UNIVERSITY FOR DEVELOPMENT STUDIES

PREVALENCE OF OBESITY AND RELATED EXPOSURES AMONG ADULT TRADERS IN THE KASSENA-NANKANA MUNICIPALITY

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BY

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DECLARATION

STUDENT

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

Candidate's signature…… Date ……

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Supervisor

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with guidelines on supervision of thesis laid down by the University for Development Studies.

Principal Supervisor's Signature …… Date……

Name: Dr. Nafiu Amidu

DEDICATION

I dedicate this work to God Almighty for his unceasing guidance, protection and help through my study period. I also dedicate this work to my love ones who in diverse ways have contributed their quota towards making this a success.

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ABSTRACT

Kassena-Nankana municipality is a fast developing municipality and as a result cannot do away with the consequences of urbanization of overweight, obesity and related exposures, which included genetic factors. The aim of my study was to assess the prevalence of overweight, obesity and related exposures of traders of age 15 years and above. This was a descriptive cross-sectional study of overweight and obesity in the Kassena-Nankana Municipality conducted in the Navrongo central market. Structured interview guide questionnaire, UNICEF UNISCALES and microtoise, Blood Pressure apparatus and tape measure were used for the data collection. Respondents' levels of physical activity and 24-hour dietary recall were also assessed. The study involved 322 respondents of ages 15 years and above. The prevalence of overweight using BMI classification was 31.1% of which 40.9% were males and 28.5% were females whiles obesity was 9.0% of which 30.3% were males and 28.5% were females. Using waist to hip ratio (WHR) classification, the prevalence of overweight was 26.7% whiles obesity was 36.3% of which 42.4% were males and 34.8% were females. The prevalence of hypertension among the traders was 37.0% of which 27.3% were males and 39.5% respectively. Cereals were widely consumed by study participants. The study revealed that, majority of the participants were not consciously exercising. Overweight, physical inactivity, operating shop trading system, hypertension, age, and cigarette smoking are some of risk factors of obesity among traders in Kasena-Nankan Municipality. Regenerative health and nutrition education as well as making known the benefits of being physically active will go a long way to reduce overweight/obesity related exposures in the municipality.

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LIST OF ACRONYMS

BMI	Body Mass Index
BP	Blood Pressure
BVI	Body Volume Index
CM	Centimeters
DALYs	Disability Adjusted Life years
DBP	Diastolic Blood Pressure
GDHS	Ghana Demographic and Health Survey
GHS	Ghana Health Service
HC	Hip Circumference
WHO	World Health Organization
M	Meters
Kg/mm	Kilograms per square meters
mmHg	Millimeters of mercury
n	Number
UDS	University for Development Studies

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Overweight/obesity is having more body fat than is optimally needed by the body to be healthy. Being overweight/obese is common especially where food supplies are plentiful and lifestyles are sedentary. A healthy body requires a minimum amount of fat for proper functioning of the hormonal, reproductive, and immune systems, as thermal insulation, as shock absorption for sensitive areas, and as energy for future use. But the accumulation of too much storage fat can impair movement, flexibility, and alter appearance of the body (Berrios et al., 1997). The degree to which a person is overweight is generally described by body mass index (BMI). The BMI method is used as an international standard of assessing overweight /obesity among adult populations. The index is calculated using an individual's weight and height. To obtain BMI, the weight of an individual in kilograms is divided by his/her height in meters squared.

Overweight is defined as a BMI of 25-29.5kg/m2, thus it includes pre-obesity defined as a BMI between 25kg/m2 and 30kg/m2 and obesity as defined by a BMI of 30 or more (≥30kg/m2) (WHO, 2013b). Pre-obese and overweight however are often used interchangeably thus giving overweight a common definition of a BMI of between 25 - 30kg/m2. There are however several other ways to measure the amount of adiposity or fat present in an individual's body. Nutritionally, overweight and obesity could be determined by anthropometric indicators, body mass index (BMI), Body volume index (BVI), skin fold calipers or "pinch test", simple weighing, bioelectrical impedance analysis (BIA), hydrostatic weighing and dual-energy-X-ray absorptiometry (Field, Willett, Lissner, & Colditz, 2007).

Overweight affects all age groups of people in the human population. Excess weight has reached epidemic proportions globally, with more than 1 billion adults being either overweight or obese. In 2013 this increased to 2 billion people (WHO, 2013b).

According to Biritwum, Gyapong, and Mensah (2005), the prevalence of obesity was found to be 5.5% in Ghana and was higher among females (7.4%) compared with males (2.8%). A study conducted in Kumasi in the Ashanti region of Ghana by Owiredu (2008), found a much higher prevalence of obesity among sedentary workers (17.4%) compared with active subjects (5.9%) using body mass index creteria, and using waist to hip ratio, the prevalence of central obesity was found to be 27.9% to 2.9% respectively. Among civil servant in Tamale metropolis of the Northern region of Ghana, obesity was reported to be 31.2% (Mogre, Mwinlenaa, Oladele, & Amalba, 2012).

Being overweight is generally caused by the intake of more calories (by eating) than are expended by the body (by exercise and everyday living). Factors that may contribute to this imbalance include: overeating, limited physical exercise, hormonal imbalances, genetic predisposition, stress and alcoholism amongst others (Garrow, 1986).

Poor diet (high consumption of sugar, salt, saturated fat, etc) and unhealthy lifestyle (smoking, alcohol consumption and physical inactivity) have been identified as major risk factors of overweight and obesity, cardiovascular disease and other non-communicable diseases (NCDs) which may eventually lead to death (He et al., 2002; He et al., 1999).

1.2 PROBLEM STATEMENT

Overweight and obesity have become as common as non-communicable diseases condition in some parts of the country. Globally in 2013, 2 billion adults were overweight or obese

(WHO, 2013b), though different countries and regions are at different stages of obesity epidemic, sub-Saharan Africa as a whole is at the center of most rapid demographic and epidemiologic transitions in world history but the matter of concern is that, the prevalence of obesity is still not properly documented and thus unknown. Though some studies have been carried out in Accra (Amoah, 2003; Biritwum et al., 2005), Kumasi (Owiredu, 2008), Tamale (Mogre et al., 2012) to assess obesity prevalence , that of Kassena-Nankana Municipality is still unknown.

1.3 SIGNIFICANCE OF STUDY

Traders and market women in Kassena-Nankana Municipality basically are sedentary workers and being sedentary workers exposes them to risk of becoming overweight or obese. Overweight and obesity predispose an individual to unhealthy conditions more especially type 2 diabetes mellitus and cardiovascular diseases. This study hopes to bring to bare the nature and magnitude of the problem to allow a viable ground for the targeted group to better understand their health needs and to appreciate effective existing and incoming interventions that could address the problem. Also the related exposures which are not immediately seen could be well understood by the targeted group and general populace through an accelerated drive of nutrition sensitive interventions present. The study will also provide a data base on overweight and obesity for the municipality since there is scarce/no data in that regard.

1.4 OBJECTIVES

The aim of the study is to determine the prevalence of overweight, obesity and related exposures of traders of age 15years and above in Kassena-Nankana Municipality.

1.5 SPECIFIC OBJECTIVES

1. To determine the BMI of the participating traders
2. To determine the level of physical activity of the traders
3. To assess the diet and eating practices of the participating traders.
4. To determine the prevalence of overweight and obesity among traders

1.6 RESEARCH QUESTIONS

1. What are the BMIs of the traders?
2. What are their levels of physical activity?
3. What make up their diet and how frequent do they consume them?

1.7 ORGANIZATION OF THESIS

Chapter one, is about the introduction of the study topic. Chapter two is the literature review where I review previous work related to my research topic. Chapter three is methodology, which talks about the design used to conduct the study, the outline of the research setting, sampling size determination, statistical analysis and ethical considerations. In chapter four, I presented my findings which include; prevalence of overweight, obesity and related exposures. Chapter five is the discussion where I report on the effects of certain variables to the development of overweight/obesity related

conditions, recommended and concluded based on my findings on the prevalence of overweight, obesity and related exposures in the Kassena-Nankana Municipality.

CHAPTER TWO

Literature review

2.1 MAGNITUDE AND CONSEQUENCES OF OBESITY

Obesity is defined as having excessive amount of body fats (Marie, 2006). Obesity is more than a mere concern because it increases the risks of diseases and health problems. Being extremely obese means one is likely to get health problems related to weight gain (Marie, 2006).

According to WHO (2007), at least 2.8 million people die each year globally as a result of being overweight or obese, and an estimated 35.8 million (2.3%) of global DALYs are caused by overweight or obese (Cope & Allison, 2008). There is a worldwide obesity epidemic with the prevalence of overweight and obesity exceeding 50% in almost all the regions of the world (Balkau et al., 2007).

Over the past three decades, this epidemic has affected the industrialized countries, with some areas of North America, Europe and Asia having more than threefold increase in the prevalence of obesity (Fezeu et al., 2008; Wilson, D'Agostino, Parise, Sullivan, & Meigs, 2005). In recent times, low and medium income countries have joined the obesity epidemic and the increase has been faster in these countries (Fezeu et al., 2008; Wilson et al., 2005). According to the world health organization, there were about 1.6 billion overweight adults aged 15 years and above and at least 400 million adults are obese worldwide in 2005. According to available data in 2004, from the global database on body mass index launched on the WHO website, the worldwide prevalence of being overweight in 2004 has been found to rang from less than 15% in Eritrea to more than 50% in the USA, Seychelles, New Zealand and Australia.

Overweight and obesity have several health consequences; they are a major risk factor for the global burden of non-communicable diseases (NCDs) including diabetes, heart diseases, hypertension, stroke and some cancers (Steyn & Damasceno, 2006). Obesity and overweight are the fifth leading causes of global deaths with about three million adults dying each year from being obese or overweight (WHO, 2008). Other health related problems associated with obesity include increasing disability adjusted life years (DALYs), premature death, reduction in life expectancy and high cost of health care (Swinburn, Caterson, Seidell, & James, 2004).

Cultural attitudes about fatness take a special toll on women. Astrup says that women, especially in black populations think being overweight is something that is beautiful and attractive. Among certain tribes in Nigeria, women are traditionally fattened up before marriage to make them seem more attractive and healthy to their future husbands. Also contributing to the weight problem among Nigerian women, younger women there are not allowed to play sports or walk outside without an escort. A study in Cameroun of anthropometric measurement of prevalence of obesity in urban adult population found in a high prevalence of overweight and obesity in subjects over 35 years of age and among women (Kamadjeu et al., 2006). However (Sobngwi, Mauvais-Jarvis, Vexiau, Mbanya, & Gautier, 2002), found a contrary estimated prevalence of obesity based on BMI to be 17.1% in women and 5.4% in men in urban Cameroun significantly lower than Kamadjeu's study.

Without effective government intervention, and a change in cultural attitudes, sub-Saharan Africa's obesity epidemic is likely to worsen in the coming years, bringing yet more medical horrors to its beleaguered population.

2.2 PATHOPHYSIOLOGY OF OBESITY

A sophisticated interplay between each individual's genetic predisposition and their environment affect an intricate system that controls appetite and energy expenditure and hence energy balances (Kaner et al., 2007). Obesity can develop only as a result of an imbalance between energy intake and energy expenditure (Dustmann, Glitz, & Frattini, 2008). To fully understand the cause of obesity, one has to first understand the complex way in which positive energy balance can occur. According to (Fuster et al., 2006), Total Energy Expenditure is the sum of Resting Energy, Energy Expenditure, thermal effect of Food and Physical Activity related to Energy Expenditure. Resting Energy Expenditure which is required by the body to maintain basic physiologic functions such as blood pumping by the heart, making hormones and maintaining body temperature expend majority of human energy (60-80%). Physical activity related energy expenditure is the component of energy expenditure that is most under voluntary control because it is influenced most strongly by the amount of physical activity. Physical activity related energy expenditure is the variable component of energy expenditure and can easily form 10% of total energy expenditure in sedentary persons to 40% of total energy expenditure in highly active persons. Total energy expenditure is the increase energy expenditure associated with digestion, absorption and storage of ingested macronutrients usually 7 to 10% of total calorie content of the meal.

Energy intake and expenditure are both influenced by genetic and environmental factors surrounding us. Energy intake can also influence energy expenditure and vice versa. When energy intake is higher than energy expenditure, the excess energy is stored in the human being as protein, carbohydrates or fats, but the body stores has very limited capacity for both proteins (in the muscle and organs) and carbohydrates (as glucose and glycogen). The body are virtually unlimited capacity to store fat in the adipose tissue and thus obesity may result

(Fuster et al., 2006).

2.3 NUTRITION SURVEILLANCE SYSTEMS

The overall goal of ensuring proper nutrition for the vulnerable group of people and advocacy for proper food choices of the entire municipal population lies in the hands of the nutrition unit of the district health administration. This encompasses health food choices and lifestyle of the people. The unit has two (2) nutrition officers who are situated at the district level and two (2) including public health nurses, community health nurses, enrolled nurses, midwives, staff nurses whose capacities have been built take up nutrition activities at the community level.

2.4 OBESITY IN ADULTS

Obesity can be defined as the excessive deposition of body fat to the point where it impairs the health of the individual and it is a leading cause of preventable illness and deaths worldwide (Cope & Allison, 2008). In simple terms obesity is a state of imbalance between calories consumed and energy expended which will lead to excessive accumulation of fat in the body (Thounaojam, Nammi, & Jadeja, 2015). This fat deposition may be generalized or may occur preferentially in different components of adipose tissue.

Compare to men, women suffer a disproportional burden of disease attributable to overweight and obesity. Studies have revealed that female obesity is fast becoming a dietary factor globally. Nearly 50% of all Hispanic Americans and African Americans

women are overweight. The link between diabetes and obesity is particularly pronounced in women and there have been a 32 percent increase in women with diabetes.

Diabetes negatively impacts the health of women in many ways. Being overweight or obese increase the relative risks of coronary artery disease (CAD) in women. Women who are obese are at higher risks of lower back pain and knee osteoarthritis. Obesity negatively affects both contraception and fertility as well. Maternal obesity is linked with higher rates of cesarean section as well as higher risk of obstetrical conditions. According to the world health organization, 26% of non-pregnant women between 20-39 years are overweight and 29% are obese (WHO, 2008).

Determinants of obesity can be related to either dietary intake or physical activity or both, and they can be genetic, psychosocial behavioral or environmental. Determinants of obesity can also vary depending on other factors such as age of the person. Previously, much emphasis was placed on individual risk factors for obesity, recent reviews and recommendations have focused environmental factors in the development of obesity (WHO, 2008). The environment in which we live in is described as 'obseogenic' (obesity promoting or toxic environment) because of the decrease in opportunities for physical activity (Marie, 2006). Excess weight accumulation occurs with an imbalance in energy, caused by either a surplus of energy intake or lack of energy expenditure (Physical activity).

2.5 DETERMINANTS OF OVERWEIGHT, OBESITY AND HYPERTENSION

The factors influencing overweight, obesity, and hypertension can be group under two main headings, which are genetic factors and socio-demographic factors (age, gender,

physical activity, alcohol consumption, smoking and education).

2.5.1 Genetic Factors

Like many other medical conditions, obesity is the result of interplay between genetic and environmental factors as well as some socio-demographic factors. Polymorphisms in various genes controlling appetite and metabolism predispose individual to obesity under certain dietary conditions (Yang & Kelly, 2007). The percentage of obesity that can be attributed to genetics varies widely from 6 % to 85%, depending on the population examined (Yang & Kelly, 2007). As of 2006, more than 41 sites on the human genome have been linked to the development of obesity when a favorable environment is present (Poirier et al., 2006).

The obesity epidemic is attributable to dietary and behavioral trends acting on a person's genetic makeup to determine body mass and susceptibility to obesity-related disease. Common forms of obesity have a strong hereditary component, yet genetic pathways that contribute to obesity have not yet been elucidated. Many genetic association studies have been reported but few have been successfully replicated. Discovery of the genes involved in the development of common forms of obesity, thereby identifying pathways that are causal in patient (Kopelman, 2000).

It is clear that obesity often tracks in families. Having obese relatives increases one's risk for obesity, even if the family members do not live together or share the same patterns of exercise and food intake. Family studies and twin studies yield estimates of the fraction of the variation, or in the population that can be attributed to inherited variation, or the heritability. Estimates of heritability range from 30 to 70% with the typical estimate at 50% meaning about one-half of the variation in body mass within a population is a result

of inherited factors. Common forms of obesity are not inherited in families in a predictable pattern like cystic fibrobosis or Huntington's disease but rather show a complex parttern of segregation, meaning that multiple genes are involved. Because of his complex genetic traits. A few studies have suggested that there are genes that act in a recessive manner and can explain a larger fraction of the variation in body mass (Wilson et al., 2005). These results have not been consistently observed and may also reflect the patterns seen in early-onset, severe obesity caused by one or few genes rather than the more common polyenic and later-onset obesity observed in the general population. Thus each of the obesity genes likely makes only a small contribution to body weight but together inherited variation plays a large role in determining how an individual responds to the environmental factors of diet and physical activity (Wilson et al., 2005).

More than 50genes have been examined in association studies with hypertension, and the number is constantly growing (Dickson & Sigmund, 2006). One of these genes is the angiotensinogen (AGT) gene, studied extensively by Kim et al. They showed that increasing the number of AGT increases the blood pressure and hence this may cause hypertension (Dickson & Sigmund, 2006). Twins have been included in studies measuring ambulatory blood pressure; from these studies it has been suggested that essential contains a large genetic influence (Dickson & Sigmund, 2006).

However, the genetic influence on hypertension is not fully understood at the moment. It is believed that linking hypertension-related phenotypes with specific variations of the genome may yield definitive evidence of heritability (Kotchen et al., 2000). Another view is that hypertension can be caused by mutations in single genes, inherited on a Mendelian basis (Anastos et al., 1991).

2.5.2 Socio-demographic and Environmental Factors

The proportion of fat deposited in the abdomen increases as body shape becomes more android with age, due to decreasing height and increasing slackness of abdominal wall muscle (Mogre et al., 2012). During adulthood, weight gain occurs in the abdominal region, emphasizing the importance of hypertrophic obesity, which is generally android (Kaye, Folsom, Prineas, Potter, & Gapstur, 1990). This change in the adult figure may influence the positive association between age and excess abdominal adiposity, measured by waist-to-hip ratio (Lanska, Lanska, Hartz, & Rimm, 1984).

With obesity being refered to as an epidemic in current times in every nataion, this worldwide trend is best described by the new word ‘globosity’ with the environmental predicted to be the prime cause of the morden obesity. The environment we live in affects our physical activity and nutrition. People need to have lively pastime. Instead, they have become used to a sedentary pastime; video games, television, movies and today’s prefferd pastimes (Gruberg et al., 2002).

The trend of eating fast food is increasing day by day. People are eating out at fast food restaurants more often so they have less control over how much fat, sugar and salt they consumed. People are not interested in walking because driving is often the easiest option. This habit not only harms the people but it takes its toll on environment by causing environmental pollution. Things like escalators, elevators, computers, cell phones and several kinds of washing machines reduce the need for physical activity. There is a common belief that physical activity is limited to sports men and women. This may leave people feeling like theey have limited options for activity (Höfelmann, Antunes, Silva, & Peres, 2012). Fast food and junk food advertisers purposely target children whom they

know have increasing purchasing power (Höfelmann et al., 2012).

According to Owiredu et al (2008), most Ghanaians eat more fried and fatty foods, souces and soups than it was in the past decades. Lifestyle factors such as alcohol consumption, lack of physical activity and eating habits rather than energy source is associated with increase weight gain, BMI and waist to hip ratio (Razak et al., 2007). This however is in accordance with a study by Biritwum et al. (2005), in which those addicted to alcohol had higher proportion of obesity in Ghana.

Age is a recognized risk factor for high blood pressure. While a great deal is understood about the contribution of age to overall risk profile, the issue remains complicated and there is continued debate about several key points. Some researchers believe that changes in blood vessels that occur with age explain this finding (Williamson et al., 1991). Others believe that experimental data points more closely to other, related, factors, and that age, by itself, is not really an independent risk factor (Albert, Glynn, Buring, & Ridker, 2006).

2.5.3 Diet

It's no secret that the amount of calories people eat and drink has a direct impact on their weight. Conventional wisdom says that since a calorie is a Calorie, regardless of its source, the best advice for weight control is simply to eat less and exercise more. For good health, the type of fat people eat is far more important than the quantity consumed and there is some evidence that, the same may be true for weight control (Field et al., 2007; Matsuzawa, Shimomura, Nakamura, Keno, & Tokunaga, 1994).

People who ate more red and processed meat over the course of a study by

Matsuzawa et al. (1994), gained more weight (about a pound extra every four years).There's convincing evidence that sugary drinks increase the risk of weight gain, obesity, and diabetes (Hu, 2003; Malik, Willett, & Hu, 2009; Vartanian, Schwartz, & Brownell, 2007). There is some evidence that skipping breakfast increases the risk of weight gain and obesity, though the evidence is stronger in children, especially teens, than it is in adults (Albert et al., 2006). People don't eat nutrients or foods in isolation. They eat meals that fall into an overall eating pattern and researchers have begun exploring whether particular diet or meal patterns help with weight control or contribute to weight gain.

Portion sizes have also increased dramatically over the past three decades; as has consumption of fast food (Poti & Popkin, 2011). Ll.S, children, for example, consume a greater percentage of calories from fast food than they do from school food and these trends are also thought to be contributors to the obesity epidemic (Poti & Popkin, 2011).

In addition to reduced BP, clinical trials have documented that a reduced sodium intake can prevent hypertension (relative risk reduction of ""20% with or without concomitant weight loss) (He et al., 2002) can lower BP in the setting of antihypertensive medication (Appel et al., 2001) and can facilitate hypertension control (He et al., 2002; Langford et al., 1985). Studies have shown that, reduced salt intake is associated with a reduced risk of atherosclerotic cardiovascular events and congestive heart failure (He et al., 2002).

Potassium reduces BP to a greater extent in blacks than in whites (He et al., 1999). In several trials, the effects of increased potassium intake in blacks have been

particularly striking (He et al., 2002). Another trial documented that increased fruit and vegetableconsumption lowers BP, but it did not specify the amount of potassium provided in the fruits and vegetables (John, Hanke, Rumpf, & Thyrian, 2005).

2.5.4 Physical activity

Garrow (1986), reported that the changes in fitness and body composition which accompany physical training in people of normal weight would be very valuable in the treatment of obesity. However, one of the most marked disabilities arising from obesity is a reduced exercise tolerance; therefore, severely obese patients are unable to perform the exercise which would bring these benefits (Garrow, 1986). It has been suggested that exercise may confer benefits on the obese person by reducing voluntary food intake, or by causing a prolonged elevation of metabolic rate. Obesity is best treated by a combination of dietary restriction and exercise. The more severe the issue of obesity, the more important the diet component of treatment; but exercise becomes more important with the management of mild obesity or the prevention of obesity (Garrow, 1986).

Exercise as a lifestyle modification is beneficial to a wide variety of health conditions. Specific to hypertension, the benefits of exercise have been promoted by a number of organizations and agencies including the American Heart Association, the American College of Sports Medicine and the Surgeon General of the United States, the National Institutes of Health, and the Centers

for Disease Control (Wallace, 2003). Although hypertension studies are ongoing, there is an ample amount of research support that provides clear evidence of the positive effects of exercise on lowering blood pressure in hypertensive persons (Wallace, 2003).

2.5.5 Alcohol consumption

Alcohol accounts for nearly 10 per cent of the calorie intake amongst adults who drink (Gatineau & Mathrani, 2012). It has an energy value of 7kcaljg, second only to fat which is the most energy dense macronutrient at 9kcaljg; therefore daily energy intake may rise considerably when alcohol is consumed (Gatineau & Mathrani, 2012). As well as being unaware of the calories contained in alcoholic drinks, people often fail to include them in their assessment of daily calorie consumption; Alcohol is more closely linked to weight gain when consumed in large amounts (Gatineau & Mathrani, 2012).

Extensive research has shown that moderate alcohol intake is associated with health benefits, including less cardiovascular disease, diabetes and hypertension. Nakanishi, Suzuki, and Tatara (2003), reports that over consumption of alcohol is associated with an increased prevalence of hypertension among men and women.

2.5.6 Gender

Women have higher tendency of depositing adipocyte as compare to men (Field et al., 2007). Worldwide, gender differences are more pronounced with, 10% of men and 14% of women obese (WHO, 2005). Men are more likely to

carry excess fat around their abdomen (referred to as "apple shaped"), which is riskier than carrying weight around the hips and thighs (referred to as "pear shaped") as many women do (Matsuzawa et al., 1994).

Overweight men also tend to have more visceral fat which substantially increases their risk of heart disease, metabolic syndrome and diabetes (Matsuzawa et al., 1994). However, after menopause, visceral fat levels rise rapidly in overweight women to comparable levels found in heavier men (Matsuzawa et al., 1994). This rise evens out the health risks of obesity between genders later in life. As such, calls to action to reduce the prevalence of obesity generally do not differentiate between men and women.

Men are at greater risk for cardiovascular and renal disease than are age- matched, premenopausal women (Poirier et al., 2006). Recent studies using the technique of 24-hour ambulatory blood pressure monitoring have shown that blood pressure is higher in men than in women at similar ages (Poirier et al., 2006). After menopause, however, blood pressure increases in women to levels even higher than in men (Poirier et al., 2006). The Third National Health and Nutrition Evaluation Survey (NHANFSIII) showed that, in general, men had higher blood pressure than women through middle age (Burt et al., 1995). Furthermore, the incidence of uncontrolled hypertension is also greater in men than in women (Anastos et al., 1991). After menopause, however, blood pressure increases in women as well (Anastos et al., 1991).

2.5.7 Education

The existing evidence concerning the relationship between education, hypertension and obesity is relatively limited, as the main focus of most research has been more broadly on the links between socio-economic factors and health status, or longevity; with a smaller number of studies focusing on lifestyles and obesity in particular. The evidence available, covering a number of OECD countries, generally shows strong associations between education and obesity. However, there have been only few studies that have investigated the causal effects of education on obesity and hypertension, and these studies have reported mixed results.

Cutler and Lleras-Muney (2006), found that those with more years of schooling are less likely to smoke, to over-consume alcohol, to be overweight or obese or to use illegal drugs. Similarly, the better educated are more likely to exercise and to obtain preventive care such as flu shots, vaccines, mammograms, pap smears and colonoscopies. They also found the relationship between education and health appears to be non-linear for obesity, with increasing effects of additional years of schooling.

2.5.8 Smoking

The relation between smoking and obesity is incompletely understood. On the one hand, nicotine acutely increases energy expenditure (EE) (Hofstetter, Schutz, Jéquier, & Wahren, 1986) and could reduce appetite; which explains why smoker tend to have lower body weight than non-smokers and why smoking cessation is frequently followed by weight gain (Ward, Klesges, & Vander Weg, 2001;

Williamson et al., 1991). Moreover, a belief popular among both smokers and non-smokers is that smoking is an efficient way to control body weight (Potter, Pederson, Chan, Aubut, & Koval, 2004). On the other hand, studies indicate that heavy smokers (those smoking a greater number of cigarette per day) have greater body weight than do light smokers (Bamia, Trichopoulou, Lenas, & Trichopoulos, 2004; Chiolero, Jacot-Sadowski, Faeh, Paccaud, & Cornuz, 2007; John et al., 2005) and that there is a clustering of smoking, obesity, and lower socio-economic status, at least in developed countries (Houston et al., 2006; Ward et al., 2001). Finally, there is increasing evidence that smoking affects body fat distribution and it is associated with central obesity and insulin resistance (Houston et al., 2006).

Tobacco use is the most common cause of avoidable cardiovascular mortality worldwide (Teo et al., 2006). There are now 1.3 billion cigarette smokers worldwide; of which 82 percent are in developing countries and if current practices continue, there will be an estimated one billion tobacco-related deaths during the 21st century (Teo et al., 2006). The immediate noxious effects of smoking are related to sympathetic nervous over activity, which increases myocardial oxygen consumption through a rise in blood pressure, heart rate, and myocardial contractility (Dickson & Sigmund, 2006). The incidence of hypertension is increased among those who smoke 15 or more cigarettes per day (Bowman, Gaziano, Buring, & Sesso, 2007), and the coexistence of hypertension and smoking decreases left ventricular function in asymptomatic people (Rosen et al., 2006).

2.6 ANTHROPOMETRIC INDECIES

Anthropometric measurements continue to play an important role in clinical practice, in spite of the several instruments that are available for the measurement of the total body fat and its distribution (Kushner, 1992). Since recurrent laboratory test are time consuming and expensive, using anthropometric criteria that are accessible and economical can be helpful in diagnosing diseases and their prognosis (Rahimian *et al.,* 2006). Body mass index (BMI) waist circumference (WC), waist-to-hip rarion (WHR) and waist-to-height ratio (WHtR) have been known to be functional in the assessment of body fat content and distribution and prediction of caradiovascular diseases (Kopelman, 2000).

Anthropometric indices include height, weight, head circumference, body mass index (BMI) triceps skin folds thickness (TSF), and upper arm circumference (MUAC) (Qureshi et al., 2002). Application of anthropometry requires two essential items: an anthropometric indicator and a cutoff point. The indictors often called, an anthropometric index, is an estimate or a combination of measurements made in the field such as weight and height or the combination of measurement with additional data, such as age. Anthropometric indices can be influenced by race, inheritance and nutrition.

Various indices reveal different compounds of nutritional status. Forinstance waist for height indicates thinness, and because acutely undernourished persons generally lose body weight but not height, weight for height decreases with acute under nutrition. Additionally, in clinical practice, the use of the birth of a new born is a significant indicator of a neonatal and post-natal infant measurements of health during the vulnerable periods of life and gives an indication of health of the society because it is sensitive to environmental and socio-economic influences (Kumar & Datta, 1984).

2.6.1 Waist circumference

Waist circumference (WC) is a practical measure of intra-abdominal fat mass (Pouliot et al., 1994) and recommendations have been made to use it in the identification of people in need of inventions for cardiovascular risk reduction (Zhu, Hinds, Kim, Shen, & Sioutas, 2002). WC is closely associated with systolic and diastolic blood pressures but weakly associated with total cholesterol and blood sugar (Owiredu, 2008). Notwithstanding the close association between central adiposity and cardiovascular risks, some controversy regarding the best anthropometric index for central adiposity still exists. WC is considered to be a better correlate of cardiovascular risks factors than WHR (Lean, Han, & Morrison, 1995).

BMI, WC, WHR, WHtR have now been found to be closely related to cardiovascular risks factors (Lakka et al., 2002). However, WC is found to be better estimate of abdominal visceral adipose accumulation than WRH and may be a better predictor of multiple cardiovascular risk factors than WHR when compared tomographic scanning is used to measure adipose tissue (Hsieh & Yoshinaga, 1995). It has been established that the means of waist circumference and fat age increase with age. Central obesity is measured by an increase in waist circumference (WC) or waist–to-hip ratio (Montague & O'Rahilly, 2000).

Furthermore, central distribution of body fat, which suggests excusive deposition of intra-abdominal fat, is also found to be an important predictor of cardiovascular risk such as blood pressure, plasma lipid levels, and glucose concentrations across ethnic groups (Lakka et al., 2002). The waist circumference (WC), waist-to-hip ratio (WHR), and waist-to-height ratio (WHrR) are used as surrogates for fat centralization (Gallagher et al., 1996; Pouliot et al., 1994). The importance of central obesity as a cardiovascular risk factor has been described in a study (Hsieh & Yoshinaga, 1995).

2.6.2 Waist-to-hip and waist-height ratio

Waist-to-hip ratio (WHR) is by far the most widely used index of central fat distribution due to its benefits in routine monitoring and assessment of patients WHR and WHtR are main predictors for DM and hypertension in working aged men and women (Bloemer, De Ruyter, & Wetzels, 1999). Waist-to-hip ration gave more sensitive valves (10.8%) than waist circumference (1.6%) for abdominal obesity in a study on anthropometric indices and lifestyle practices of the indigenous orange Asli adults in Lembah Belum (Razak et al., 2007).

2.6.3 Body fat percentage

The body fat percentage of a person is the total weight of aft divided by total eight: body fat includes essential body fat and storage body fat. Essential body fat is necessary to maintain life and reproductive functions. The percentage of essential body fat for women is greater than for men due to the demands of child bearing and hormonal functions. The percentage of essential body fat is 2-5% in men, and 10-13% in women (ACE, 2009).

Storage body fat consists of fat accumulation in adipose tissues, part of which protect internal organ in the chest and abdomen. The minimum recommended total body fat percentage exceeds the essential fat percentage value reported above (Rossouw et al., 2002).

A number of methods are available for determining body fat percentage, such as measurements with calipers or through the use of bioelectric impedance analysis. There is no single ideal percentage of body fat everyone. Levels of body fat epidemiologically dependent on sex and age (Rossouw et al., 2002).

Different authorities have developed different recommendations for ideal body fat percentages. The table below, from the American council on exercise (not an official government agency) shows how average percentages differ according to the specified groups and categories (ACE, 2009)

2.7 CONSEQUENCES OF OBESITY AND HYPERTENSION

2.7.1 Consequences of obesity

Obesity is an epidemic disease that threatens to inundate health care resources by increasing the incidence of diabetes, heart disease, hypertension, and cancer. These effects of obesity result from two factors: the increased mass of adipose tissue and the increased secretion of pathogenetic products from enlarged fat cells. This concept of the pathogenesis of obesity as a disease allows an easy division of disadvantages of obesity into those produced by the mass of fat and those produced by the metabolic effects of fat cells (Bray, 2004).

2.7.2 Coronary Heart Disease (CHD)

Coronary heart disease (CHD) is a condition in which a waxy substance called a plaque builds up inside the coronary arteries. These arteries supply oxygen-rich blood to the heart. Atherosclerotic Plaque can narrow or block the coronary artery and reduce blood flow to the heart muscle. This can cause angina or a heart attack. Obesity can also lead to heart failure, a condition in which your heart can not pump enough blood to meet your body's metabolic needs.

2.7.3 High Blood Pressure

Blood pressure is the force of blood pushing against the walls of the arteries as the heart pumps blood. A systolic blood pressure of above 140mmHg implies hypertension, diastolic blood pressure above 90mmHg indicates hypertension and a pulse rate above 40b/m in adults is suggestive of hypertension (Burt et al., 1995). If the blood pressure rises and stays high over time, it can damage the body in many ways. Your chances of having high blood pressure are greater if you are overweight or obese.

2.7.4 Stroke

Overweight and obesity can lead to build up of plaque in the arteries. Eventually, an area of plaque can rapture causing a blood clot to form and if the clot is close to your brain, it can block the flow of blood and oxygen to your brain and cause a stroke. The risk of having a stroke rise as BMI increases.

2.7.5 Type 2 Diabetes

Diabetes is a condition in which the body's blood glucose or blood sugar level is too high than normal. Normally, the body breakdown carbohydrate into glucose and then transport it into cells throughout the body. Insulin therefore helps cells to take in glucose to be used for energy. In type 2 diabetes, the body's cells do not use insulin properly. At first, the body reacts by making more insulin. Over time, however, the body cannot make enough insulin to control its blood sugar level. Diabetes is the leading cause of early death, CHD, Stroke, Kidney disease and blindness. Most people who have type 2 diabetes are overweight or obese.

2.7.6 Abnormal Blood Fats

If one is overweight or obese, one is at risk of having high levels of triglycerides and low density lipids (LDL) and low levels of high density lipids (HDL). Abnormal levels of these blood fats are risk factors for CHD.

2.8 METABOLIC SYNDROME

Metabolic syndrome is a general name for a group of risk factors that raises your risk for heart disease and other health problems such as diabetes type 2 and stroke. You can develop any one of these risk factors by itself but they tend to occur together. A diagnosis of metabolic syndrome is made if you have at least three of the following risk factors: Per WHO International Diabetes Federation (IDF).

1. A large waistline: this is called abnormal obesity or having an “apple shape”. Having extra fat in the waist area is greater risk factor for CHD than having extra fat in other parts of the body such as on the hips.
2. A higher than normal triglycerides level
3. A lower than HDL cholesterol level
4. Higher than normal blood pressure
5. Higher than normal fasting blood sugar

2.9 SLEEP APNEA

Sleep apnea is a common disorder in which you have one or more pauses in breathing or shallow breaths while you sleep. A person who has sleep apnea may have more fat stored around the neck. This can narrow the airway, making it hard to breath.

CHAPTER THREE

METHODOLOGY

3.1 STUDY AREA

Kassena-Nankana Municipality is one of the thirteen (13) districts in the Upper East Region of the Republic of Ghana. It is bounded by five (5) districts and one country; on the North by Kassena-Nankana West District and Burkina Faso, on the East by Kassena-Nankana West District and Bolgatanga Municipality, on the West by the Builsa South and Builsa North Districts and on the South by West Mamprusi Municipality (in the Northern Region). It has a land area of 767 square kilometers. The Municipality is politically divided into thirty-five (35) Electoral Areas. Two of which is located in the urban area and the remaining 35 is within the rural are

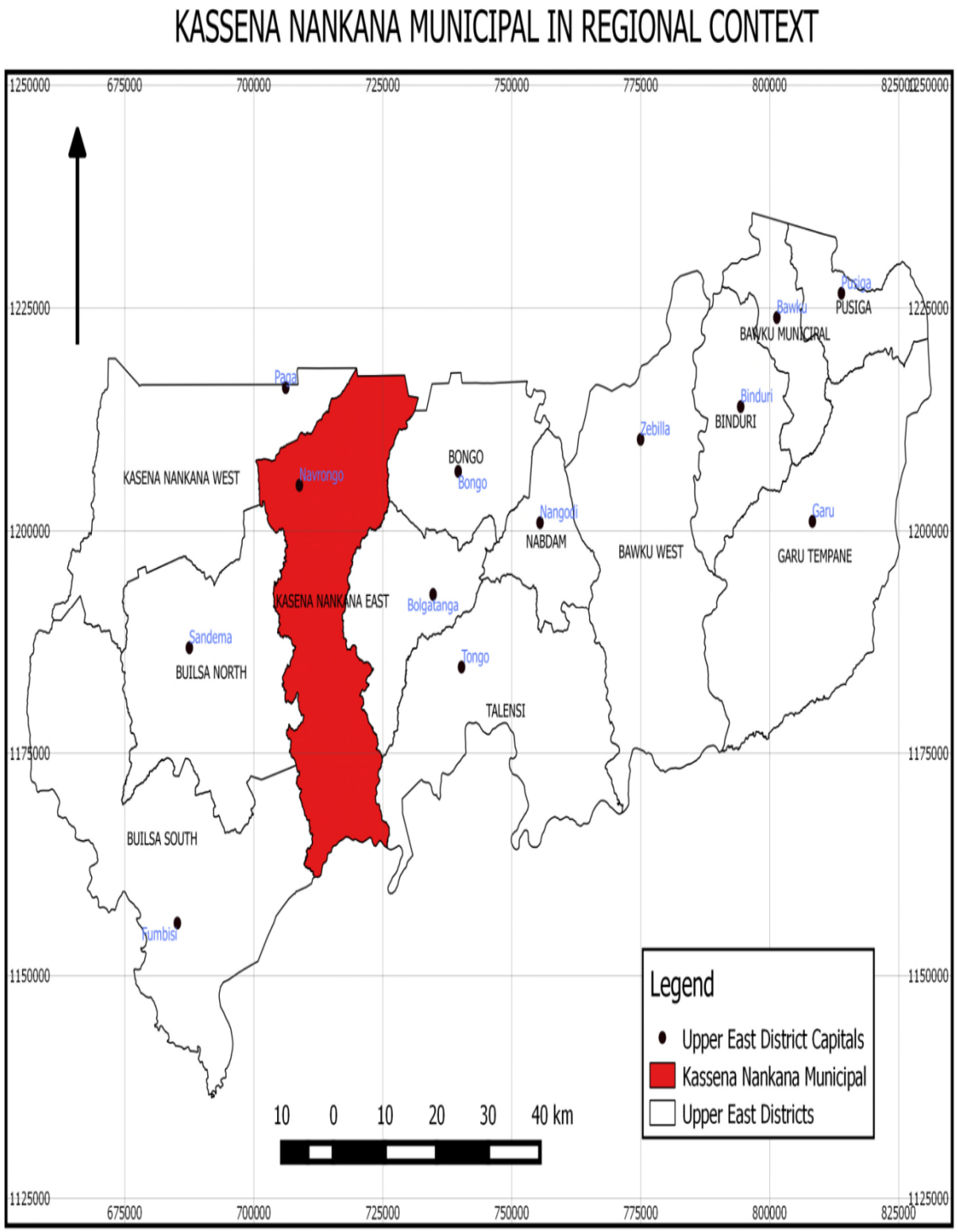

Figure 3.0.1: Map of Kassena-Nankana Municipal (Ghana Statistical Service)

The Municipality has a total of 97 communities. The ones are shown in the map below.

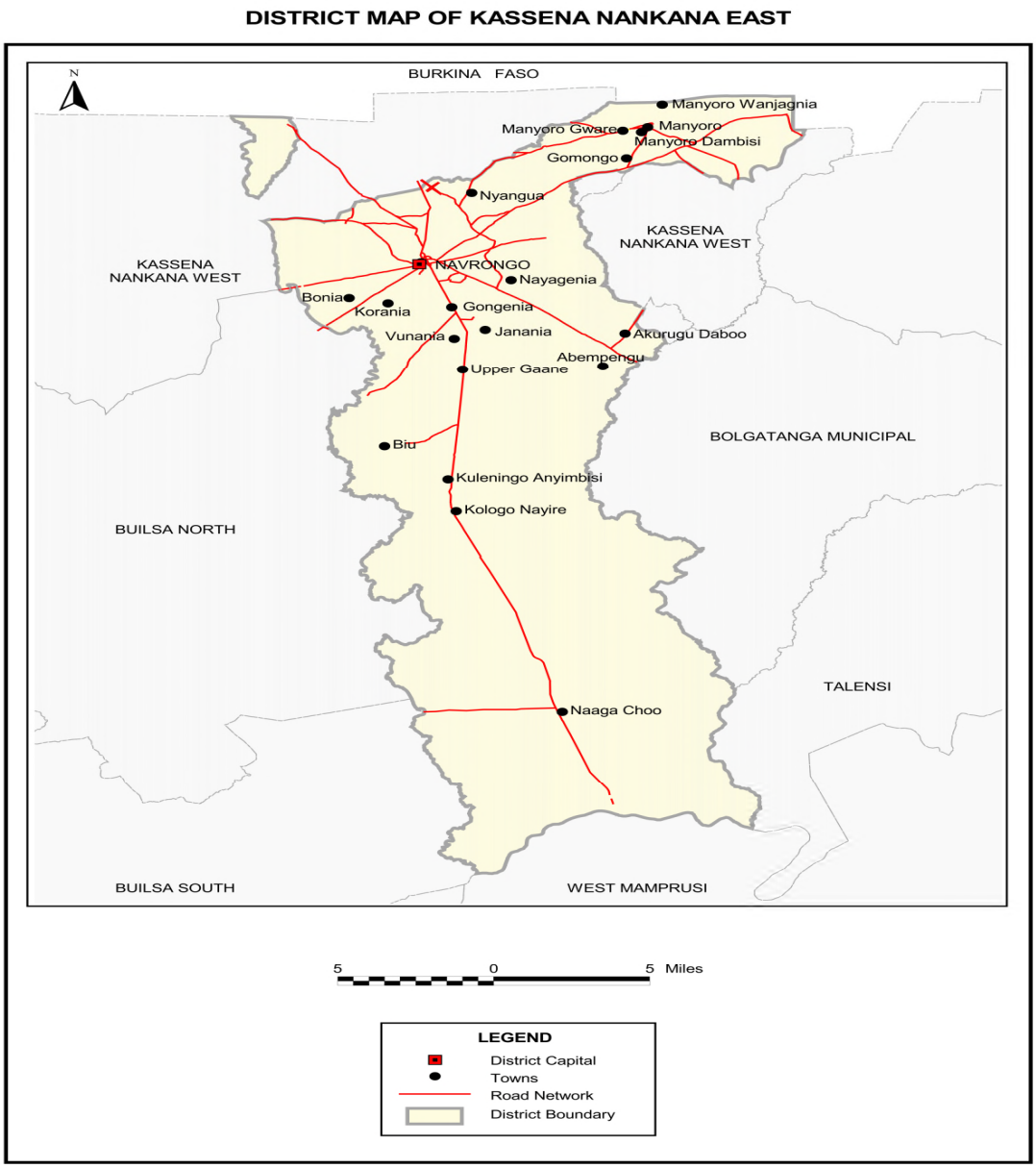

Figure 3.0.2: Map of the District (Ghana Statistical Service)

The 2010 Population Housing and Census estimates the total population of the Municipality at 109,994 with an inter-censual growth rate at 1.8% which is higher than the regional growth rate of 1.2%. The projected population for 2016 is estimated at 122,365.

Most of these traders are engaged in sedentary activities and poor feeding practices. Overweight and obesity are common within the adult population and seen mostly in women as compared to men.

The 2010 Population Housing and Census estimates the total population of the Municipality at 109,994 with an inter-censual growth rate at 1.8%. The Municipality's current population has a high growth potential unless a very marked decline in fertility sets in within the next few years. This was done by adding the Municipality's population to that of the KassenaNankana West District. Since the 2000 Population Housing and Census covered both districts, it would not have been possible to get the growth rate without the summation of the two population figures (table 3.1).

Nankanas, Kassenas, Dagombas and Bulisa are the predominant ethnic groups in the Municipality. Other tribes from other parts and outside of country reside in the Municipality. These ethnic groups co-exist peacefully creating a harmonious environment for social, cultural, environmental, political and economic development of the Municipality.

Table 3.1: Trend Analysis of the Municipal population

YEAR	POPULATION	GROWTH RATE (%)
1960	93,397	-
1970	99,006	2.95
1984	147,996	3.0
2000	149,491	1.0
2010	109,944(+70,667)	1.8

Source: Ghana Statistical Service

3.2 STUDY POPULATION

The target group for this study was traders aged 18 years and above within the Kassena - Nankana Municipality. The Navrongo market which is the main market and other surrounding markets within the municipality were considered.

3.3 STUDY DESIGN

This design of the study was cross-sectional using both quantitative survey methods complemented by in-depth interviews. This was carried out among traders both males and females in Kassena-Nankana Municipality in the upper East region of Ghana between the months of August 2015 and July 2016.

3.4 SAMPLE SIZE DETERMINATION

The minimum sample size for the study was calculated to be 290 adults, based on the assumption that 25.3% of the adult traders are overweight (Oladoyinbo, Ekerette, & Ogunubi, 2015), with an expected difference of 5% between the sample and the general population and a type I error (α) of 0.05.

$$n = \frac{Z^2(1-p)}{d^2}$$

Where n = minimum sample size; Z = standard normal variance=1.96 to obtain a power of 95% confidence interval (β=5%) and a type 1 error probability of 5%; d=Absolute standard error=0.05; p=prevalence=25.3%.

$$n = \frac{1.96^2(1-0.25)}{0.05^2}$$

In the present study, which was limited to only adult traders who answered at least 75% of the questionnaire, the sample size was recalculated to evaluate any possible loss of precision. Given a response rate of 90%, the sample size was recalculated as: 290/0.90. Using the above formula, the calculated sample size was approximately 322. Three hundred and twenty-two subjects will therefore be recruited.

3.5 SAMPLING PROCEDURES

Purposive and simple random sampling methods were used in the selection of traders which included people within the defined age range. Purposive sampling was used because the study involved traders and simple random sampling where each study participants had equal chance of being selcected. Traders of ages 15 and above were considered until the sample size was exhausted.

3.6 DATA COLLECTION

Data was collected using structured and semi structured questionnaires adopted from UNICEF (2000). Respective weights and heights of each subject were measured. The height and weight were taken using a microtoise and an electronic scale respectively. A measuring tape was used to measure both the waist circumference and hip circumference of each participant. The waist measurement was made midway between the inferior angle of the ribs and the suprailiac crest and hip measurements were done at the maximal circumference over the buttocks. Body mass index (BMI) was calculated as weight (kg) over height (m^2). Also blood pressure apparatus was used to measure blood pressure from each subject.

Participants were asked to recall and describe carefully all foods (including beverages) that have been taken in the last 24-hours period. Details as regards to the type of food and the amount consumed were recorded.

The questionnaire was approved after pretesting with ten (10) respondents. The questionnaire consisted of four sections. Section A dealt with socio-demographic characteristics of traders and section B covered 24-hour dietary recall of respondents. Section C was on health check list, section D collected data on anthropometry of respondents.

Observation of how respondents went about their trading activities was made by researcher. It was aimed at determining the eating related habits of respondents. The environment from which respondents traded was observed for their related exposures

3.7 DATA QUALITY CONTROL MEASURES

3.7. 1 Training of Research Assistants.

The training of the Research Assistant was done a day before the pre-testing. They were oriented on the questionnaire to enable them give the same interpretations to the questions; ensure questions were posed in similar manner to avoid inter-interview bias. They also practiced how to administer the questionnaire, how to collect information and examine completed questionnaires for inconsistence and completeness. The research assistances were also trained on the proper weight and height taken to avoid human and data capturing tool error.

3.7.2 Pretesting of Questionnaire/Procedures.

The Principal Investigator and two Research Assistants carried out the pretesting in a neighboring district (Kassena-Nankana west District), which is not part of the selected district. Some of the questions were dropped or revised after pre-testing.

3.8 STATISTICAL ANALYSIS

Data was entered into Microsoft Excel 2010 and exported to Scientific Package for Social Sciences (SPSS) version 22.0 for analysis. Data was presented as frequency, percentages and graphs. Mean and standard deviation were used to describe the data. Categorical variables were compared using chi-square and p-value < 0.05 was considered statistically significant.

3.9 ETHICAL CONSIDERATION

Ethical permission to conduct the study was requested from the Municipal Directorate of health services and Municipal Assembly. In addition to the above, at any point during the interview, I introduced myself and explained the objectives of the study to the respondents before data was collected. Information collected was treated with strict confidentiality.

CHAPTER FOUR

RESULTS

4.1 SOCIODEMOGRAPHIC CHARACTERISTICS OF STUDY PARTICIPANTS

Table 4.1 shows the socio-demographic characteristics of study population. A total of 322 participated in the study of which Christians were the majority 254 (78.9%) which constitute 41 (62.1%) males and 213 (83.2%) females.

Majority were married with a total of 223 (69.3%) which constitute 42(63.6%) males and 181(70.7) females whiles those divorced were least with 4(6.1%) were males and 3(1.2%) were females. On Education, 150(46.6%) had no formal education with 30 (45.5%) being males and 120(46.9%) females while secondary education was the least with 11(3.4%) out of which 3(4.5%) being males and 8(27.7%) being females.

Only 5(1.6%) smoked cigarette/tobacco, of which 3(4.5%) were males and 2(0.8%) were females and 227(70.5%) participants drink alcohol, of which 39 (12.1%) took beer, with 15(22.7%) being males and 24(9.4%) being females.

On exercise, majority 289 (89.8%) were not exercising, and only 1 (0.3%) exercise more than >5 times a week and he was a male 1(1.5%).

Those who operate open shops trading were 188 (58.4%) of which 34(51.5%) were males and 154(60.2%) females while the least 134 (41.6%) operated in shops

Table 4.1: Socio-demographic characteristics of study population

VARIABLE	TOTAL (n=322)	MALE (n=66)	FEMALE (n=256)	P-VALUE
Religion				
Christians	254 (78.9%)	41 (62.1%)	213 (83.2%)	0.0002
Muslims	54 (16.8%)	22 (33.3%)	32 (12.5%)	< 0.0001
Traditional	4 (1.2%)	1 (1.5%)	3 (1.2%)	-
None	10 (3.1%)	2 (3.0%)	8 (3.1%)	-
Marital Status				
Single	81 (25.2%)	20 (30.3%)	61 (23.8%)	0.2797
Married	223 (69.3%)	42 (63.6%)	181 (70.7%)	0.2673
Divorced	7 (2.2%)	4 (6.1%)	3 (1.2%)	-
Widowed	11 (3.4%0	0 (0.0%)	11 (4.3%)	-
Education				
No education	150 (46.6%)	30 (45.5%)	120 (46.9%)	0.8366
Basic	88 (27.3%)	17 (25.8%)	71 (27.7%)	0.7480
Secondary	11 (3.4%)	3 (4.5%)	8 (27.7%)	-
Technical	24 (7.5%)	4 (6.1%)	20 (7.8%)	-
Tertiary	49 (15.2%)	12 (18.2%)	37 (14.5%)	0.4521
Smoking History				
Yes	5 (1.6%)	3 (4.5%)	2 (0.8%)	0.0274
No	317 (98.4%)	63 (95.5%)	254 (99.2%)	
Alcohol Intake				
No alcohol	227 (70.5%)	42 (63.6%)	185 (72.3%)	0.1705

Bear	39 (12.1%)	15 (22.7%)	24 (9.4%)	0.0030
Wine	3 (0.9%)	1 (1.5%)	2 (0.8%)	-
Traditional Liquor	53 (16.5%)	8 (12.1%)	45 (17.6%)	0.2864
Exercise Habit				
No exercise	289 (89.8%)	57 (86.4%)	232 (90.6%)	0.3088
Weekends only	28(8.7%)	8 (12.1%)	20 (7.8%)	0.2680
1-5 days	4 (1.2%)	0 (0.0%)	4 (1.6%)	-
>5 days	1 (0.3%)	1 (1.5%)	0 (0.0%)	-
Trading System				
Open	188 (58.4%)	34 (51.5%)	154 (60.2%)	0.2041
Shop	134 (41.6%)	32 (48.5%)	102 (39.8%)	
Perception about weight				
Very underweight	5 (1.6%)	0 (0.0%)	5 (1.9%)	-
Somewhat underweight	39 (12.1%)	7 (10.6%)	32 (12.5%)	0.6741
About right weight	249 (77.3%)	52 (78.8%)	197 (76.9%)	0.7509
Somewhat overweight	29 (9.0%)	7 (10.6%)	22 (8.6%)	0.6106

Data is presented as number and percentage. P-value <0.05 is significant

4.2 ANTHROPOMETRIC CHARACTERISTICS AND BLOOD PRESSURES OF STUDY PARTICIPANTS

The mean age of the study participants was 32.95 ± 8.44 of which 34.42 ± 7.106 were males and 32.57 ± 8.718 were females (Table 4.2). The mean height (m), weight (kg), BMI was 1.595 ± 0.09, 63.24 ± 11.62 and 24.84 ± 4.17 respectively whiles the mean Waist circumference (cm), Hip circumference (cm) and WHR (ratio) were 32.61 ± 3.88, 39.75 ± 4.87 and 0.825 ± 0.08 of which none was statistically significant when compared between males and females. The males have higher SBP (117.3 ± 16.88) compared with females (114.7 ± 14.20) however, the difference was not statistically significant (p = 0.1949). Furthermore, there was significant mean difference (p=0.0005) diastolic blood pressure (DBP) among participants with 80.62 ± 14.67 for males and 73.91 ± 13.56 for females respectively.

Table 4.2: Anthropometric characteristics and blood pressures of study participants

VARIABLE	TOTAL (n=322)	MALE (n=66)	FEMALE (n=256)	P-VALUE
Age	32.95 ± 8.44	34.42 ± 7.106	32.57 ± 8.718	0.1108
Height (cm)	159.5 ± 8.73	159.8 ± 10.01	159.4 ± 8.383	0.7365
Height (m)	1.595 ± 0.09	1.598 ± 0.1001	1.594 ± 0.084	0.7365
Weight (Kg)	63.24 ± 11.62	64.48 ± 12.50	62.92 ± 11.39	0.3318
BMI (Kg/m2)	24.84 ± 4.17	25.30 ± 4.760	24.72 ± 4.005	0.3176
Waist Circumference (cm)	32.61 ± 3.88	32.78 ± 4.568	32.57 ± 3.695	0.6943
Hip Circumference (cm)	39.75 ± 4.87	39.47 ± 5.401	39.82 ± 4.737	0.6011
WHR(ratio)	0.825 ± 0.08	0.8338 ± 0.071	0.8225 ± 0.082	0.3083
SBP (mmHg)	115.2 ± 14.80	117.3 ± 16.88	114.7 ± 14.20	0.1949
DBP (mmHg)	75.28 ± 14.04	80.62 ± 14.67	73.91 ± 13.56	0.0005

Data is presented as mean and standard deviation. P-value < 0.05 is significant

4.3 TREND OF OBESITY ON SOCIODEMOGRAPHIC DATA OF STUDY PARTICIPANTS

Table 4.3 shows the trend of obesity on socio-demographic characteristics of study participants. Of 254 (76.1%) Christians, 156 (80.8%) were not overweight/obese whiles 98 (76.0%) were overweight/obese and there was no significant difference (X^2=1.096, p=0.2951) between these two categories. For the Muslims, 26 (13.5%) were not overweight/obese but 28 (21.7%) were.

A total of 133 (68.9%) who were married were not overweight/obese whiles 90 (69.8%) were overweight/obese and for the single, 49 (25.4%) and 32 (24.8%) were not overweight/obese and overweight/obese respectively.

Again, there were no significant differences between those who were not overweight for; no formal education [27 (14.0%)], no form of exercise [178 (92.2%)], and operating shop trading system [80 (41.5%)] and their counterparts who were overweight/obese; 22 (17.1%), 111 (86.0%) and 54 (41.9%) for no formal education, no form of exercise, and operating shop trading system respectively.

Table 4.3: Trend of obesity on socio-demographic data of study participants

Variable	Not overweight/ obese (n=193)	Overweight/ obese (n=129)	Chi-square	P-value
Religion				
Christians	156 (80.8%)	98 (76.0%)	1.096	0.2951
Muslims	26 (13.5%)	28 (21.7%)	3.756	0.0526
Others	11 (5.7%)	3 (2.3%)		
Marital Status				
Single	49 (25.4%)	32 (24.8%)	0.01393	0.906
Married	133(68.9%)	90 (69.8%)	0.02658	0.8705
Widowed	11 (5.7%)	7 (5.4%)	0.01093	0.9167
Education				
None	27 (14.0%)	22 (17.1%)	0.5629	0.4531
Educated	166 (86.0%)	107 (82.9%)		
Exercise Habit				
No exercise	178 (92.2%)	111 (86.0%)	3.212	0.0731
Exercise	15 (7.8%)	18 (14.0%)		
Trading System				
Open	113 (58.5%)	75 (58.1%)		
Shop	80 (41.5%)	54 (41.9%)	0.005341	0.9417

Data is presented as number and percentages.

4.4 TREND OF OBESITY AND HYPERTENSION AMONG GENDER USING AGE CATEGORY

The trend of obesity among gender using age category was shown in table 4.4. Majority of the males who were normal [10(45.5%)] weight was >35 years, overweight was 20(46.5%) and were between 20-35 years whiles 3(13.6%) of obese individuals were >35 years old. Using WHR criteria, the chi-square for trend analysis showed that, as the ages increase from <20 years, 20-35 years to >35 years, participants for normal [1(100%), 39(63.3%) and 12(34.2%)] weight decrease and this was significant (X^2=8.7200; p=0.0031). Overweight increase [0(0.0%), 8(13.3%), 6(17.1%) although this was not significant (P=0.5263). Furthermore, those who were hypertensive significantly (p=0.0074) increased with increasing age among the males with majority, 17(48.6%) being >35 years.

Among the females using BMI, majority [112(70.9%)] were normal weight and were between the ages of 20-35 years whiles 38(41.3%) and 12(13.0%) of overweight and obese participants were the majority and were >35 years. The trend of obesity among females was significant with the normal weight decreasing with age (X^2=13.920; p=0.0002) whiles overweight (X^2=9.3500; p=0022) and obese (X^2=3.9140; p=0.0479) increases with increasing age. Using WHR stratification, 32(32.0%) of normal weight was the majority and were >35years with the obese [18(18.0%)] being the least (>35 years). Majority of female participants who recorded high, 28(28.0%) in the study were >35 years of ages (table 4.4).

Table 4.4: Trend of obesity and hypertension among gender using age category

VARIABLE	<20 years	20-35 years	>35 years	Chi-square	p-value
Male					
BMI CRITERIA					
Underweight	0(0.0%)	2(4.7%)	2(9.1%)	0.5693	0.4505
Normal	1(100.0%)	17(39.5%)	10(45.5%)	0.0021	0.9637
Overweight	0(0.0%)	20(46.5%)	7(36.8%)	0.6416	0.4231
Obese	0(0.0%)	4(9.3%)	3(13.6%)	0.3859	0.5344
WHR CRITERIA					
Normal	1(100.0%)	39(63.3%)	12(34.2%)	8.7200	0.0031
Overweight	0(0.0%)	8(13.3%)	6(17.1%)	0.4015	0.5263
Obese	0(0.0%)	0(0.0%)	0(0.0%)	-	-
HYPERTENSION	0(0.0%)	14(23.3%)	17(48.6%)	7.1850	0.0074
Female					
BMI CRITERIA					
Underweight	0(0.0%)	3(1.9%)	0(0.0%)	-	-
Normal	4(66.7%)	112(70.9%)	42(45.7%)	13.920	0.0002
Overweight	2(33.3%)	33(20.9%)	38(41.3%)	9.3500	0.0022
Obese	0(0.0%)	10(6.3%)	12(13.0%)	3.9140	0.0479
WHR CRITERIA					
Normal	0(0.0%)	67(28.9%)	32(32.0%)	1.7840	0.1816
Overweight	2(33.3%)	40(17.2%)	22(22.0%)	0.6605	0.4164
Obese	4(66.7%)	64(27.6%)	18(18.0%)	5.0140	0.0251
HYPERTENSION	3(5.0%)	61(26.2%)	28(28.0%)	0.0121	0.9125

Data presented as number and percentages

4.5 BLOOD PRESSURE AND SOCIO-DEMOGRAPHIC CHARACTERISTIC OF STUDY PARTICIPANTS

Table 4.5 presents information on blood pressure and socio-demographic data. On gender, out of 256 females in the study, 12(4.7%) of them were hypertensive, and 244(95.3%) were normotensives. For the 66 males, 6(9.1%) of them were hypertensive, 60(90.9%) were normotensive.

About 317 of study participants had no smoking history of which 17(5.4%) of them were hypertensive and 300(94.6%) were normal whiles the 5 smokers, 1(20%) was hypertensive and 4(80%) were normotensive.

For the trading systems, of the188 participants who operated open shop, 14(7.4%) were hypertensive and 174(92.6%) were normal whiles the 134 shop operators, 4(3.0%) were hypertensive and 130(97%) normal.

Of the 241 participants who had ever married, 10(4.1%) were hypertensive and 231(95.9%) were normal whiles the 81 singles, 8(9.9%) were hypertensive and 73(90.1%) were normal. There were a total 254 Christian, of which 18(7.1%) were hypertensive and 236(92.9%) were normal whiles of the 54 were Muslims, all (100%) were normal.

On exercise habit, out of 33 participants who engage in any form of exercises, all (100%) were normotensive whiles the majority of 289 who were not exercising, 18(6.2%) were hypertensive 271(93.8%) were normal.

Table 4.5: Trend of blood pressures (BP) on socio-demographic characteristics

VARIABLE	BP		P-VALUE
	HYPERTENSION >140mmHg systolic or >90mmHg diastolic	NORMOTENSIVE ≤120mmHg systolic or ≤80mmHg diastolic	
Gender			
Male	6 (33.3%)	60 (19.7%)	
Female	12 (66.7%)	244 (80.3%)	0.1650
Smoking history			
No	17 (94.4%)	300 (98.7%)	
Yes	1 (5.6%)	4 (1.3%)	
Education			
Basic	10 (55.6%)	140 (46.1%)	0.4323
Secondary	3 (16.7%)	85 (27.9%)	0.2962
Technical	0 (0.0%)	11 (3.6%)	-
Tertiary	1 (5.6%)	23 (7.6%)	-
No education	4 (22.2%)	45 (14.8%)	-
Trading System			
Open	14 (77.8%)	174 (57.2%)	0.0858
Shop	4 (22.2%)	130 (42.8%)	
Marital status			
Single	8 (44.4%)	73 (24.0%)	0.0522
Married	10 (55.6%)	213 (70.1%)	0.2626
Divorced	0 (0.0%)	7 (2.3%)	-

Widowed	0 (0.0%)	11 (3.6%)	
Religion			
Christian	18 (100.0%)	236 (77.6%)	0.0239
Muslim	0 (0.0%)	54 (17.8%)	-
Traditional	0 (0.0%)	4 (1.3%)	-
None	0 (0.0%)	10 (3.3%)	-
Exercise Habit			
No exercise	18 (100.0%)	271 (89.1%)	0.1401
Weekends only	0 (0.0%)	28 (9.2%)	-
1-5 times a week	0 (0.0%)	4 (1.3%)	-
>5 times/week	0 (0.0%)	1 (0.3%)	-
Alcohol			
No alcohol	9 (50.0%)	218 (71.7%)	0.0497
Beer	5 (27.8%)	34 (11.2%)	0.0252
Wine	2 (11.1%)	1 (0.3%)	-
Traditional liquor	2 (11.1%)	51 (16.8%)	-

Data presented as number and percentages. $P < 0.05$ is statistically significant

4.6: 24 HOUR DIET RECALL FOR STUDY PARTICIPANTS

Table 4.6 shows 24-hour dietary recall of the participants in relation to overweight and obesity. All the study participants consumed cereals and fish. Fresh vitamin A rich fruit [316(98.1%)], dark green leafy vegetable [210(65.2%)], white tubers and roots [134 (41.6%)], Vitamin A rich vegetables and tubers [115(35.7%)] and flesh meat [115(35.7%)] were diet consumed by most of the participants.

Majority of participants who are not-overweigh/obese consumed fresh vitamin A rich fruit [187(96.9%)] and dark green leafy vegetable [132(68.2%)] whiles those who were overweight/obese also consumed more of dark green leafy vegetable [78(60.5%)] and fresh vitamin A rich fruit [129(100.0%)] with organ meat (iron rich) [1(0.8%)] being the least. However, the differences of the dietary recall between not-overweight/obese and overweight/obese was not significant.

Table 4.6: 24 Hour dietary recall for study participants

oods	**Total (n=322)**	**Not overweight/ Obese (n=193)**	**Overweight/ Obese (n=129)**	**X^2**	**p-value**
ereals	322 (100.0%)	193(100.0%)	129(100.0%)	-	-
hite tubers and roots	134 (41.6%)	84(43.5%)	50(38.8%)	0.0873	0.3954
Dark green leafy vegetable	210(65.2%)	132(68.2%)	78(60.5%)	1.955	0.1432
Vit. A rich veg. and tubers	115(35.7%)	64(33.2%)	51(39.5%)	1.368	0.2421
Fresh vitamin A rich fruits	316(98.1%)	187(96.9%)	129(100.0%)	-	-
Dried fruits and vegetables	49(15.2%)	30(15.5%)	19(14.7%)	0.03984	0.8418
Organ meat (Iron rich)	6(1.9%)	5(2.6%)	1(0.8%)	-	-
Flesh meat	115(35.7%)	67(34.7%)	48(37.2%)	0.2095	0.6471
Eggs	74(23.0%)	45(23.3%)	29(22.5%)	0.03049	0.8614
Fish	322 (100.0%)	193(100.0%)	129(100.0%)	-	-

Data is presented as number and percentages

4.7 PREVELANCE OF OVERWEIGHT, OBESITY AND HYPERTENSION USING BMI, WHR CRITERIA AND BP APPARATUS RESPECTIVELY

From the figure 4.1 below using body mass index (BMI), the prevalence of overweight was 31.1% of which 40.9% were males of 66 participating males, whiles 28.5% were females of 258 participating females. The prevalence of obesity was 9.0% for the same BMI category with males recording 10.6% whiles 8.6% for females

Using waist to hip ratio (WHR) criteria, the prevalence of overweight was 26.7% with 30.3% for males and 25.8% for females. Again, the prevalence of obesity was 36.3% for the same WHR with males recording 42.4% whiles females were 34.8%.

For the blood pressure (BP) category, the prevalence of hypertension was 37.0% of which 46.9% were males when as much as 39.5% were females.

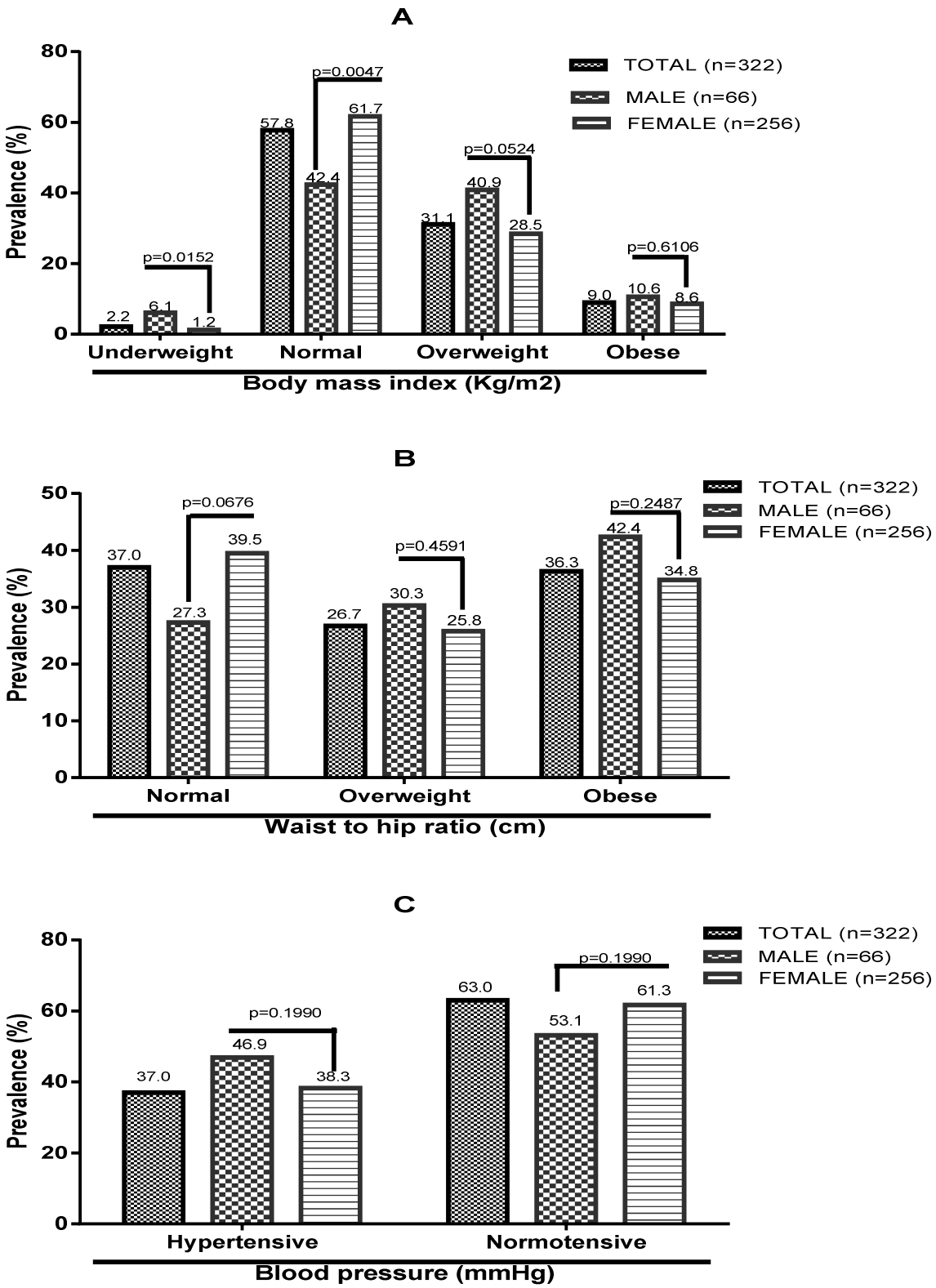

Figure 4.1: Prevalence of obesity and blood pressure among gender

CHAPTER FIVE

DISCUSSION

The purpose of this study was to evaluate the prevalence and some risk factors of overweight and obesity among traders in Kassena-Nankana municipality of the Upper East region of Ghana. The study found high and similar prevalence of risk factors among the dwellers of the Kassena- Nankana municipality.

The prevalence of overweight (31.1%) and obesity (9.0%) reported in this study is comparable to the 23.4% and 14.1% prevalence of overweight and obesity reported by Amoah *et al.,* (2003). The prevalence is also consistent with the 6% reported in the population of Singapore and 10% as reported by Abubakari A.R. (2008) in West Africa who studied the prevalence and time trends among adult population. The difference in prevalence may be due to the fact that, Ghana and most parts of the West Africa are witnessing both demographic and epidemiological transitions due to various degrees of the adoption of western life in different parts of the regions. The prevalence found in this present study should be of concern and that it might be due to the ever increasing availability of fast foods that are more nutritious and healthy with less energy-dense foods by these populations. Another reason may be due to the fact that; these were traders of whom some engage in shop trading system which do not allow them to move inches away from the where the ply their trade.

The trend of obesity more especially among females was significant with the normal weight decreasing with age (X^2=13.920; p=0.0002) whiles overweight (X^2=9.3500; p=0022) and obese (X^2=3.9140; p=0.0479) increases with increasing age. These findings on overweight/obesity and age are in line with a study conducted (Singh R.B., 1998) in India who found obesity to increase with increasing age. Overweight leading to obesity tends to

develop slowly during adulthood and this could be a possible explanation for increased overweight and obesity in older individuals (Lissner L., 1998).

The prevalence of hypertension among traders is high 37.0%. This result is higher than what was reported by Ogah (2006) in his study on the prevalence of hypertension in Nigeria and 18.7% by Adedoyin R.A. (2008) among semi urban population. However, this study is in line 27.1% as reported by Ogbagbon E.K. (2008) among paid workers and 34.8% in a study in south east of Nigeria by Asekun-Olarinmoye E.O. (2013). The variation observed in the prevalence of hypertension among participants in these studies might be due to variation in the studied settings (rural or urban), the region where the study was conducted (Ghana or Nigeria), the occupation of the participants in the study, and behavorial and lifestyle differences.

Prevalence of hypertension in this current study was high among the male participants (46.9%) when compared with their female (38.3%) counterparts, even though prevalence was found to be not significant (p=0.1990) by gender. This is consistent with Asekun-Olarinmoye *et al.,* (2013) that reported no significant findings between hypertension and gender among rural adults in Nigeria. However, this finding was not consistent with the study by Ekwunifa *et al.,* (2011). One possible reason may be that, males naturally lead a more stressful lifestyle and tend to have more responsibilities to cope with than their female counterparts.

Furthermore, the prevalence of hypertension was seen to increase significantly with age in this study and this agrees with previous studies (Asekun-Olarinmoye E.O., 2013; Ekwunife O.I., 2011; Salamatu U.A., 2015). Age has been recognized as a risk factor for high blood pressure (Cappucio F.P., 2004; Sever, 2006) with some studies arguing that high

prevalence of hypertension among older people might be due to changes that occur in the blood vessels as one grows old (Sever, 2006).

Again, prevalence of cigarette smoking in this current study was significantly higher among the males (4.5%) than females (0.8%). This is consistent with existing studies that found prevalence of cigarette smoking to be significantly higher among the male when compared with females (Adepoju E.G., 2013; Salamatu U.A., 2015). Prevalence of cigarette smoking among females in this study was in line (0.9%) with Jarallah J. (1999) in Saudi Arabia however was higher than that reported among females (0.1%) in India (Chockalingam K., 2013). The prevalence of cigarette smoking was also higher among hypertensive (5.6%) than the normotensive (1.3%) counterparts who smoke cigarette affirming the fact that cigarette smoking increases the chance of hypertension and other related cardiovascular diseases.

Majority of the participants did not engage in vigorous exercise although most operated open trading system with females being more than males. Prevalence of physical inactivity reported in Ghana is 8.8% (Trilling S.J., 2000). Physical inactivity has become a public health problem all over the world. Globally, around 31% of adults aged 15 years and over were insufficiently active as at 2008 (men 28% and women 34%). This current high level (86.4% for males do not involved excercise; 90.6% for females do not involved in exercise) of physical inactivity may be partly due to insufficient participation in physical activity during leisure time and an increase in sedentary behaviour during occupational and domestic activities (Oyeyemi A.L., 2013; WHO, 2013a). In many African countries it is not the norm for the female gender to engage in moderate to vigorous physical activities. This may be due to the socialization process that does not seem to encourage such activities by females and may have accounted for the low females engaging in exercise activities.

According to a study by Nathenson and Wen (2012), high levels of religious salience may correspond to greater likelihood of obesity and lesser likelihood of getting regular exercise. In this present studies majority (78.9%) of the participants were Christians and most (76.0%) were overweight/obese although this was no significant difference (X^2 = 1.096, p=0.2951). This is consistent with the study by Nathenson and Wen (2012).

CONCLUSIONS AND RECOMMENDATION

CONCLUSION

Overweight, physical inactivity, operating shop trading system, hypertension, age, and cigarette smoking are some of risk factors of obesity among traders in Kasena-Nankan Municipality of the Upper East region of Ghana. Overall prevalence of overweight and obesity among these traders were 31.1% and 9.0% using BMI classification, 26.7% and 36.3% using WHR (ratio) classification. Prevalence of obesity was significantly higher among >35 years old. Women are more physically inactive than men. The type of food nutrients consumed more as traditional food were cereal (carbohydrates) and fats. The prevalence of hypertension was found to significantly increase with age.

RECOMMENDATION

Based on the findings and conclusions, it was recommended that,

1. Health education programmes be organized to educate the general public on appropriate dietary practices with respect to their health.
2. The general public should also be educated on the need to regularly engage in physical activities and the need to keep and stay in a healthy environment.
3. Health promotion with regards to smoking cessation and weight loss should emphasize among traders in Kassena-Nankana Municipality of the Upper East region of Ghana.

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APPENDIX

QUESTIONNAIR

DEPARTMENT OF COMMUNITY HEALTH AND DEVELOPMENT

SCHOOL OF ALLIED HEALTH SCIENCES

UNIVERSITY FOR DEVELOPMENT STUDIES

QUESTIONNAIRE

PREVALENCE OF OVERWEIGHT, OBESITY AND RELATED EXPOSURES OF TRADERS IN KASSENA NANKANA MUNICIPALITY

I, Yeribu Harriette, a student of the University for Development Studies (UDS) wish to undertake a study on the above topic, it will be most appreciated if you could please co-operate and provide answers to the questions. All responses will be handled confidentially. Thank you

Signature: …….

Date of Interview: ……..

SECTION A: SOCIODEMOGRAPHIC DATA

1. How old are you? ----------
2. What is your gender? [male] [female]
3. What is your religious denomination? .....
4. Marital status: [Single] [Married] [Cohabiting] [Divorced] [Widowed] [Separated] [Partnered but not cohabiting]
5. If married, how long have you been married? .....

6. What is your educational level? [Basic] [Secondary] [Technical] [Tertiary]

7. Do you smoke cigarette? [No] Yes]

8. Which type of alcohol do you take? [No alcohol] [Beer] [Wine] [Traditional liquor]

9. Do you engage in any exercise?

   [No exercise] [Weekends only] [1–5 times a week] [More than 5 times a week]

10. On your own weight, which of the following do you consider yourself? [very underweight] [somewhat underweight] [about the right weight] [somewhat overweight] [very overweight

    11.Which type of trading system do you operate? [open] [shop]

SECTION B: 24-HOUR DIETARY RECALL

12a.please, mention all the foods and drinks that you ate over the past 24 hours whether at home or outside the home (Hint: start with meals eaten at supper yesterday).

Eating moment	**Name of dish**	**Ingredients**
Breakfast		
Snack before lunch		
Lunch		
Snack before dinner		
Diner		
Snack after dinner		
Drinks		

12b. From the meals mentioned, indicate whether you ate them from the following food groups during the past 24 hours whether at home or outside home.

Food group	**Examples**	**Yes**	**No**
CEREALS	Bread. Noodles, biscuits, any other food made from millet, sorghum, maize, rice, white.		
WHITE TUBERS AND ROOTS	White potatoes, white yam, cassava, or food made from roots.		
DARK GREEN LEAFY VEGETABLES	Dark green leavy vegetables, including wild ones +other localy available viamin-A rich leaves such as cassava, leaves, ayoyo, alefu, bra, fresh, baobab		

	leaves etc.		
VITAMIN A RICH VEGETABLES AND TUBERS	Carrots, sweat potatoes that are orange inside + other localy available vitamin – Arich vegetables (e.g. sweat pepper)		
FRESH VITAMIN A RICH FRUITS	Ripe mangoes, papayas, dawadawa pulp(yellow part) +other locally available vitamin-A rich fruits		
DRIEDFRUITS AND VEGETABLES	Any form of dried vegetables (okro, baobab leaves(kuuka), wild types		
ORGAN MEAT (IRON RICH)	Live, kidney or other organ meats blood-based foods		
FLESH MEAT	Beef, pork, lamb, goat, rabbit wild game, chicken, duck, or other birds		
EGGS	Fowl, duck, guinea fowl or any other egg		
FISH	Keta schoolboys (anchovies), tilapia, mudfish etc		

SECTION C: HEALTH CHECKLIST

11. Please, indicate whether you experience the following conditions and if yes, how frequent?

CONDITION	YES	NO	FREQUENCY
a. Reduced water in the system (dehydration from sitting in the sun)			
b. Headaches (from car fumes, dust, heat, thinking too much)			
c. Waist pain (lower back pain resulting from sitting for long periods during the day and carrying heavy loads)			
d. Back pain (upper back pain)			
e. Neck pain (from bending over goods to clean them and or to sort them)			
f. Disorganised mind (depression/stress)			
g. Diarrhoea (from eating food prepared in market areas where there is poor sanitation)			
h. Vomiting (from food poisoning)			

i. High blood pressure and heart palpitation (from thinking too much)			
j. Malaria (mosquitoes bread in the stacked sacks of rubbish, the blocked gutters and stagnant puddles)			
k. Fever and dizziness (from too much heat)			
l. Vaginal infections (from dirty toilets)			
m. Skin and nail infections on hands (from handling second hand shoes that may have been worn by people with foot root)			
n. Sore ribs and chest (from shouting for long periods in order to sell wares)			
o. Neck and upper back pain (from carrying heavy loads)			
p. Arm pain (from carrying head loads			
q. Blurry vision (from working			

with fire)			
r. Breathing problems (from working with fire)			
s. Knee problem (from having to sit and stand often during the course of the day).			

SECTION D: ANTHROPOMETRIC PARAMETERS

Height_____

Weight_____

Waist circumference_____

Hip circumference_____

Systolic blood pressure_____

Diastolic blood pressure_____