^{9} food\ groups$

It is documented that there are no established cut-off points of number of food groups that indicate adequate or inadequate dietary diversity for both Household and Individual Dietary

Diversity Scores. Therefore, it is recommended that the mean score or distribution of scores for analytical purposes be used (Kennedy et al., 2010; Azadbakht, and Esmaillzadeh, 2010). As a result, diet was categorised into two: low dietary diversity score and high dietary diversity score based on a mean score of 7. Food groups below the mean score of 7 were termed low dietary diversity score while those who consumed 7 and above 7 food groups were considered as having high dietary diversity score.

Leisure-time physical activity was measured using the question "how much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?'' Two categories were created for the purpose of the present study

*Physically active*: Respondents who undertook moderate physical activities ≥ 30mins in a day

*Physically inactive*: Respondents who did not exercise at all and those who undertook ≤ 30mins of moderate physical activity.

**Control Variables**

It has been observed by researchers that certain characteristics of an individual contribute greatly to the disparity in the prevalence of body weight (Amoah, 2003b). Among the variables controlled for in the present study included: age, sex, marital status, locality of residence, educational level, type of occupation, ethnic group, wealth status, alcohol consumption and smoking status. Respondents were classified into ten year aged groups to help ascertain the effect of each age group on the dependent variable. That is, 15-24years , 25-34 years and 35-44 years and 45-59 years. Male and females respondents were also compared. Marital status was classified as not in union, currently married, living together and separated/divorced/widowed.

Education was categorised as no formal education, primary education, middle/JHS, secondary/ SHS and higher education. Respondents were categorised in relation to their locality of residence (Agbogbloshie, James Town and Ussher Town) and also grouped into four ethnic groups- Akan, Ga Danbge, Ewe, Mole Dagbani and other tribes. Ethnic affiliation was used as a proxy to measure respondents' cultural traits. With respect to type of occupation, there were five categories- No occupation, Professional/clerical/managerial, Sales and services, agricultural and manual work. Wealth quintile was categorised as- poorest, poorer, average, rich and richest.

Alcohol consumption was measured based on the pattern of consumption. The following questions were asked ***a.*** Have you ever consumed a drink that contains alcohol (such as beer, wine, spirits, etc.)? Responses were *"yes"* and *"no"*. Another question followed an affirmative answer: ***b.*** Have you consumed alcohol in the last 30 days? Responses were *"yes"* and *"no"*. Another question followed when another affirmative answer was given ***c.*** if they had consumed alcohol in the last 24 hours (using the day and time of the interview as the reference period), responses were *"yes"* and *"no"*.

Alcohol consumption was therefore categorised in this study as follows:

i. *Regular drinkers:* Respondents who said *"yes"* to *a.*, *"yes"* to *b.* and *"yes"* to *c.*
ii. *Occasional drinkers:* Respondents who said *"yes"* to *a.*, *"yes"* to *b.* and *"no"* to *c.* and those who said *"yes"* to *a.*, and *"no"* to *b.*)
iii. *Non-drinkers:* Respondents who answered *"no* "to *a.*

Finally, smoking status was determined with the following questions: ***a***. Have you ever smoked tobacco or used smokeless tobacco? Responses were *"yes"* or *"no"*. An affirmative response called for a follow up question. ***b***. Do you currently use (smoke, sniff or chew) any tobacco products such as cigarettes, cigars, pipes, chewing tobacco or snuff? The responses

were as follows; *"yes, daily" "yes, but not daily"* and *"no"*. In this study therefore, smoking status was categorised as:

i. *Regular smokers*: Respondents who said *"yes"* to *a.* and *"yes, daily"* to *b.*

ii. *Occasional smokers:* Respondents who said *"yes"* to *a.* and *"yes, but not daily"* to *b.*

iii. *Former-smokers:* Respondents who said *"yes* "to *a.* and *"no"* to *b.*

iv. *Non-smokers:* Respondents who said *"no"* to *a.*

**Dependent variable**

*Body Mass Index*

The variable BMI was determined from the weight and height measurements of respondents. It was computed by dividing the weight in kilograms by height in meters squared ($kg/m^2$) using the WHO cut off point (WHO, 2004):

I. Underweight ($<18.5 kg/m^2$)

II. Normal weight ($18.5 kg/m^2 – 24.9 kg/m^2$)

III. Overweight ($25 kg/m^2 – 29.9 kg/m^2$)

IV. Obese ($\geq 30.0\ kg/m^2$)

Mathematically, BMI= weight (kg) / height ($m^2$).

### 2.1.7 Method of Analysis

Frequencies and percentages were first used to describe the characteristics of the respondents. Cross tabulations and chi-square tests were used to establish the association between the independent, intermediate and dependent variables. All associations with P values less than 0.05 ($p< 0.05$) were considered significant under a 95% significance level. Likewise those with P values less than 0.01 ($p< 0.01$) and $p< 0.100$ were classified to be significant at 99% and 90% significance respectively. A multinomial logistic regression analysis was carried out

to determine the net effect of the background characteristics and intermediate variables on the dependent variable. Statistical Package for Social Sciences (SPSS) version 17.0 was used for the analysis.

### 3.1.7 Multinomial logistic regression

Multinomial logistic regression involves nominal response variables more than two categories. Multinomial logit models are multi-equation models, a response variable with k categories will generate k-1 equations. Each of these k-1 equations is a binary logistic regression comparing a group with the reference group. To interpret the model, any one of the β's for each covariate is arbitrarily set to zero. The remaining coefficients measure the change relative to the group set as the reference. Since the dependent variable has three categories, there will be two possible logits in this analysis. The other logit (reference category) is compared to each category in the regression model. In the present study, normal weight was assigned as reference category to the dependent variable.

A number of statistical measures including the coefficients of the parameters were produced after the multinomial regression model was fitted. The Nagelkerke $R^2$ indicates the proportion of the variation in BMI which is explained by the regression model. The Wald test was used to test the significance of individual regression coefficient for each category of the independent variable. The parameter is considered significant if the p-value of any coefficient is less than 0.01, 0.05 and 0.10. The beta values show the log odds of a variable being in a particular category rather than the reference category. A variable with a negative beta value tells that a member of that category is less likely to experience the outcome being considered in the reference category. On the other hand, if a beta value is positive, then a member of that category is more likely to experience the outcome than the reference category for that variable.

### 3.2 Limitations of the study

One of the limitations of the study is its cross-sectional nature. This does not allow inferences to be drawn with respect to the causal relationships among variables. The actual BMI measurements of respondents were taken shortly after asking them about the perceptions of their weight. This makes it difficult to conclude that the perceptions they had about their weight translated into their actual body weight. A longitudinal study is best needed to infer such causality.

Secondly, in the study of perceptions about body weight using social cognitive models which is one of the behaviour change model explains the cultural or societal norms of body weight. Data on the cultural norms is lacking in this study. This could have highlighted the individual's belief and behavioural intentions that are shaped by the social context in which one lives or cultural norms related to the behaviour and hence giving a holistic understanding of the dynamics in the associations.

# CHAPTER FOUR

## Socio-demographic characteristics of the study population

### 4.1 Introduction

The Body Mass Index (BMI) of an individual, to a large extent, is determined by demographic and socio-economic variables. A description of such characteristics is important for analyses. The characteristics considered in this study are sex, age, level of education, locality of residence, occupation, ethnicity, smoking status and alcohol intake.

### 4.2 Sex of respondents

Several studies have shown that BMI varies by sex of individuals **(**WHO, 2011; Amoah, 2003b, Biritwum, 2005; Pretince, 2006). The result presented in Table 4.1 shows that more females (54%) were interviewed compared to males (46%), hence there were more females than males. This is consistent with the sex distribution of the population of Ghana (GSS, 2009). It is expected that since the population has more females and females have higher prevalence of obesity, the proportion of overweight or obesity will be higher among females.

**Table 4.1: Percentage distribution of respondents by Sex**

| Sex of respondents | Frequency | Percentage |
|---|---|---|
| Males | 325 | 46.4 |
| Females | 375 | 53.6 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.3 Age of respondents

The age at which a particular event takes place is mostly important hence forms the basis of demographic classifications and mostly determines the population structure. For instance, BMI is said to be related to a specific stage of life. The mean age of respondents is 31 years; this indicates that averagely respondents are young adults (25-34years) age groups, hence the population is youthful. A third (33.9%) of the respondents was aged between 15-24 years while 30.9% were aged between 25-34 years. one out of every five (20.6%) of them was aged between 34-44 years. Also, 14.7% were between the age group 45-59 years. Since BMI increases with age, the study population may have at least a third being overweight or obese.

**Table 4.2: Percentage distribution of respondents by Age**

| Age of respondents | Frequency | Percentage |
|---|---|---|
| 15-24 | 237 | 33.9 |
| 25-34 | 216 | 30.9 |
| 35-44 | 144 | 20.6 |
| 45-59 | 103 | 14.7 |
| **Total** | **700** | **100.0** |
| **Mean age=31 years** | | |

Source: EDULINK DATA, 2011

### 4.4 Highest level of education attained

Formal education is said to be one of the media that greatly influence the attitudes and behaviors of people (Anyanwu et al., 2010). It offers to people a view of the world that expands their horizon beyond the boundaries of traditional society. It also causes people to reassess and re-evaluate issues (Caldwell, 1980) including health-related behaviours.

Generally, the highest levels of education attained by the majority (70%) of the respondents are Middle/Junior High School and Secondary/ Senior high School. Almost one out of every five (19%) of the respondents had completed Primary school, 5% had attained higher education while 6% had no formal education. Respondents with higher education are expected to have normal BMI. Education increases people's ability to select a healthy diet, avoid unhealthy habits and make efficient use of medical care. This positively affects their BMI (Kemna, 1987 cited in Devaux et al., 2011).

**Table 4.3: Percentage distribution of respondents by level of education**

| Level of education | Frequency | Percentage |
|---|---|---|
| No education | 40 | 5.7 |
| Primary | 134 | 19.1 |
| Middle/JHS | 311 | 44.4 |
| Sec/SHS | 182 | 26.0 |
| Higher | 33 | 4.7 |
| **Total** | **700** | **100** |

Source: EDULINK DATA, 2011

### 4.5 Marital status

Marriage provides social support and financial resources that promote health by providing access to better nutrition and health care (Waldron et al., 1996). The distribution in Table 4.4 illustrates that 42% of the respondents were not in any kind of marital union. About a quarter (23%) of them was currently married while about one fifth (19%) was co-habiting. Also, 16% were formerly married (divorced, widowed or separated). It is expected of respondents who are never married to have normal body sizes since they may be in the process of attracting partners and be concerned about their body sizes.

**Table 4.4: Percentage distribution of respondents by marital status**

| Marital status | Frequency | Percentage |
|---|---|---|
| Never married | 292 | 41.7 |
| Currently married | 161 | 23.0 |
| Living together | 134 | 19.1 |
| Widow/divorced/separated | 113 | 16.1 |
| **Total** | **700** | **100** |

Source: EDULINK DATA, 2011

### 4.6 Locality of residence

The respondents were interviewed in three localities: Agbogbloshie, James Town and Ussher Town. The locality of the respondents is considered an important variable in the present study because they vary geographically by economic activity and level of development. Almost half (49%) of the respondents resides in Ussher Town while a third (34%) lived in James Town. Less than one-fifth (17%) of the respondents were in Agbogbloshie.

**Table 4.5: Percentage distribution of respondents by Locality of residence**

| Locality | Frequency | Percentage |
|---|---|---|
| Agbogbloshie | 118 | 16.9 |
| James Town | 237 | 33.9 |
| Ussher Town | 345 | 49.3 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.7 Ethnic background of respondents

Ethnicity is also an important characteristic to consider in this study because each ethnic group has cultural practice that can influence the lifestyle of an individual and subsequently his/her health. The ethnic distribution shown in Table 4.6 shows that more than half (58.6%) of the respondents belonged to the Ga Dangme ethnic group .This was expected since residents of Ga Mashie (James Town and Ussher Town) who constituted a larger proportion of the study population are mostly Ga. While respondents who belong to the Akan ethnic group constituted 26.4%, 4.7% were Ewe. Those who belonged to Mole-Dagbani ethnic group constituted 2.6% while 7.4% were from other tribes in Ghana.

**Table 4.6: Percentage distribution of respondents by ethnic background**

| Ethnic group | Frequency | Percent |
|---|---|---|
| Akan | 185 | 26.4 |
| Ga Dangme | 410 | 58.6 |
| Ewe | 33 | 4.7 |
| Mole-Dagbani | 20 | 2.9 |
| Other Tribe | 52 | 7.4 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.8 Occupation

An individual's occupation may serve as a proxy for income status which in turn can also affect the quality of life and health status. The type of occupation also influences the level of physical activity in a typical day and consequently one's body weight. It can be seen from Table 4.7 that 42% of the respondents were sales and service workers, while a little above one quarter (27%) were manual workers. Slightly more than, 1 out of every 5 of them (21%) were not working. About 9% were managers/clerks/professionals (white colour jobs) while 1.6% were agricultural workers. Those who engage in white colour jobs (managers/clerks/professionals) are expected to have overweight or obese BMI since their work is sedentary and involves less vigorous activities.

**Table 4.7: Percentage distribution of respondents by occupation**

| Occupation | Frequency | Percent |
|---|---|---|
| No occupation | 145 | 20.7 |
| Prof/Manage/Clerical | 60 | 8.6 |
| Sales and Service | 295 | 42.1 |
| Agriculture | 11 | 1.6 |
| Manual work | 189 | 27.0 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.9 Wealth status

Socio-economic status is an important variable used in demographic analysis. It is determined by a combination of factors such as type of employment and a person's income level among others. Table 4.8 illustrates that there was a fair distribution of subjects in the poorer, middle and richer categories. A little above one out of every five (21.6% and 21.4% respectively) subjects was in the poorer and richer categories. Also, one out of every five (20.1%) subjects was in the middle category while 19.4% was in the richest category.

**Table 4.8: Percentage distribution of respondents by wealth status**

| Wealth status | Frequency | Percent |
|---|---|---|
| Poorest | 122 | 17.4 |
| Poorer | 151 | 21.6 |
| Average | 141 | 20.1 |
| Average | 150 | 21.4 |
| Richest | 136 | 19.4 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.10 Alcohol Intake

Alcohol is one of the main risk factors of obesity hence its importance to the study. Persons who occasionally drink alcohol (Beer, spirits, wines, homebrews etc.) constituted 45.1%. A little over a third of them (37.4%) had never drank alcohol while 17.4% were regular drinkers of alcohol. It is expected that alcohol users will record higher percentages of overweight or obesity. This is because intake of alcohol can affect an individual's ability to evaluate the costs and benefits of behaviors such as eating and exercise that affect weight status (Field et al., 2010).

**Table 4.9: Percentage distribution of respondents by alcohol Intake**

| Alcohol Intake | Frequency | Percent |
|---|---|---|
| Regular drinkers | 122 | 17.4 |
| Occasional drinkers | 316 | 45.1 |
| Non-drinkers | 262 | 37.4 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.11 Smoking status

Many studies suggest that the more frequent one smokes, the higher the nicotine level in the blood and thus may lower the BMI (Chhabra and Chhabra, 2010). The distribution of smoking status in Table 4.10 depicts that most (83.1%) respondents had never smoked or used smokeless tobacco. One out of every ten (10.7%) of them were occasional smokers: they smoke but not on a daily basis. About 4% of the respondents were former smokers while almost 2.6% of them were regular smokers who smoked on a daily basis. It is expected

that the proportion of the respondents whose BMI may be affected by their smoking may not be substantial.

**Table 4.10: Percentage distribution of respondents by smoking status**

| Smoking status | Frequency | Percent |
|---|---|---|
| Regular smokers | 18 | 2.6 |
| Occasional smokers | 75 | 10.7 |
| Former smokers | 25 | 3.6 |
| Non-smokers | 582 | 83.1 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.12 Perceived weight

The respondents in the study population perceived their weights differently. As can be seen from Table 4.11, more than half (52%) of respondents perceived themselves as normal weight, a little over a quarter (26%) considered themselves as being overweight, 12% perceived themselves as obese and 9% perceived themselves as underweight. There may be an agreement between respondents' perceived weight and the actual body weights.

**Table 4.11: Percentage distribution of respondents by perceived weight**

| Perceived body weight | Frequency | Percent |
|---|---|---|
| Underweight | 63 | 9.0 |
| Normal | 366 | 52.3 |
| Overweight | 184 | 26.3 |
| Obese | 87 | 12.4 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.13 Weight management goals

The results presented in Table 4.12 show that more than one third (35.9 %) of the respondents wanted to stay about the same weight while a third (33.7%) did nothing about their weight. Also, 16% and 14% respectively wanted to lose and gain weight.

**Table 4.12: Percentage distribution of respondents by weight management goals**

| Weight management goals | Frequency | Percent |
|---|---|---|
| Lose weight | 112 | 16.0 |
| Gain weight | 101 | 14.4 |
| Stay about the same | 251 | 35.9 |
| Do nothing | 236 | 33.7 |
| **Total** | **700** | **100.0** |

Source: EDULINK DATA, 2011

### 4.14 Physical activity levels of respondents

Leisure-Time Physical activity is part of an overall weight management strategy. As shown in Table 4.13, the study population is generally physically inactive. More than four-fifth (91%) indicated that they were physical inactive. They were either involved in leisure-time physical activity for less than 30 minutes or not involved at all. Nonetheless, about 9% were physically active; that is about 1 out of every 10 of them engaged in leisure time physical activity. Physically active respondents are expected to have a normal BMI. This is because physical activity contributes to burning of excess fat.

**Table 4.13: Percentage distribution of respondents by physical activity**

| Physical activity | Frequency | Percent |
|---|---|---|
| Physically active | 63 | 9.0 |
| Physically inactive | 637 | 91.0 |
| **Total** | **700** | **100.0** |

Source: EDULINK Data, 2011

### 4.15 Dietary Behaviour

Diet is a key factor that determines many health outcomes (Wang et al., 2008). Dietary diversity is a good indicator of nutritional quality diet and health, especially children and adult's body weight (Dop et al., 2008; Savy et al., 2005, Kennedy, 2009). About three-quarters (74%) of the respondents belong to the category of high dietary diversity score: this means that they had good dietary behaviour. A little over a quarter (26%) of them had low dietary diversity score. It is expected of respondents who had high dietary diversity score to have normal BMI since diversity of food is a representation of diet quality and good health.

**Table 4.14: Percentage distribution of respondents by dietary diversity score**

| Dietary diversity score | Frequency | Percent |
|---|---|---|
| High dietary diversity score | 520 | 74.3 |
| Low dietary diversity score | 180 | 25.7 |
| **Total** | **700** | **100.0** |

Source: EDULINK Data, 2011

The various food groups consumed by the respondents can be seen in Appendix A. Almost all respondents (99.9%) had eaten starchy foods. The food group which was less consumed was pulses. Some of these food groups are noted to be associated with obesity. For example, increased fat intake has been observed to have a direct link with development of overweight and obesity (Misra and Khurana, 2008).

### 4.16 Actual Body Mass Index (BMI)

The weight and height measurements enabled the categorization of the respondents by BMI categories. These categories are in accordance with WHO standard measurements for BMI. The proportion of the respondents according to the actual BMI categories can be seen from Table 4.15. Generally, the mean BMI of the respondents is 25.7kg/$m^2$; this indicates that the study population is averagely overweight. However, more than one- half (54%) of them had normal body size, while a little over 1 out of every 5 (21%) was overweight. A little less than 1 out of every 5 (18%) is obese and 7% is underweight. This conforms to the findings of Amoah (2003) which indicates that under-nutrition coexists with over-nutrition in urban poor communities (Amoah, 2003b).

**Table 4.15: Percentage distribution of respondents by BMI status**

| BMI status | Frequency | Percent |
|---|---|---|
| Underweight | 49 | 7.0 |
| Normal | 379 | 54.1 |
| Overweight | 148 | 21.1 |
| Obese | 124 | 17.7 |
| **Total** | **700** | **100.0** |
| **Mean BMI=25.70 Kg/m$^2$** | | |

Source: EDULINK DATA, 2011

# CHAPTER FIVE

## Socio-demographic characteristics and Body mass index

### 5.1 Introduction

Variations in body mass index (BMI) statuses are related to some socio-demographic characteristics of individuals. Modifiable risk factors (MRFs) such as physical activity and dietary practice also play a role in the variations in BMI statuses. However, some socio-demographic characteristics also relate with these MRFs. The association of these MRFs with BMI and the socio-demographic characteristics with these risk factors, using cross tabulation were explored in this chapter. All associations with P values less than 0.05 ($p< 0.05$) were considered significant under a 95% significance level. Also, those with P values less than 0.01 ($p< 0.01$) and $p< 0.100$ were classified to be significant at 99% and 90% significance respectively.

### 5.2 Sex of respondents and BMI

It is evident from Table 5.1 that the prevalence rate of overweight and obesity is higher among females than males. On the other hand, the prevalence rate of underweight is higher among males than females. About a quarter of the females were overweight (25%) and about a third (29.1%), obese. On the other hand, 8% of men were underweight. A far larger (70%) proportion of men had normal body weights compared to the proportion of females (40.3%). This relationship is statistically significant ($p=0.000$) and similar to findings from WHO (2011); Pretince (2006) in developing countries; Abubakari et al., 2008 in West Africa; Njelekela et al., 2009 in Tanzania; Steyn et al.(1998) in South Africa; Amoah (2003) and Dake et al. (2010) in Ghana. The authors found women to be more likely to become obese

compared to men. de-Graft Aikins (2010b) explained that obesogenic cultures associated with pregnancy and childbirth increase the risk of obesity among women in Ghana. Some women believed that traditional breast milk-inducing foods, particularly palm-nut soup, are fattening. Therefore, consumption of such foods constitutes an obesogenic risk for women in their reproductive years.

**Table 5.1: Percentage distribution of respondents by sex and BMI**

| Sex of Respondents | Actual BMI (%) | | | | Total No. |
|---|---|---|---|---|---|
| | Underweight | Normal Weight | Overweight | Obese | |
| Males | 8.0 | 70.2 | 17.2 | 4.6 | **325** |
| Females | 6.1 | 40.3 | 24.5 | 29.1 | **375** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| | **$\chi^2$ value = 92.744** | **df= 3** | | **P=0.000** | |

Source: EDULINK data, 2011

### 5.3 Age and BMI

As age increases, the proportions overweight and obese also increase while that of normal weight decreases. The proportion underweight also decreases up to aged 35-44 years but increases among those between the age group 45-59 years. For example, the prevalence of overweight is low (11.4%) among respondents aged 15-24 years than those aged 35-44 years. On the other hand, the proportion underweight is higher among respondents within the age group 15-24 years compared to those aged 35-44 years (2.8%). The association between age of the respondents and BMI is statistically significant (p=0.000). This finding conforms to those done among African American girls by Boyington (2008); West African populations by

Abakhail et al. (2002) and Ghanaians by Biritwum et al. (2005) and Amoah (2003) who also found that body weight increases with age. Tufano et al. (2004) attributed this to effect of parity and postmenopausal status of older women. Also, at older age, there is a probability to engage in less vigorous activity and hence an increased risk for overweight and obesity (Schutzer and Graves, 2004).

**Table 5.2: Percentage distribution of respondents by age and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Age groups of respondents** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| 15-24 | 11.8 | 68.8 | 11.4 | 8.0 | 237 |
| 25-34 | 5.1 | 57.9 | 19.4 | 17.6 | 21 |
| 35-44 | 2.8 | 36.1 | 33.3 | 27.8 | 144 |
| 45-59 | 5.8 | 37.9 | 30.1 | 26.2 | 103 |
| Total | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| **$\chi^2$value = 86.453** | | **df= 9** | | **P value= 0.000** | |

Source: EDULINK data, 2011

### 5.4 Highest level of education and BMI

Overweight and obesity levels decrease as level of education increases. Obesity was less (9.1%) prevalent among respondents with higher education while the prevalence was higher (28.4%) among those with primary education. Similarly, overweight was less (15.2%) prevalent among persons with higher education but more (32.5%) prevalent among those with no formal education. A higher proportion (64.3%) of individuals who had secondary education was normal weight compared to those with primary education (40.3%). The proportion with higher education underweight was higher (12.1%) than those with primary education (4.5%). This implies that, urban poor respondents of lower educational status are

more likely to be overweight or obese compared to those with higher education. The relationship between level of education and body mass index was statistically significant (p=0.001). Kemna (1987) (cited in Devaux et al., 2011) explained that education increases people's ability to select a healthy diet and avoid unhealthy habits. This positively affects their BMI. Also, the attainment of higher education is associated with higher income. Higher income subsequently gives an individual the ability to purchase and consume healthy food and hence the possibility of them eating Healthy.

**Table 5.3: Percentage distribution of respondents by level of education and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Highest level of education** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| No education | 7.5 | 45.0 | 32.5 | 15.0 | **40** |
| Primary | 4.5 | 40.3 | 26.9 | 28.4 | **134** |
| Middle/JHS | 7.1 | 54.3 | 20.9 | 17.7 | **311** |
| Sec/SHS | 7.7 | 64.3 | 15.9 | 12.1 | **182** |
| Higher | 12.1 | 63.6 | 15.2 | 9.1 | **33** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |

**$\chi^2$ value = 32.761 df= 12 P value =0.001**

Source: EDULINK data, 2011

### 5.5 Marital status and BMI

The prevalence rate of underweight and normal weight was higher among respondents never married. Also, overweight and obesity prevalence was respectively higher among respondents currently married and those formerly married. Among currently married respondents, one out of every fifty (2%) of them was underweight while a third (33 .5%) was overweight. This

indicates that married couples are at a risk of having an increase in a body size. On the other hand, two thirds (67.1%) of those who were never married had normal BMI compared to those currently married (44.7%). About twice (10%) the proportion of currently married respondents (20%) who were obese were never married respondents. Marital status statistically had a significant association with BMI (P= 0.000). This means that a respondent's marital status can determine their body weight. These findings are consistent with those by Poluru and Mukherjee (2010) in India; Jeffery and Rick (2002) in U.S.A and Biritwum et al. (2005) in Ghana who found that obesity was more common among married than unmarried women.

The relationship between marital status and BMI can be explained as follows: Marriage increases cues and opportunities for eating; married people tend to eat together hence reinforce each other for increased intake of foods (Jeffery and Rick, 2002).

**Table 5.4: Percentage distribution of respondents by marital status and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Marital status** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| Never married | 12.0 | 67.1 | 11.3 | 9.6 | **292** |
| Currently married | 1.9 | 44.7 | 33.5 | 19.9 | **161** |
| Living together | 4.5 | 50.0 | 22.4 | 23.1 | **134** |
| Formerly married(W/D/S) | 4.4 | 38.9 | 27.4 | 29.2 | **113** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| **$\chi^2$ value = 84.949** | | **df= 9** | **P value=0.000** | | |

Source: EDULINK data, 2011

### 5.6 Locality and BMI

Generally, the prevalence rate of overweight and obesity was higher among respondents of Ussher Town. On the hand, the prevalence rate of normal weight was higher among residents of Agbogbloshie. While more than half (60%) of the residents in Agbogbloshie were normal weight, 23.7% was obese. Residents in Ussher Town had a higher proportion of underweight respondents (7.5%). Obesity was more prevalent (20%, 18.1% respectively) among residents of Ussher Town and James Town compared to residents of Agbogbloshie (10.2%). Residents of James Town and Ussher Town are mostly indigenous Ga and so have similar cultural traits. These cultural traits are related to the similar types of diets and cultural behaviours peculiar to them, hence, the higher levels of obesity.

**Table 5.5: Percentage distribution of respondents by locality and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Locality** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| Agbogbloshie | 5.9 | 60.2 | 23.7 | 10.2 | **118** |
| James town | 6.8 | 55.3 | 19.8 | 18.1 | **237** |
| Ussher Town | 7.5 | 51.3 | 21.2 | 20.0 | **345** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |

**$\chi^2$ value = 7.116 df= 6 P value=0.310**

Source: EDULINK data, 2011

### 5.7 Ethnicity and BMI

The distribution of ethnicity in Table 5.6 shows that about three-quarters (70%) of respondents who belonged to Mole Dagbani ethnic group were normal weight while none was underweight. Mole Dagbani respondents constituted the least percentage (10%) in the obese category. The proportion overweight was higher (24.3%) among respondents who belonged to the Akan ethnic groups while the prevalence rate of obesity was higher (21.2%) among those who belonged to other tribes in Ghana. This is similar to studies by Amoah (2003b) and Biritwum et al. (2005) which indicate that underweight is less prevalent among the Akan ethnic group while overweight and obesity were highest among the Akan and Ga. The relationship is however not significant (P=0.429).

**Table 5.6: Percentage distribution of respondents by ethnicity and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Ethnicity** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| Akan | 6.5 | 55.1 | 24.3 | 14.1 | **185** |
| Ga Adangme | 7.3 | 52.9 | 20.2 | 19.5 | **410** |
| Ewe | 15.2 | 57.6 | 12.1 | 15.2 | **33** |
| Mole Dagbani | 0.0 | 70.0 | 20.0 | 10.0 | **20** |
| Other | 3.8 | 51.9 | 23.1 | 21.2 | **52** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |

**$\chi^2$ value = 12.299 df= 12 P value =0.422**

Source: EDULINK data, 2011

### 5.8 Occupation and BMI

Basically, the prevalence rate of overweight and obesity was higher among sales and service workers. The proportion of normal weight was also higher (69.7%) among respondents with no occupation. More than a tenth (14%) of unemployed persons was underweight while none of agricultural workers was underweight. Obesity was less prevalent among unemployed respondents and agricultural workers compared to other types of occupation. The prevalence of obesity was also less among agricultural workers because agricultural workers in Ghana perform manual tasks, farmers walk to their farms and are therefore not at risk of overweight or obesity as much as those doing sedentary work. The relationship between type of occupation and BMI is statistically significant (p= 0.000). This means that one's occupational status has an influence on his/her body weight; because of the nature of the work, which may either be sedentary or vigorous in nature.

**Table 5.7: Percentage distribution of respondents by occupation and BMI**

| | **Actual BMI (%)** | | | | |
|---|---|---|---|---|---|
| **Types of occupation** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| No occupation | 13.8 | 69.7 | 7.6 | 9.0 | **145** |
| Prof/Manage/Clerical | 8.3 | 61.7 | 16.7 | 13.3 | **60** |
| Sales/services | 4.1 | 41.7 | 27.8 | 26.4 | **295** |
| Agriculture | 0.0 | 63.6 | 27.3 | 9.1 | **11** |
| Manual work | 6.3 | 58.7 | 22.2 | 12.7 | **189** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| | **$\chi^2$ value =73.043** | **df=12** | **P value =0.000** | | |

Source: EDULINK data, 2011

### 5.9 Wealth status and BMI

In general, the prevalence rate of obesity was fairly distributed amongst respondents in both lower and higher socio-economic status. Almost the same proportions (19.7%, 19.1% and 19.1% respectively) in the poorest, middle and richest categories were obese. The prevalence rate of overweight was higher (24.3%) among respondents in the richest category of wealth than those in the poor category. Underweight was higher (9.9%) among respondents with average wealth status compared to other categories of wealth status. While the proportion of normal weight was higher (57.0%) among respondents who belonged to the poorer category of wealth status, it is lower among those who belonged to the average wealth status. This shows that obesity is not a problem only to the poor, but also to the rich. The relationship is however not significant (P=0.719).

**Table 5.8: Percentage distribution of respondents by Wealth quintile and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Wealth quintile** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| Poorest | 7.4 | 52.5 | 20.5 | 19.7 | **122** |
| Poorer | 7.3 | 57.0 | 18.5 | 17.2 | **151** |
| Average | 9.9 | 50.4 | 20.6 | 19.1 | **141** |
| Richer | 7.3 | 56.7 | 22.0 | 14.0 | **150** |
| Richest | 2.9 | 53.7 | 24.3 | 19.1 | **136** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| | **$\chi^2$ value =8.811** | **df= 9** | **P value =0.719** | | |

Source: EDULINK data, 2011

## 5.10 Alcohol consumption and BMI

The distribution of alcohol intake in Table 5.9 shows that the prevalence rate of overweight (24.6%) and obesity (19.7%) are higher among respondents who regularly drank alcohol (19.1% and 14.1% respectively for the overweight and obese). However, 9.2% of non-alcohol users were underweight compared to regular alcohol users (4.9%). The proportion normal weight was higher (57.3%) among non-users of alcohol than regular users of alcohol (50.8%). This finding conforms to findings from Wannamethee and Shaper (2003) in the U.K, French et al. (2010) in the US and Biritwum et al. (2005) in Ghana which found a positive association between alcohol consumption and BMI among adults. According to French et al. (2010), excess energy and inhibition of fat oxidation from alcohol may contribute to body weight gain. Although some studies reported a relationship between alcohol use and BMI, the association between the two in this study was not statistically significant (p=0.283). This means that, in this study, respondents who consumed alcohol and were overweight or obese, could have other factors that influence their higher prevalence rates of overweight and obesity.

**Table 5.9: Percentage distribution of respondents by Alcohol intake and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Alcohol intake** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| Regular drinkers | 4.9 | 50.8 | 24.6 | 19.7 | **122** |
| Occasional drinkers | 6.0 | 52.8 | 21.5 | 19.6 | **316** |
| Non-drinkers | 9.2 | 57.3 | 19.1 | 14.5 | **262** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |

**$\chi^2$ value =7.425 df= 6 P value = 0.283**

Source: EDULINK data, 2011

## 5.11 Smoking status and BMI

The prevalence rate of overweight was higher among former and non-smokers (28% and 22% respectively) as compared to regular and occasional smokers (16% and 14%). Obesity was less prevalent among current smokers (6%) than non-smokers (19%). While 11% of regular smokers were underweight, none of those who formerly smoked was underweight. The finding is consistent with that by Biritwum et al. (2005) in Ghana who found prevalence of obesity to be less among smokers than non-smokers. The nicotine in cigarette and other substances decrease food intake and increase energy expenditure, thereby causing smokers to have lower BMI (Chhabra and Chhabra, 2010).

**Table 5.10: Percentage distribution of Respondents by smoking status and BMI**

| Smoking status | Actual BMI (%) | | | | Total No. |
|---|---|---|---|---|---|
| | Underweight | Normal weight | Overweight | Obese | |
| Regular smokers | 11.1 | 66.7 | 16.7 | 5.6 | **18** |
| Occasional smokers | 10.7 | 62.7 | 14.7 | 12.0 | **75** |
| Former smokers | 0.0 | 60.0 | 28.0 | 12.0 | **25** |
| Non-smokers | 6.7 | 52.4 | 21.8 | 19.1 | **582** |
| **Total** | **7.0** | **54.1** | **21.1** | **17** | **700** |

**$\chi^2$ value = 12.002 df= 9 P value=0.213**

Source: EDULINK data, 2011

## 5.12 Perceived weight and Actual BMI

Essentially, a higher proportion of respondents do not have correct perceptions of their weight status. Although respondents at each category of BMI misperceived their weight, misperception of body weight was higher at the extreme ends of the BMI categories (underweight, obese). Basically, underestimation of body weight was higher among those who perceived themselves to be underweight; 20.6% out of those who perceived themselves to be underweight were actually underweight. More than three quarters (79.4%) of them underestimated their weight. They were bigger than they thought they were. Overestimation of weight was also higher among those who thought they were obese. More than a third (44.8%) of respondents who considered themselves as obese overestimated their weight. They were thinner than they thought they were.

The finding is similar to that of Olubukola and Olubukola (2012) in Nigeria among tertiary students. Underestimation of weight was higher among students who considered themselves underweight; 5.5% out of 15.5% who perceived themselves underweight were actually underweight. Also, 13% out of 31% of those who thought they were overweight overestimated their weight. They were smaller than they perceived themselves to be. The result in the present study however does not support studies by Alwan et al. (2010) in the Seychelles and Muhihi et al. (2012) in Tanzania which reported underestimation of weight among overweight and obese adults.

Powell and Kahn (1995) report that family influence; peer and physical development dissatisfaction of appearance influence the determination of one's body weight. The development of self-image involves the imagined appearance of oneself to others, the imagined judgment associated with how one appears to others, and feelings of pride or

embarrassment resulting from those perceptions. Upon comparing themselves to others in the society, they choose behaviours that will enable them meet the societal standard or norm (Hoover, 1984 cited in Kemper et al., 1994). It is therefore plausible that the perceptions people had about their body sizes may have been influenced by the body sizes of other community members. Upon comparison, those with body sizes below what they mostly see may have underestimated their body sizes to be smaller while those who had significant others with smaller body sizes may have overestimated their weight to be bigger.

The difference between peoples' perceptions about their body sizes and their actual measurements may have implications for behaviours that influence the body sizes of the individuals that may affect health status. The relationship between perceived body weight and actual BMI is statistically significant (p=0.000).

**Table 5.11: Percentage distribution of Respondents by perceived weight and Actual BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| Perceived weight | **Underweight** | **Normal weight** | **Overweight** | **Obese** | Total No. |
| Underweight | 20.6 | 74.6 | 1.6 | 3.2 | **63** |
| Normal weight | 9.3 | 67.8 | 16.9 | 6.0 | **366** |
| Overweight | 0.5 | 39.1 | 32.1 | 28.3 | **184** |
| Obese | 1.1 | 13.8 | 29.9 | 55.2 | **87** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |

**$X^2$ value = 230.173 df= 9 P value=0.000**

**Source: EDULINK data, 2011**

### 5.13 Perceived weight and weight management goals/practices

Higher proportions of respondents in each category of weight perception wanted to maintain their weight rather than to gain or lose weight. Among respondents who considered themselves underweight, a third (33.3%) and 23.8 % respectively wanted to maintain and gain weight. However, 6.3% had intentions of losing weight. Also, 38.5% of those who perceived themselves as normal weight wanted to maintain their weight while 12.3% wanted to lose weight. Among those who considered themselves to be overweight, 7.9% and 4.8% respectively wanted to lose and gain weight. On the other hand 34.2% wanted to maintain their weight while 38% did nothing about their weight. A third (34.5%) of those who perceived themselves to be obese wanted to lose weight while 4.6% and 29.9% respectively wanted to gain weight and stay about the same weight. However, a third (31%) did nothing about their weight.

It was imperative to find out what they were doing to lose, gain or maintain their weight. The results showed that respondents did not combine physical activity with diet to achieve their expectations. While most respondents had high dietary diversity score, majority of them were physically inactive. For example, 83.9% of those who perceived themselves to be obese had high dietary diversity score (good dietary behaviour) while 92% was physically inactive. This may not effectively contribute to weight control. This is contrary to a study by Cheung et al. (2007) in China which indicates a significant relationship between perceived weight and weight control behaviours. They found that participants who perceived themselves as overweight/obese were more likely to exercise and restrict caloric intake.

**Table 5.12: Percentage distributions of respondents by perceived weight and weight control goals/practices**

| Perceived body weight | Weight management goals (%) | | | | Weight control practices (%) | | | | Total No. |
|---|---|---|---|---|---|---|---|---|---|
| | Lose weight | Gain weight | Stay about the same | Do nothing | Physically inactive | Physically active | Low dietary diversity score | High dietary diversity score | |
| Underweight | 6.3 | 23.8 | 33.3 | 36.5 | 90.5 | 9.5 | 23.8 | 76.2 | **63** |
| Normal weight | 12.3 | 17.5 | 38.5 | 31.7 | 89.6 | 10.4 | 30.3 | 69.7 | **366** |
| Overweight | 17.9 | 9.8 | 34.2 | 38.0 | 93.5 | 6.5 | 21.7 | 78.3 | **184** |
| Obese | 34.5 | 4.6 | 29.9 | 31.0 | 92.0 | 8.0 | 16.1 | 83.9 | **87** |
| **Total** | **16.0** | **14.4** | **35.9** | **33.7** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| **$\chi^2$ value=44.242 P value =0.000** | | | | | **$\chi^2$ =2.352 P =0.503** | | **$\chi^2$ = 9.937 P value= 0.019** | | |

Source: EDULINK, data, 2011

### 5.14 Weight control practices and BMI

The general pattern shows that there were higher proportions (21.8% and 18.1% respectively) of physically inactive respondents who were overweight and obese. Fourteen percent of the respondents who were physically active were overweight while a higher percentage (21.8%) of those who were physically inactive was overweight. Also, 18% of physically inactive persons were obese. This suggests that being physically inactive has influence on increasing the risk of being overweight or obese although there was no significant association (p=0.334) between physical activity and actual BMI in the present study.

The prevalence of underweight and overweight (10.6% and 22.2% respectively) was higher among respondents who had low dietary diversity score. However, the prevalence of obesity was higher (19.6%) among those who had high dietary diversity score. The consumption of variety of food groups ensure adequate intake of nutrients to attain a healthy body weight (Savy et al., 2005). However, food diversity may not necessarily prevent the consumption of food (example. fat and energy-dense foods) that results in obesity (Appendix A).

**Table 5.13: Percentage distributions of respondents by weight control practices and BMI**

| | Actual BMI (%) | | | | |
|---|---|---|---|---|---|
| **Levels of physical activity** | **Underweight** | **Normal weight** | **Overweight** | **Obese** | **Total No.** |
| Physically active | 9.5 | 61.9 | 14.3 | 14.3 | **63** |
| Physically inactive | 6.8 | 53.4 | 21.8 | 18.1 | **637** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| | **$\chi^2$ value = 3.399** | **df=3** | **P value=0.334** | | |
| **Dietary behaviour** | | | | | |
| Low dietary diversity score | 10.6 | 55.0 | 22.2 | 12.2 | **180** |
| High dietary diversity score | 5.8 | 53.8 | 20.8 | 19.6 | **520** |
| **Total** | **7.0** | **54.1** | **21.1** | **17.7** | **700** |
| | **$\chi^2$ value = 8.668** | **df= 3** | **P value=0.034** | | |

Source: EDULINK data, 2011

### 5.15 Associations between Socio-demographic variables and weight control practices

The distributions shown in Tables 5.14a and 5.14b illustrate the effects of the socio-demographic variables on physical activity and diet.

#### 5.15.1 Age -sex characteristics and weight control practices

With respect to respondents' sex and weight control practices, more females (92.5%) did not engage in leisure time physical activity compared to males (89.2%). Also, a little more than a quarter (26.1%) of females belonged to the category of low dietary diversity score compared to males (25.2%). Females' physically inactive and low consumption of variety of food groups may have translated into their actual body weight; making them more obese than males.

With respect to age of respondents, a higher (96.5%) proportion of them within the age group 35-44 years were physically inactive compared to those within the age group 15-24 years (87.8%). Also, higher proportions (75.1% and 75.5% respectively) in the lower age groups (15-24 years and 25-34 years) had high dietary diversity score compared to those in the higher age groups (73.6% and 70.9 % respectively). As noted earlier, the probability of engaging in vigorous activity decreases at increasing age hence a higher proportion of old adults being physically inactive. Also, a higher proportion had low dietary diversity score probably because they may be cautious about their diet due to perceptions about the kind of food to eat or not to eat as one ages. This also explains why the prevalence rates of overweight/obesity are high among respondents in the higher age groups. The relationship between age and physical activity was significant (P =0.033) while that with diet was not significant (P=0.825)

### 5.15.2: Highest level of education and weight control practices

Level of education was significantly related to physical activity (p=0.021). 1 out of every 10 (10.4%) respondents with secondary education as well as 1 out of 4 (24.2%) of those with higher education was physically active. On the other hand, a small percentage (2.5%) with no formal education was physically active. With reference to the dietary behaviour, a higher (77.8%, 74.7% respectively) proportion of those with middle or secondary education had high dietary diversity score which signifies good dietary behaviour. Kenkel (1991) explained that education improves people's knowledge about health behaviour and its outcome. Consequently, persons with higher levels of education choose healthier lifestyles such as being physically active and eating diversity of foods to keep the body healthy.

### 5.15.3 Locality and weight control practices

Looking at respondents' weight control practices in the various localities, a larger (10% and 9% respectively) proportion of respondents in Ussher and James Town were physically active compared to those in Agbogbloshie (5%). This may be attributed to the availability of places for recreation at James Town and Ussher Town (Appendix B). However, a higher (76.4%) proportion of respondents from Ussher Town had low dietary diversity scores compared to those in James Town and Agbogbloshie (73.0% and 73.7% respectively). While the association between locality and physical activity was not statistically significant (p= 0.249, that of diet was significant under 90% significant level (p= 0.065**)**

### 5.15.4 Marital status and weight control practices

Marital status was also not significantly associated with weight control practices (p=0.203 and p= 0.494 respectively**)**. A higher (93.8% and 93.2% respectively) proportion of respondents formerly and currently married were physically inactive compared to those never married (88.4%). Also, the proportion of never married respondents who had high dietary diversity score was higher (74.7%) compared to currently married respondents (73.3%). This may also justify why never married respondents have lower prevalence rate of overweight/obesity.

### 5.15.5 Occupation and weight control practices

One out of every 5 professional/managerial/clerical workers engaged in a physical activity while a third (33.3) of them had low dietary diversity score. Most professional/managerial/clerical workers engaged in physical activity probably due to the sedentary nature of their work. On the other hand, over a third (36%) of agricultural workers also belong to the category of low dietary diversity score while none of them engaged in any leisure time physical activity. This may partly be attributed to the nature of their work; it involves much physical activity and they may not see the need for additional physical activity. Also, they had the largest proportion with low dietary diversity score probably because they are more likely to eat what they produce. The relationship between type of occupation and physical activity was statistically significant (p=0.001) while that of diet was not significant (p=0.590).

### 5.15.6 Ethnic background and weight control practices

Among the Akan ethnic group, more than three quarters (77.8%) had high dietary diversity score while 92.4% was physically inactive. Also, 90.3% of respondents who belonged to the Ga Dangbe ethnic group were physically inactive while 75% had high dietary diversity score. Among Ewe respondents, 84.8% was physically inactive while 69.7% had high dietary diversity score. The relationship between ethnic group and both physical activity and diet was not significant (p=0.707 and p=1.000 respectively).

### 5.15.6 Wealth status and weight control practices

Higher (15.4% and 80.1% respectively) proportions in the richest category of wealth engaged in physical activity and had high dietary diversity score. On the other hand, a few (4.1%) of those in the poorest category were physically active while a higher (68.9%) proportion belonged to the category of high dietary diversity score. The relationship between physical activity was significant (p=0.025) while that of diet was non-significant (p=0.271).

### 5.15.7 Smoking status and weight control practices

The association between smoking status and weight control practices shows that 88.9% of regular smokers were physically inactive. A third (33.3%) of them also had low dietary diversity score. Also, more than a third (37.3%) of occasional smokers had low dietary diversity score. Majority (91.2%) of non-smokers were physically inactive while 24.2% had low dietary diversity score. The nicotine in cigarette, for example, decreases food intake. Therefore, the probability of regular smokers desiring to eat a different food group may be low (Chhabra and Chhabra, 2010). The association between smoking and diet is significant under 90% significance level (p=0.074). However, smoking was not significantly associated with physical activity

### 5.15.8 Alcohol intake and weight control practices

A large majority (93.4%) of regular users of alcohol were physically inactive compared to non-drinkers (90.8%). While a third (31.1%) of regular drinkers had low dietary diversity score, a little over a quarter (26%) of non-drinkers had low dietary diversity score. The results suggest that when alcohol is consumed on regular basis, it can affect an individual's ability to evaluate the costs and benefits of behaviors such as eating and exercise that affect weight status. Alcohol intake was not significantly associated with physical activity as well as dietary behaviour.

**Table 5.14a: Percentage distribution of Respondents by socio-economic variables and weight control practice**

| Socio-demographic variables | WEIGHT CONTROL PRACTICES (%) | | | | TOTAL |
|---|---|---|---|---|---|
| | Physically inactive | Physically active | Low dietary diversity | High dietary diversity | |
| **Sex of respondents** | | | | | |
| Males | 89.2 | 10.8 | 25.2 | 74.8 | **325** |
| Females | 92.5 | 7.5 | 26.1 | 73.9 | **375** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value=0.128** | | **P value=0.785** | | |
| **Age of respondents** | | | | | |
| 15-24 | 87.8 | 12.2 | 75.1 | 24.9 | **237** |
| 25-34 | 90.3 | 9.7 | 75.5 | 24.5 | **216** |
| 35-44 | 96.5 | 3.5 | 73.6 | 26.4 | **144** |
| 45-59 | 92.2 | 7.8 | 70.9 | 29.1 | **103** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value =0.033** | | **P value=0.825** | | |
| **level of education** | | | | | |
| No education | 97.5 | 2.5 | 35.0 | 65.0 | **40** |
| Primary | 94.0 | 6.0 | 30.6 | 69.4 | **134** |
| Middle/JHS | 91.3 | 8.7 | 22.2 | 77.8 | **311** |
| Sec/SHS | 89.6 | 10.4 | 25.3 | 74.7 | **182** |
| Higher | 75.8 | 24.2 | 30.3 | 69.7 | **33** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value=0.009** | | **P value=0.208** | | |
| **Locality** | | | | | |
| Agbogbloshie | 94.9 | 5.1 | 26.3 | 73.7 | **118** |
| James Town | 90.7 | 9.3 | 23.6 | 76.4 | **237** |
| Ussher Town | 89.9 | 10.1 | 27.0 | 73.0 | **345** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value=0.249** | | **P value=0.065** | | |
| **Marital status** | | | | | |
| Never married | 88.4 | 11.6 | 25.3 | 74.7 | **292** |
| Currently married | 93.2 | 6.8 | 26.7 | 73.3 | 161 |
| Living together | 91.8 | 8.2 | 21.6 | 78.4 | **134** |
| Formerly married(W/D/S) | 93.8 | 6.2 | 30.1 | 69.9 | **113** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value=0.203** | | **P value=0.494** | | |

Source: EDULINK data, 2011

**Table 5.14b: Percentage distribution of Respondents by socio-economic variables and weight control practices**

| Socio-economic Variables | Weight control practices (%) | | | | Total |
|---|---|---|---|---|---|
| | Physically inactive | Physically active | Low dietary diversity | High dietary diversity | |
| **Occupation** | | | | | |
| No occupation | 85.5 | 14.5 | 24.8 | 75.2 | **145** |
| Prof/Manage/Clerical | 80.0 | 20.0 | 33.3 | 66.7 | **60** |
| Sales/services | 93.9 | 6.1 | 24.4 | 75.6 | **295** |
| Agriculture | 100.0 | 0.0 | 36.4 | 63.6 | **11** |
| Manual work | 93.7 | 6.3 | 25.4 | 74.6 | **189** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value=0.001** | | **P value=0.590** | | |
| **Ethnic group** | | | | | |
| Akan | 92.4 | 7.6 | 22.2 | 77.8 | **185** |
| Ga Dangme | 90.7 | 9.3 | 24.9 | 75.1 | **410** |
| Ewe | 84.8 | 15.2 | 30.3 | 69.7 | **33** |
| Mole Dagbani | 90.0 | 10.0 | 45.0 | 55.0 | **20** |
| Other ethnic group | 92.3 | 7.7 | 34.6 | 65.4 | **52** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value =0.707** | | **P value =0.100** | | |
| **Wealth status** | | | | | |
| Poorest | 95.9 | 4.1 | 31.1 | 68.9 | **122** |
| Poorer | 90.7 | 9.3 | 28.5 | 71.5 | **151** |
| Middle | 92.9 | 7.1 | 25.5 | 74.5 | **141** |
| Richer | 91.3 | 8.7 | 24.0 | 76.0 | **150** |
| Richest | 84.6 | 15.4 | 19.9 | 80.1 | **136** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value = 0.025** | | **P value= 0.271** | | |
| **Alcohol users** | | | | | |
| Regular drinkers | 93.4 | 5.7 | 31.1 | 68.9 | **122** |
| Occasional drinkers | 89.9 | 10.1 | 23.4 | 76.6 | **316** |
| Non-drinkers | 90.8 | 9.2 | 26.0 | 74.0 | **262** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value =0.353** | | **P value= 0.251** | | |
| **Smoking status** | | | | | |
| Regular smokers | 88.9 | 11.1 | 33.3 | 66.7 | **18** |
| Occasional smokers | 90.7 | 9.3 | 37.3 | 62.7 | **75** |
| Former smokers | 88.0 | 12 | 20.0 | 80.0 | **25** |
| Non-smokers | 91.2 | 8.8 | 24.2 | 75.8 | **582** |
| **Total** | **91.0** | **9.0** | **25.7** | **74.3** | **700** |
| | **P value =0.935** | | **P value =0.074** | | |

Source: EDULINK data, 2011

# CHAPTER SIX

## Determinants of Body Mass Index (BMI)

### 6.1 Introduction

In this chapter, a multinomial logistic regression was applied to determine the extent to which each variable predicted BMI status. Three different multinomial logistic regression models were fitted to determine the associations. In the first model, the independent effect of perceived weight on BMI was examined. The second model examined the influence of physical activity with diet on BMI. Finally, perceived weight was used as a predictor of BMI while controlling for demographic and socio-economic characteristics of the respondents. For all models, normal weight was used as reference category for the dependent variable. The likelihood ratio test was used to assess the significance of the independent variables in predicting BMI status.

For the purpose of the regression analysis, variables such as ethnicity, occupation and smoking status were re-categorised by merging categories with low percentages. This was done to attain accuracy in the results. Ethnicity was re-grouped into Akan, Ga Dangbe, Ewe and other ethnic groups. Occupation was re-grouped into Professional/managerial/clerical, sales and services and agricultural/manual work. Smoking status was also re-categorised into daily smokers, occasional smokers and non-smokers.

### 6.2 The influence of perceived weight on BMI

Model 1 shows that perceived weight independently had a significant (P=0.000) influence in predicting the BMI status of individuals. The Nagelkerke $R^2$ value (0.320) shows that perceived weight explains 32% of the variation in actual BMI status. This implies that 68% of the variations are due to other variables.

As shown on Table 6.1, respondents who considered themselves to be underweight had 101 % more likelihood to be underweight than those who perceived themselves as normal weight. They are however less likely to be overweight and obese compared to those who perceived themselves normal weight (91.2 % and 52 % respectively). For those who saw themselves as overweight, they were almost 99 % less likely to be underweight than those who perceived themselves as normal weight. On the other hand, they had 227.8% and 766.7% respectively higher likelihood to be overweight and obese compared to those who perceived themselves to have normal weight. Similarly, respondents who perceived themselves as obese were 36.2 % less likely to be underweight. Their likelihood to be overweight or obese was higher (Odd Ratio= 8.667 and 45.091respectively) compared to those who perceived themselves to be normal weight.

Generally, the respondents' perceptions about their weight corresponded with their actual BMI.

**Table 6.1: A multinomial logistic regression of perceived weight and actual BMI**

| Variable | ACTUAL BMI [a] | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Underweight | | | | Overweight | | | | Obese | | | | |
| | **B** | **SE(B)** | **Sig.** | **Exp (B)** | **B** | **SE(B)** | **Sig.** | **Exp (B)** | **B** | **SE(B)** | **Sig.** | **Exp (B)** | |
| Intercept | -1.987 | 0.183 | 0.000 | 0 | -1.386 | 0.142 | 0.00 | | -2.422 | 0.222 | 0.000 | | |
| **Perceived Weight** | | | | | | | | | | | | | |
| Normal weight(**RC**) | 0 | | | 1.000 | 0 | | 1.000 | | 0 | | 1.000 | | |
| Underweight | 0.702 | 0.363 | 0.053 | 2.018 | -2.464 | 1.021 | 0.016 | 0.085 | -0.735 | 0.755 | 0.331 | 0.480 | |
| Overweight | -2.290 | 1.023 | 0.025 | 0.101 | 1.187 | 0.226 | 0.000 | 3.278 | 2.097 | 0.287 | 0.000 | 8.141 | |
| Obese | -0.498 | 1.057 | 0.638 | 0.608 | 2.159 | 0.377 | 0.000 | 8.667 | 3.809 | 0.392 | 0.000 | 45.091 | |

**Source**: EDULINK DATA.2011 RC: Reference category [a] R C is Normal weight **Nagelkerke $R^2$=0.320**

### 6.3 The influence of Perceived weight, Weight management goals and Weight Control Practices on BMI

Table 6.2 is a description of the influence of perceived weight, weight management goals, diet and physical activity on BMI. The introduction of other variables to the relationship between perceived weight and actual BMI increased the Nagelkerke $R^2$ Value (0.380). This implies that 62% of the variation in BMI is explained by other variables.

Weight perception was again significant in the model. Perceived weight again corresponded with the actual BMI of respondents. Those who perceived themselves as underweight were 98 % more likely to be actually underweight than those who perceived themselves to be normal weight. So it was evident that, they were less likely to be overweight or obese compared to those who perceived themselves as normal weight (91 % and 47 % respectively). Respondents who perceived themselves as overweight had 89 % less likelihood to be underweight. However, they were 225.2 % and 709 % respectively more likely as those who perceived themselves as normal weight to be overweight and obese. Those who perceived themselves as obese were 25.7 % less likely to be underweight than those who saw themselves as normal weight. Their likelihood to be overweight or obese was higher (Odds Ratio=8.416 and 37.383 respectively) than those who perceived themselves to be normal weight.

Respondents who wanted to lose weight were 78 % less likely than those who did nothing about their weight to be underweight. On the other, they had higher (43.6% and 368.7%) likelihood to be overweight or obese than those who did nothing about their weight. For those who wanted to gain weight, they had 59 % more likelihood to be underweight and rather 42 % less likelihood to be overweight. They also had 61 % less likelihood to be obese.

Respondents who wanted to maintain their weight had 19% and 1.7% respectively less likelihood to be underweight and obese. They are 6 % more likely to be overweight compared to those who did nothing about their weight.

This suggests that having an intention to change or maintain one's weight does not by itself resolve weight problems. Intentions of weight management should therefore be accompanied by a practice.

Although leisure- physical activity has been identified to be a determinant of BMI, its impact was not significant in this study. Despite the non-significant association between physical activity and BMI, being physically inactive increases the likelihood to be overweight or obese. Physically active respondents have 39.3% and 27.3% respectively less likelihood to be overweight or obese compared to the physically inactive.

The relationship between dietary behaviour and BMI was also not significant. However, respondents who had high dietary diversity score were less likely to be underweight or overweight compared to those who had low dietary diversity score. Those who had high dietary diversity score had higher likelihood to be obese compared to those with low dietary diversity score. A plausible explanation is that physical activity or high dietary diversity does not by itself influence one's BMI; rather a combination of physical activity and good dietary behaviour is more effective in predicting one's BMI as indicated in Macera et al. (2003) and Field et al. (2010) studies in the US.

**Table 6.2: A multinomial logistic regression of the effect of perceived weight, physical activity and diet on BMI**

| Variables | ACTUAL BMI [a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Underweight | | | | Overweight | | | | Obese | | | |
| | B | SE(B) | Sig. | Exp (B) | B | SE(B) | Sig. | Exp (B) | B | SE(B) | Sig. | Exp (B) |
| Intercept | -2.139 | 0.336 | 0.000 | | -1.396 | 0.226 | 0.000 | | -2.564 | 0.315 | 0.000 | |
| **Perceived Weight** | | | | | | | | | | | | |
| Normal weight**(RC)** | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Underweight | 0.682 | .370 | 0.066 | 1.978 | -2.423 | 1.022 | 0.018 | 0.089 | -0.633 | 0.769 | 0.410 | 0.531 |
| Overweight | -2.232 | 1.025 | 0.029 | 0.107 | 1.179 | 0.229 | 0.000 | 3.252 | 2.091 | 0.300 | 0.000 | 8.090 |
| Obese | -0.297 | 1.063 | 0.780 | 0.743 | 2.130 | 0.381 | 0.000 | 8.416 | 3.621 | 0.406 | 0.000 | 37.383 |
| **Weight management goals** | | | | | | | | | | | | |
| Do nothing**(RC)** | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Lose weight | -1.534 | 1.050 | 0.144 | 0.216 | 0.362 | 0.330 | 0.273 | 1.436 | 1.545 | 0.339 | 0.000 | 4.687 |
| Gain weight | 0.463 | 0.394 | 0.240 | 1.589 | -0.539 | 0.362 | 0.137 | 0.583 | -0.944 | 0.540 | 0.080 | 0.389 |
| Stay about the same | -0.210 | 0.383 | 0.583 | 0.810 | 0.058 | 0.241 | 0.810 | 1.060 | -0.017 | 0.305 | 0.954 | 0.983 |
| **Weight control practices** | | | | | | | | | | | | |
| Physically inactive | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Physically active | 0.103 | 0.479 | 0.830 | 1.108 | -0.498 | 0.406 | 0.220 | 0.607 | -0.319 | 0.477 | 0.504 | 0.727 |
| **Dietary behaviour** | | | | | | | | | | | | |
| Low dietary diversity(RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| High dietary diversity | -0.534 | 0.331 | 0.107 | 0.586 | -0.199 | 0.237 | 0.401 | 0.820 | 0.274 | 0.315 | 0.383 | 1.316 |

**Source:** EDULINK DATA, 2011 RC: Reference category R C for [a] is Normal weight **Nagelkerke $R^2$=0.38**

## 6.4 Other determinants of BMI

The results of model 3 as shown in Table 6.3 are on the effects of perceived weight on BMI, when some characteristics of the respondents are controlled. Comparing model 3 to previous models, there is a higher influence of certain variables on BMI (Nagelkerke $R^2$ (0.579). It can therefore be concluded that apart from perceived weight, certain characteristics of the participants also contribute to predicting BMI.

### 6.4.1 Discussion of results (Table 6.3)

Perceived weight was significant even after controlling for some characteristics of the respondents. Similar to models 1 and 2, the perceptions people had about their weight again translated into their BMI levels. Respondents who considered themselves as underweight were 126.5 % more likely to be underweight compared to those who perceived themselves as normal weight (p=0.060). On the other hand, they were 93.5 % less likely to be overweight and obese than those who perceived themselves as normal weight (p=0.009).

There was 89.8 % likelihood for those who perceived themselves as overweight to be underweight than those who perceived themselves as normal weight (p=0.028). They were 219.4% and 475.9 % respectively more likely than those who perceived themselves as normal weight to be overweight or obese (p=0.000, p=0.000 respectively). The hypothesis that respondents who perceived themselves as underweight are less likely to be underweight compared to those who perceive themselves as normal weight was not proved true, hence rejected. Respondents who considered themselves to be obese had more likelihood (Odds Ratio=9.561 and 49.557 respectively) to be overweight or obese than those who perceived themselves as normal weight (p= 0.000, p=0.000 respectively).

Generally, respondents' perceptions about their weight corresponded with actual BMI status. The result is consistent with findings in Morocco where overweight and obese women did not perceive themselves as being too fat due to a social perception about fat being beautiful. This made them overlook their weight problems (Rguibi and Belahsen, 2006). Brener et al. (2004) in the US also indicates that overweight adolescents who fail to perceive themselves overweight are unlikely to engage in dieting and exercise that might help them to lose weight. This has a higher possibility to further increase their weight and associated health implications.

Health-related behaviours were more likely to be performed if favourable perceptions are held towards performing the behaviour (Conner and Sparks, 2005 cited in Wang et al., 2008; Hale et al., 2002). The social context in which one finds himself shapes his/her beliefs and behavioural intentions (Ogden, 1996 cited in Crossley, 2000). It is possible that respondents may have compared themselves to family and friends in the urban poor society and chosen behavioural lifestyles that enabled them to conform to the social norms (Hoover, 1984 cited in Kemper et al., 1994), therefore their perceptions corresponding to their actual weight.

With respect to weight management goals, all categories except the desire to lose weight were not significantly related to BMI levels. The respondents who tried to lose weight were 108.2% and 786.1% respectively more likely than those who did nothing about their weight to be overweight or obese ($p=0.051$, $p=0.000$ respectively). There was less likelihood for those who wanted to gain weight to be overweight or obese. Rather, they had higher likelihood to be underweight compared to those who did nothing about their weight. The respondents who wanted to stay about the same weight had higher likelihood to be underweight, overweight or obese. A possible explanation may be that individuals do not

adhere to recommended health related behaviours although they intended to change or maintain their body weight.

Physical activity was consistently not a determinant of BMI even after controlling for confounders. However, the general pattern showed that being physically active decreased the likelihood to be underweight and overweight than physically inactive. Rather, it increased the likelihood to be obese.

With respect to dietary behaviour, respondents who belonged to the category of high dietary diversity score were significantly 46.3 % less likely to be underweight than those with low dietary diversity score (p=0.091). The finding is similar to Savy et al.'s (2005) study in Burkina Faso which indicates that the proportion of underweight was much higher (22.8 %) among women belonging to the category of low dietary scores than those belonging to the category of high dietary diversity score (9.8 %). The intake of different foods among and within food groups ensures adequate micronutrient and calories intake for good health (Savy et al., 2005; USDA, 1992).

Sex of respondents was statistically a significant determinant of BMI. The result demonstrates that overweight and obesity cases were less prevalent among men, as underweight was also less prevalent. Males were 58.5 % and 92.8 % respectively less likely to be overweight and obese compared to their female counterparts (p=0.000 and p=0.000 respectively).

The results imply that females have higher likelihood to be overweight or obese than males. Therefore, the hypothesis that males are less likely to be obese compared to females is accepted. The result is similar to other studies including WHO (2011) which indicates 50 %

more likelihood for females to be obese compared to males. Amoah (2003a) also found four times the proportion of obesity in Accra women in males. Obesogenic cultures associated with pregnancy and child birth is a plausible explanation for the increase in obesity among females. The consumption of fattening foods particularly palm nut soup by Ghanaian women constitute an obesogenic risk for those in their reproductive years (de-Graft Aikins 2010). Amoah (2003b) further explained that there is preference for overweight or obese women to thin ones by Ghanaian men. This may as well contribute to the higher prevalence rates of overweight and obesity among females.

The age of respondents was also a significantly determinant of BMI. As respondents advanced in age, they became more predisposed to overweight and obesity. Persons aged 25-34 years were 190% more likely to be obese than those aged within 15-24 years (p=0.025). Compared to respondents within the age group 15-24 years, there was 188.3% and 736.7% likelihood for those aged within 35-44 years to be overweight or obese (p=0.001 and p=0.000 respectively). Similarly, those within the age group 45-59 years were 242.6% and 646.9% more likely to be overweight than those aged within 15-24 years (p=0.007and p=0.001 respectively). The result conforms to other studies in Ghana including Amoah (2003b), which indicates that obesity increased with age up to 64 years; Biritwum et al. (2005) also report higher obesity prevalence among individuals until age 60 years. Duda et al. (2007) further stated that obesity increases up to age 70 years then it declines. Therefore there is an influence of age on BMI.

With reference to level of education, respondents in all categories had less likelihood to be underweight but more likelihood to be overweight or obese compared to those with no formal education. Those who had primary and higher education were more likely to be overweight

compared to those with no formal education. Those who had middle, secondary and higher education had higher likelihood to be obese than those with no formal education. Respondents who have primary education are significantly 332.7 % more likely to be obese than those with no formal education (p=0.040). The finding is similar to a study among the Ibos of Nigeria by Anyanwu et al. (2010) which found that obesity levels were worse at the various education groups but worst for those in the least educated group. There is a lower possibility for persons with primary education to have knowledge to develop healthy lifestyles and hence decreases their ability to select a healthy diet, avoid unhealthy habits (Yoon, 2006).

With respect to marital status, the likelihood to be underweight was less among respondents in all categories. On the other hand, the likelihood to be overweight or obese was higher in the various categories compared to the never married. Respondents who were currently married have 80.3% less likelihood to be underweight compared to the never married (P=0.039). They also had 89% more likelihood to be overweight than those never married (P=0.086).

The result is consistent with findings in Ghana by Biritwum et al. (2005) and Dake et al. (2010) which indicated higher levels of overweight among the married than the unmarried. Jeffery and Rick (2002) and India Poluru and Mukherjee (2010) in the US and India respectively also found higher prevalence of overweight among the married than the unmarried. Dake et al. (2010) attributed this to the socio-cultural perception about fatness being associated with beauty especially among married women. Also, the unmarried women are mostly young adults who have not yet started child bearing and eating of foods that may put them at obesogenic risk. Averret et al. (2008) added that ideal body weight involves

expensive and time-consuming activities such as exercise and healthy meals. Therefore, once a relationship has been established, monitoring of one's weight may reduce.

In the various locality of residence, respondents in both Ussher Town and James Town had higher likelihood to underweight, overweight or obese. Residents in James Town were significantly 58.1 % more likely to be obese compared to those in Agbogbloshie (p=0.085). Residents in James Town are typical Ga people whose staple food (Kenkey) is mainly carbohydrate. The consumption of refined carbohydrates and polished grains increase their risk of being overweight or obese because of their high energy value (Dake et al., 2010).

The various categories of wealth status were not statistically significantly related to BMI except the richest category of wealth. Generally, compared to respondents who were averagely wealthy, those in the various categories of wealth had less likelihood to be underweight. Respondents in the richest category of wealth status significantly had 78% less likelihood to be underweight compared to those in the average wealth status (p=0.024). The likelihood to be overweight was higher among those in the poorest and richest category of wealth than those who were averagely wealthy. Those in the poorer and rich category had less likelihood to be overweight. With the exception of respondents in the poorest category, there was less likelihood for those in the poorer, rich and richest categories of wealth to be obese than those with average wealth.

With respect to ethnicity, respondents who belonged to the Akan, Ga and Ewe ethnic groups had higher likelihood to be underweight compared to those in other tribes. The Akan and Ga Dangme respondents had higher likelihood to be overweight while the Ewe had less likelihood to be overweight compared to those of other tribes. Again, the Ga had higher

likelihood to be obese compared to other tribes. However, the Akan and Ewe had less likelihood to be obese compared to other tribes in Ghana. Respondents who belong to the Ewe ethnic group were significantly 457.7 % more likely to be underweight compared to those who belonged to other tribes (p=0.092).

Occupation was significantly associated with BMI. Essentially, respondents in the various categories had less likelihood to be underweight than those with no work. However, they have higher likelihood to be overweight or obese compared to those with no work. Those who engaged in sales and services were 263.2 % and 144.3 % respectively more likely than those with no work to be overweight or obese (p=0.002 and p=0.067 respectively). Agricultural/ manual workers were 160.4 % more likely than those with no work to be overweight (p=0.027). This demonstrates that individuals who engaged in sales and services are at higher risk to be overweight and obese. These findings do not conform to a study by Allman-Farinelli et al. (2010) in Australia which indicates lower BMI among sales/services workers. Also, the findings do not support other studies such as that of Fezeu et al. (2005) in Cameroon and Amoah (2003b) in Ghana which indicate lower levels of overweight and obesity among people who engaged in physically demanding jobs such as agricultural and unskilled work.

Smoking status has no significant relationship with BMI. However, the likelihood to be underweight was higher among individuals who smoke regularly than non-smokers. Occasional smokers also had less likelihood to be underweight compared to non-smokers. Regular smokers had less likelihood to be overweight but had likelihood to be obese than non-smokers. The non-significant relationship between smoking status and BMI means that there is no enough statistical evidence to say that there is a difference in the body weight of

persons who smoked and those who do not smoke. Therefore, the hypothesis that respondents who smoke regularly are more likely to be underweight was rejected.

Alcohol consumption also had no significant relationship with BMI. However, respondents who drank regularly had less likelihood to be underweight, overweight or obese compared to non-drinkers. Those who drank alcohol occasionally were less likely to be underweight compared to non-drinkers and were more likely to be overweight and obese compared to non-drinkers.

**Table 6.3a: A Multinomial Logistic Regression of background characteristics and Actual Body Mass Index (BMI)**

| Variables | ACTUAL BMI [a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UNDERWEIGHT | | | | OVERWEIGHT | | | | OBESE | | | |
| | B | SE(B) | Sig. | Exp (B) | B | SE(B) | Sig. | Exp (B) | B | SE(B) | Sig. | Exp (B) |
| Intercept | -0.803 | 1.082 | 0.458 | | -3.211 | 0.787 | 0.000 | | -5.835 | 1.105 | 0.000 | |
| **Perceived Weight** | | | | | | | | | | | | |
| Normal weight(**RC**) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Underweight | 0.818 | 0.435 | 0.060 | 2.265 | -2.732 | 1.045 | 0.009 | 0.065 | -1.118 | 0.845 | 0.186 | 0.327 |
| Overweight | -2.283 | 1.040 | 0.028 | 0.102 | 1.161 | 0274 | 0.000 | 3.194 | 1.751 | 0.366 | 0.000 | 5.759 |
| Obese | -0.489 | 1.117 | 0.662 | 0.613 | 2.258 | 0.436 | 0.000 | 9.561 | 3.903 | 0.505 | 0.000 | 49.557 |
| **Weight management goals** | | | | | | | | | | | | |
| Do nothing(**RC**) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Lose weight | -1.405 | 1.092 | 0.198 | 0.245 | 0.733 | 0.376 | 0.051 | 2.082 | 2.182 | 0.434 | 0.000 | 8.861 |
| Gain weight | 0.554 | 0.446 | 0.215 | 1.739 | -0.162 | 0.406 | 0.690 | 0.851 | -0.594 | 0.605 | 0.326 | 0.552 |
| Stay about the same | 0.119 | 0.428 | 0.781 | 1.126 | 0.294 | 0.282 | 0.297 | 1.342 | 0.320 | 0.364 | 0.378 | 1.378 |
| **Physical activity** | | | | | | | . | . | | | | |
| Physically inactive(RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Physically active | -0.140 | 0.534 | 0.794 | 0.870 | -0.117 | 0.457 | 0.798 | 0.890 | 0.159 | 0.581 | 0.784 | 1.173 |
| **Dietary behaviour** | | | | | | | | | | | | |
| low dietary diversity score(RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| high dietary diversity score | -0.623 | 0.369 | 0.091 | 0.537 | -0.137 | 0.269 | 0.610 | 0.872 | 0.538 | 0.369 | 0.145 | 1.712 |
| **Sex of respondents** | | | | | | | | | | | | |
| females**(RC)** | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Males | -0.373 | 0.375 | 0.319 | 0.689 | -0.880 | 0.280 | 0.002 | 0.415 | -2.627 | 0.438 | 0.000 | 0.072 |
| **Age groups** | | | | | | | | | | | | |
| 15-24(RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| 25-34 | -0.311 | 0.480 | 0.517 | 0.733 | 0.386 | 0.358 | 0.280 | 1.471 | 1.065 | 0.474 | 0.025 | 2.900 |
| 35-44 | 0.129 | 0.735 | 0.861 | 1.137 | 1.357 | 0.399 | 0.001 | 3.883 | 2.124 | 0.519 | 0.000 | 8.367 |
| 45-59 | 1.043 | 0.775 | 0.178 | 2.838 | 1.231 | 0.459 | 0.007 | 3.426 | 2.011 | 0.578 | 0.001 | 7.469 |

**Source:** EDULINK DATA, 2011 **RC:** Reference category R C for [a] is Normal weight **Nagelkerke $R^2$=0.579** *** P<0.001

**Table 6.3b: A Multinomial Logistic Regression of background characteristics and Actual Body Mass Index (BMI)**

| Respondents' characteristics | ACTUAL BMI [a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UNDERWEIGHT | | | | OVERWEIGHT | | | | OBESE | | | |
| | **B** | **SE(B)** | **Sig.** | **Exp (B)** | **B** | **SE(B)** | **Sig.** | **Exp (B)** | **B** | **SE(B)** | **Sig.** | **Exp (B)** |
| **Level of education** | | | | | | | | | | | | |
| No education (RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | .000 |
| Primary | -1.011 | 0.878 | 0.250 | 0.364 | 0.159 | 0.523 | 0.761 | 1.173 | 1.465 | 0.714 | 0.040 | 4.327 |
| Middle | -0.651 | 0.799 | 0.415 | 0.521 | -0.197 | 0.514 | 0.702 | 0.821 | 0.722 | 0.712 | 0.311 | 2.058 |
| Secondary | -1.044 | 0.845 | 0.217 | 0.352 | -0.309 | 0.568 | 0.586 | 0.734 | 0.597 | 0.784 | 0.446 | 1.816 |
| Higher | -0.068 | 1.051 | 0.949 | 0.934 | 0.084 | 0.793 | 0.916 | 1.087 | 1.532 | 1.182 | 0.195 | 4.626 |
| **Marital status** | | | | | | | | | | | | |
| Never married **(RC)** | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Currently married | -1.626 | 0.790 | 0.039 | 0.197 | 0.636 | 0.371 | 0.086 | 1.890 | 0.380 | 0.475 | 0.424 | 1.462 |
| Living together | -0.830 | 0.579 | 0.152 | 0.436 | 0.160 | 0.364 | 0.661 | 1.174 | 0.046 | 0.453 | 0.919 | 1.047 |
| Widow/div/sep | -0.781 | 0.689 | 0.257 | 0.458 | 0.484 | 0.398 | 0.224 | 1.622 | 0.550 | 0.488 | 0.260 | 1.733 |
| **Locality** | | | | | | | | | | | | |
| Agbogbloshie(RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | |
| Ussher Town | 0.365 | 0.611 | 0.551 | 1.440 | 0.168 | 0.388 | 0.665 | 1.183 | 0.829 | 0.548 | 0.130 | 2.291 |
| James town | 0.228 | 0.590 | 0.699 | 1.257 | 0.210 | 0.392 | 0.592 | 1.234 | 0.948 | 0.551 | 0.085 | 2.581 |
| **Wealth status** | | | | | | | | | | | | |
| middle(RC) | 0 | | | 1.000 | 1.000 | | | 1.000 | 0 | | | |
| Poorest | -0.620 | 0.514 | 0.228 | 0.538 | 0.018 | 0.391 | 0.964 | 1.018 | 0.190 | 0.471 | 0.686 | 1.210 |
| Poorer | -0.586 | 0.481 | 0.223 | 0.557 | -0.099 | 0.371 | 0.789 | 0.905 | -0.247 | 0.469 | 0.599 | 0.781 |
| Rich | -0.338 | 0.510 | 0.507 | 0.713 | -0.090 | 0.364 | 0.804 | 0.914 | -0.454 | 0.465 | 0.250 | 0.557 |
| Richest | -1.516 | 0.670 | 0.024 | 0.220 | 0.182 | 0.382 | 0.635 | 1.199 | -0.586 | 0.509 | 0.329 | 0.635 |

**Source:** EDULINK DATA, 2011 RC: Reference category RC for [a] is Normal weight **Nagelkerke $R^2$=0.579**

**Table 6.3c: A Multinomial Logistic Regression of background characteristics and Actual Body Mass Index (BMI)**

| Respondents' characteristics | ACTUAL BMI [a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | UNDERWEIGHT | | | | OVERWEIGHT | | | | OBESE | | | |
| | B | SE(B) | Sig. | Exp (B) | B | SE(B) | Sig. | Exp (B) | B | SE(B) | Sig. | Exp (B) |
| **Ethnicity** | | | | | | | | | | | | |
| Other tribes(RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Akan | 1.122 | 0.885 | 0.205 | 3.070 | 0.537 | 0.433 | 0.215 | 1.710 | -0.084 | 0.556 | 0.879 | 0.919 |
| Ga | 1.173 | 0.860 | 0.172 | 3.233 | 0.510 | 0.443 | 0.250 | 1.665 | 0.306 | 0.550 | 0.578 | 1.358 |
| Ewe | 1.719 | 1.020 | 0.092 | 5.577 | -0.327 | 0.735 | 0.656 | 0.721 | -0.478 | 0.858 | 0.577 | 0.620 |
| **Occupation** | | | | | | | | | | | | |
| Not working (RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Prof /mang/clerical | -0.204 | 0.630 | 0.746 | 0.815 | 0.849 | 0.560 | 0.130 | 2.338 | 0.648 | 0.729 | 0.374 | 1.912 |
| Sales & Services | -0.570 | 0.497 | 0.251 | 0.565 | 1.290 | 0.417 | 0.002 | 3.632 | 0.893 | 0.488 | 0.067 | 2.443 |
| Agricultural & manual work | -0.597 | 0.489 | 0.223 | 0.551 | 0.957 | 0.433 | 0.027 | 2.604 | 0.175 | 0.540 | 0.746 | 1.191 |
| **Smoking Status** | | | | | | | | | | | | |
| Non-smokers (RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Daily smokers | 0.488 | 0.901 | 0.588 | 1.629 | -0.331 | 0.746 | 0.657 | 0.718 | 0.037 | 1.310 | 0.977 | 1.038 |
| Occasional smokers | -0.042 | 0.513 | 0.935 | 0.959 | -0.589 | 0.433 | 0.174 | 0.555 | -0.398 | 0.562 | 0.479 | 0.672 |
| **Alcohol use** | | | | | | | | | | | | |
| Non-drinkers (RC) | 0 | | | 1.000 | 0 | | | 1.000 | 0 | | | 1.000 |
| Regular drinkers | -0.362 | 0.664 | 0.586 | 0.696 | -0.292 | 0.376 | 0.437 | 0.746 | -0.265 | 0.476 | 0.577 | 0.767 |
| Occasional drinkers | -0.155 | 0.408 | 0.704 | 0.857 | 0.003 | 0.290 | 0.992 | 1.003 | 0.156 | 0.368 | 0.672 | 1.169 |

**Source**: EDULINK DATA.2011 RC: Reference category R C for [a] is Normal weight **Nagelkerke $R^2$=0.579**

# CHAPTER SEVEN

## Summary, conclusion and recommendations

### 7.1 Introduction

Underweight, overweight and obese are important global public health concern because of their health implications. Although the health implications are known, their prevalence rates continue to increase in both developed and low and middle income countries (LMICs). It substantially increases the risk of morbidity and mortality globally and poses a threat to human development globally including countries in Sub-Saharan Africa.

Therefore, the study examined the association between perceived body weight and actual Body Mass Index (BMI) among the adult population in three urban poor communities in the Greater Accra Region of Ghana. Urban poor communities were chosen because they belong to the urban subgroup that has higher risk of under-nutrition and over-nutrition

The study also sought to find if perceived weight determines an individual's weight control practices and examined the relationship between an individual's socio-demographic characteristics and actual BMI. The study had three hypotheses: (1) Individuals who perceived themselves as underweight are less likely to be underweight compared to those who perceive themselves as normal weight; (2) Males are less likely to be obese compared to their female counterparts; and (3) current smokers are more likely to be underweight compared to non-smokers. These were based on the assertion that there are sex differentials of obesity and its risk, the prevalence rate of obesity is less among smokers than non-smokers and lastly, perceived weight may influence weight control strategies and subsequently BMI (Wang, 2009; Biritwum et al., 2005; Kuchler and Variyam, 2003).

The study was a quantitative and a cross-sectional study based on data from the second round of EDULINK Urban and Poverty survey gathered in November and December 2011 by the Regional Institute for Population Studies (RIPS). A sample of 700 individual men and women aged 15 to 59 years whose anthropometric measurements were obtained were analysed in the present study. The statistical techniques employed in the study included description of the respondents using frequencies and percentages. Cross tabulation also helped to explore the prevalence of BMI among individuals while a multinomial logistic regression analysis enabled the examination of the relationships among variables and BMI.

### 7.2 Summary of the study

The results of the study showed that, more females (54%) than males (46%) were sampled. The mean age of 31 years shows that averagely the respondents were young adults. Almost half (49%) of the respondents resided in Ussher Town and more than half (59%) belonged to the Ga Dangme ethnic group. Nearly 44% of the respondents had attained middle or Junior High school (JHS) while 5% had attained higher education. Those not in any union constituted about 42% while about a quarter (23%) were married.

Forty-two percent of the respondents were engaged in sales and services but only 1.6% was agricultural workers. They were fairly distributed in the poorer and richer category of wealth status (21.6% and 21.4% respectively). Those who occasionally drink alcohol constituted 45.1% while non-drinkers constituted 37.4%. While 3% of the respondents regularly smoked tobacco, more than three-quarters (83.1%) never smoked or used smokeless tobacco. The mean BMI of the respondents was 25.7kg/$m^2$ indicating that the study population was

overweight on average. Also, a little over half (52%) of respondents perceived themselves as normal weight while 9% considered themselves as underweight.

Associations were explored among variables using Pearson's chi-square statistical test ($p<0.05$). Perceived weight was statistically significantly associated with BMI. Essentially, underestimation of body weight was higher (79%) among those who perceived themselves as underweight: they were bigger than they perceived themselves to be [normal weight (74.6%), overweight (1.6%) and obese (3.2%)]. Overestimation of weight was also high among those who thought they were obese; 45% of respondents misperceived themselves as obese. However, they were thinner than they thought they were [underweight (1.1%), normal weight (13.8%) and overweight (29.9%)]. Perceived weight was significantly associated with weight management goals and diet.

Socio-demographic variables that had significant association with BMI included age, sex, educational level, marital status and type of occupation.

With respect to weight management goals, higher proportions of respondents in each category of weight perception wanted to maintain their weight: they did not want to gain or lose weight. However, among those who considered themselves as underweight, 23.8% wanted to gain weight. More than a third (38.5%) of those who perceived themselves as normal weight wanted to maintain their weight. Only, 7.9% of those who perceived themselves overweight wanted to lose weight, while a third (34.5%) of those who perceived themselves as obese wanted to lose weight. Although the respondents managed their weight (wanted to change or maintain their body weight), their perceptions influenced their dietary behaviour but not their levels of physical activity.

While most of them had high dietary diversity score, majority were physically inactive. For instance, while 78.3% of those who perceived themselves as being overweight had high dietary diversity score, 93.5% were physically inactive.

Associations were also explored among socio-demographic variables and weight control practices. Among the variables that were associated with physical activity levels were age, educational level, type of occupation and wealth. None of the socio-demographics had a significant association with diet.

Three different multinomial logistic models were built to determine the associations between variables and BMI. In the first model, the independent effect of perceived weight on BMI was examined. The second model examined the influence of physical activity with diet on BMI. Lastly, perceived weight was used as a predictor of BMI while controlling for demographic and socio-economic characteristics of the subjects. In all three models, a statistically significant association was found between perceived weight and BMI. The perceptions people had about their weight corresponded with their actual BMI status. Respondents who perceived themselves as underweight had higher likelihood to be underweight while those who perceived themselves overweight or obese had higher likelihoods to be overweight or obese compared to those who saw themselves as normal weight.

Also, the weight management goals of respondents were statistically significantly associated with actual BMI. Respondents who tried to lose weight had higher likelihood to be overweight or obese than those who did nothing about their weight. Also, the likelihood to lose weight was higher among those who tried to gain weight compared to those who did

nothing about their weight. Leisure-time physical activity was not significantly associated with BMI.

Demographic variables that were statistically significantly associated with BMI were sex, age, level of education, marital status and type of occupation. Males were less likely than females to be overweight or obese. As respondents advanced in age, the likelihood to be overweight or obese increased. There was a higher propensity for individuals in sales and service work to be overweight and obese compared to those with no work. The likelihood to be overweight was high among agricultural/manual workers than those with no work.

The study answered three main hypotheses. Respondents who perceived themselves as underweight were more likely to be underweight compared to those who perceived themselves as normal weight under a 90% confidence level. As a result, the first hypothesis was rejected. The second hypothesis was accepted under 99% confidence level; males had less likelihood to be overweight/obese than females. There was no enough statistical evidence to support the hypothesis that regular smokers are more likely to be underweight compared to non-smokers, therefore, the third hypothesis was rejected.

## 7.2 Conclusion

Perceived weight was significantly associated with actual BMI even after controlling for some confounders. Generally, respondents knew their weight and knew what was healthy and what was not. That is, underweight people wanted to gain weight while overweight and obese people wanted to lose weight. However, the perceptions individuals had about their weight influenced their dietary behaviour but not their engagement in physical activity.

The finding is similar to a cross-sectional study by Blokstra et al. (1999) among Dutch men and women which indicates that persons who perceived themselves as overweight and obese dieted ( less intake of caloric diets) to control their weight. Also, Lemon et al. (2009) reported different weight loss strategies among Massachusetts employees. Fifty one percent of 899 employees who perceived themselves to be overweight tried to lose weight using only dietary strategies. Benkeser et al. (2005) reported that, 17.7 % of Ghanaian women who tried to decrease weight did so by eating less food or food with fewer calories.

Other studies have reported more positive findings with respect to physical activity as a form of body weight management. Malinauskas et al. (2006) reported that 80 % of 185 US female college students who perceived themselves as overweight and consciously tried to lose or control their weight engaged in physical activity. Lemon et al. (2009) again reported that another 50.7% of Massachusetts employees used physical activities like walking, going to a gym or fitness centre, and doing other recreational activities as strategies to lose weight. However, 43.7% reported using both dietary strategies and physical activity to lose weight.

Females were significantly at higher risks of being overweight or obese compared to males. This, therefore, supported the hypothesis that males are less likely to be overweight or obese. There was not enough statistical evidence to say that there is a difference in the body weight of persons who smoke regularly and those who do not smoke. An individual becomes more predisposed to overweight and obesity as he/she advances in age.

### 7.3 Recommendations

It was found in the present study that a higher proportion of the respondents do not have adequate perceptions about their weight. Yet, they do not want to do anything about their weight. Based on these findings, it is imperative to understand the prevailing cultural norms

around body weight and weight management which was lacking in the present study's data. This calls for further research, particularly, qualitative studies to help understand the socio-cultural perceptions of what healthy body weight are in the study of BMI in the study areas.

Findings suggest that females have higher likelihood of being overweight or obese and also healthy eating has influence on lower BMI; it is therefore important to ensure a continual sensitization of the regenerative health policy on healthy diet especially among women.

Findings from the present study also show that as an individual advances in age, the likelihood of being overweight or obese increases. Based on this, intervention programs should target individuals especially the economically productive age group (the middle-aged and elderly) who are likely to be at risk of other conditions such as hypertension, diabetes and other chronic conditions.

Although physical activity is not significantly associated with BMI in this study, a higher proportion of the respondents were however physically inactive. Being physically inactive puts them at a higher risk of obesity (Weinsier et al., 1998). Therefore, it can be recommended that there should be an intensification of leisure-time physical activity education coupled with the regenerative health programme among the populace.

Also, physical activity levels were low among respondents who wanted to manage or control their weight. This may put them at risk of further weight gain (Brener et al., 2004). For effective weight control, awareness creation on the importance of engaging in both physical activity and healthy dietary practices should be strengthened in urban poor communities.

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# APPENDICES

## Appendix A

**Table 2.14a Percentage distribution of food groups eaten by respondents in 7days**

| FOOD GROUPS | Yes (%) | No (%) |
|---|---|---|
| Starchy foods | 99.9 | 0.1 |
| Vegetables | 97.0 | 3.0 |
| Meat and Fish | 96.1 | 3.9 |
| Fruits | 88.1 | 11.9 |
| Sugar and sugary foods | 81.7 | 18.3 |
| Fats and Oils | 77.0 | 23.0 |
| Eggs | 72.9 | 27.1 |
| Milk and Diary | 60.1 | 39.9 |
| Pulses | 58.4 | 41.6 |

Source: EDULINK Data, 2011

## Appendix B

**JAMES TOWN**

| **Recreational Center** | **Activity undertaken** |
|---|---|
| Manstse Agonaa Park | Foot ball |
| Wingo Court | Basket Ball |
| Sacred Heart Technical School | Hand ball and Basket Ball |
| Fire Service Training School | Football, Hand ball, and Jogging |
| James Town round about | Foot ball |
| James Town Police Station | Foot ball |
| James Town Beach | Jogging, football, swimming and general exercise |
| Korle lagoon area | foot ball |
| Assembly spot | Playing of Draft and playing cards. |
| Gamada Premises | Boxing and theatre |

**USSHER TOWN**

| | |
|---|---|
| Bukom Park | Football and jogging. |
| Ussher Town Beach | Football, jogging, swimming and general exercise |
| Osekan Park | Football and jogging. |
| Ussher fort Garden | Football and playing cards. |
| Creole Town | Football and drumming and dancing |
| Ussher fort | Boxing gym |

# APPENDIX C

**Fig 1: Ghanaian men figural models (**Duda et al., 2007**)**

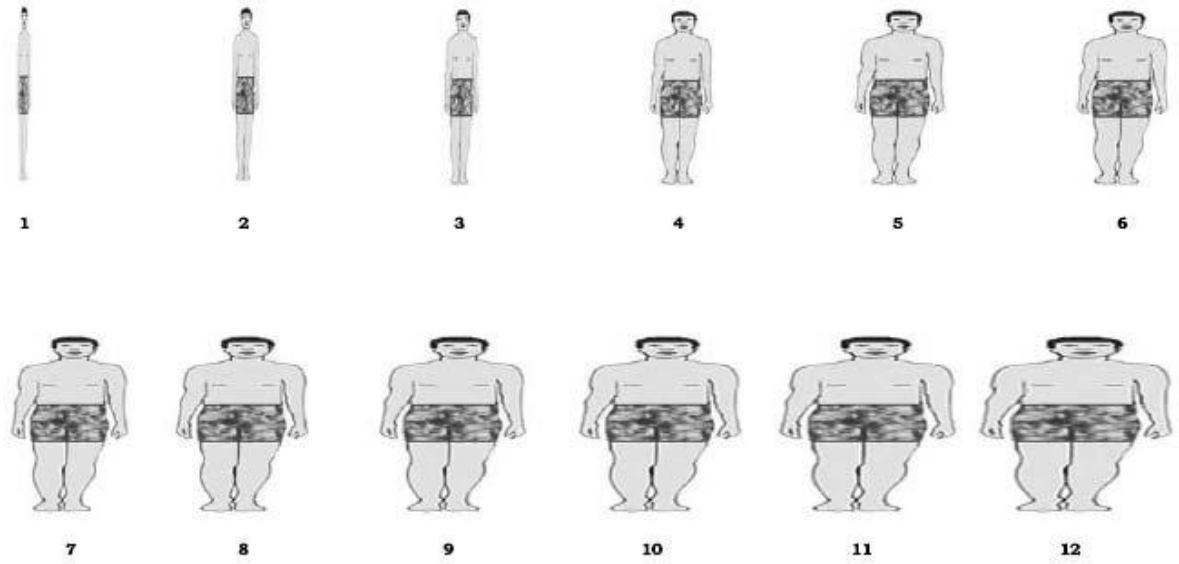


**Fig 2: Women figural models (**Duda et al., 2007**)**