ASSOCIATION BETWEEN RISK FACTORS FOR LIFESTYLE DISEASES AND PREVALENCE OF DIAGNOSED HYPERTENSION AND DIABETES IN THE SWAHILI COMMUNITY: THE CASE OF KISAUNI AND OLD TOWN DISTRICTS IN MOMBASA, KENYA

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DECLARATION AND APPROVAL

Declaration

I declare that this thesis is my original work and has not been previously published or presented for the award of a degree in any University.

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Approval

This thesis has been submitted for examination with our approval as University supervisors

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DEDICATION

Dedicated to my dear parents Mr. Mulatya Ndungi and Mrs. Queen Moki-Ndungi and siblings Hartnell K.M. Ndungi and Micah M. Ndungi

Also, to everyone that supports women in the society to realize and attain their full potential in life and achieve their goals.

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ABSTRACT

There is an increasing prevalence of lifestyle diseases in developing countries. The rise in these diseases reflects a significant change in dietary habits, physical activity levels and socio-economic status among other lifestyle factors. The study aimed at determining the association between selected risk factors for lifestyle diseases and the prevalence of diagnosed diabetes and hypertension among the Swahili community of Old Town and Kisauni districts in Mombasa County. Old Town has a typical Swahili culture while Kisauni district has slightly deviated. A one-time cross-sectional study design was administered. Systematic sampling was used to randomly select 207 households. Data was collected on food consumption, dietary habits and physical activity. Focus Group Discussions and Key Informants in-depth Interviews were used to collect qualitative data. Weight, height, waist circumference, mid-upper arm circumference (MUAC) and skin-fold thickness were taken. Body Mass Index (BMI), Arm Fat Area (AFA) and Arm Muscle Area (AMA) were then calculated using these measurements where applicable. Data analysis was done using the Statistical Package for the Social Sciences version 11.5 computer software. Results indicated that the mean number of household members in Kisauni district was 3.4 whereas in Old Town it was 3.8. About 36.8% of the individuals had at least primary education. Most (69.1%) of the women were housewives while the men were either businessmen or employed. Many (45.2%) of the women earned an income of KES ≤10,000 and most (87.4%) men earned an income of KES ≥30,000. Members of this community from Kisauni and Old Town districts had average knowledge and were aware of healthy eating, obesity, diabetes and hypertension. Their dietary habits and practices involved consumption of Swahili foods that were high in fats, sugars and coconut milk. Most (75.8%) of them had low physical activity. Prevalence of overweight and obesity was 48.48% and 35.86% respectively in Kisauni district and 37.55% and 52.32% respectively in Old Town. Prevalence of diagnosed diabetes mellitus and hypertension was 11.1% and 39.9% respectively in Kisauni district and 14.8% and 44.0% respectively in Old town. Physical activity levels were associated with overweight and obesity ($p<0.05$). Obesity in the Swahili community as assessed by BMI and waist circumference was associated with diabetes and hypertension ($p<0.05$). There is therefore need to acquire sustainability of consumption of healthy diets and physical activity in order to prevent obesity and some of its comorbidities like hypertension and diabetes.

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ACRONYMS AND ABBREVIATIONS

AFA- Arm Fat Area

AMA- Arm Muscle Area

ANOVA- Analysis of Variance

BMI- Body Mass Index

CPGH- Coast Provincial General Hospital

CVDs- Cardiovascular Diseases

DM- Diabetes Mellitus

FFQ- Food Frequency Questionnaire

GPAQ- Global Physical Activity Questionnaire

HTN- Hypertension

IDF- International Diabetes Federation

LD- Lifestyle Diseases

METs- Metabolic equivalents

MOH- Ministry of Health

MOT- Ministry of Tourism

MUAC- Mid Upper Arm Circumference

NCDs- Non communicable diseases

TPA- Total Physical Activity

WC- Waist Circumference

WHO- World Health Organization

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Chronic diseases of lifestyle like hypertension and diabetes are increasing in global prevalence and they threaten developing nations' ability to improve the health of their populations (Lopez *et al.,* 2006). Although often associated with developed nations, the presence of these diseases has become the dominant health burden in many developing countries. This can be explained largely by social and economic changes in the developing countries that have increased the prevalence of risk factors for these diseases (Hoang *et al.,* 2007). A substantial portion of the increasing global impact of lifestyle diseases is attributable to economic and social changes that have led to the increase in risk factors for these diseases (Levenson *et al.,* 2002).

Chronic diseases of lifestyle have recently increased in frequency as countries become more industrialized (Steyn *et al.,* 2006). Some of these diseases, such as diabetes mellitus and hypertension appear at greater rates in populations living in the 'western way' which is defined by consumption of high fat, high calorie refined diet and reduction in physical activity (Steyn *et al.,* 2006). These diseases are different from other diseases because they are potentially preventable, and can be lowered with changes in diet, lifestyle and environment (Vaillant, 2001). The diseases account for 3.8 million deaths worldwide per year, a number similar in magnitude to the mortality attributed to HIV/AIDS (WHO, 2007).

The major risk factors of chronic diseases of lifestyle are overweight and obesity among other lifestyle factors (WHO, 2006). These two conditions are associated with morbidity and mortality from several health conditions including diabetes and hypertension which have attracted growing concern. Obesity is one of the most significant contributors to increased prevalence of diabetes leading to the use of the word 'diabesity'. It is increasing substantially and is one of the major contributors of disease prevalence due to its pathophysiological link to other cardiovascular risks such as hypertension and diabetes. According to the World Health Organization's update (WHO, 2009), diabetes, hypertension, and obesity are three of the top five continuing risk factors for cardiovascular deaths in the world. It is estimated that, in 2010, 6.4% of adults had diabetes mellitus affecting 285 million in the world and the prevalence is expected

to increase to 7.7% by 2030, affecting 439 million adults (Shaw *et al.*, 2010). A 67% increase in the prevalence of diabetes in developing countries is expected from 2010 to 2030 (Shaw *et al.*, 2010). The multi-factorial risk of diabetes and hypertension include diet, sedentary lifestyle, socio-economic status and genetic patterns as reported by the International Diabetes Federation (IDF, 2007). A low-fiber diet, high trans-fatty acid intake, low unsaturated-to-saturated fat intake ratio and sedentary lifestyle greatly influence the development of overweight and obesity which are risk factors of diabetes and hypertension (Parillo, 2004). Increased sedentary lifestyle on the other hand is presented by urban settings (Sobngwi, 2004). Urban dwellers in Kenya seem to have higher prevalence of overweight and obesity (Christensen *et al.*, 2008). Waudo *et al.* (2006) also reports a high prevalence of overweight and obesity in urban dwellers of the Lake Victoria basin.

Chronic diseases of lifestyle were rarely seen in developing countries in the past. Kenya like most developing countries is faced with an impending epidemic of these diseases. The WHO report (2002) indicates that of the total mortality in Kenya, lifestyle diseases contributed to about 32%. The Ministry of Health Annual Status Report of 2007 indicates that these diseases contribute over half of the top twenty causes of morbidity and mortality in Kenya. The report also indicates that about 53% of all hospital admissions in Nairobi municipality are due to the lifestyle diseases where diabetes contributed about 27.3%.

The Swahili community of Mombasa County in Kenya is faced with the lifestyle diseases epidemic. This is shown in the Coast Provincial General Hospital (CPGH) diabetic clinic records which indicate that about 54% (majority) of all diabetic patients are from the Swahili community (CPGH, 2008). This community has been described as an ethnic-mixed group of people speaking closely related forms of Bantu speech, living on islands and coastal areas of East Africa. Historically, the Swahili developed as Arab and Persian traders established business contacts and married local women on the East African coast around AD 700. The resulting people were Islamic Bantu-speaking fishers, traders and woodwork artisans, living in city-states varying from governorships to republics. The people's features vary from light-skinned Arab to Bantu. They have close association with Arabic and Islamic cultures (Bakari, 1981). The Kenyan Swahilis are the Bajun, Fundi, Ozi, Pate, Vumba, Mvita (from Old Town, Mombasa), Shela, Amu (the dialect of Lamu Island) and Siyu, which are communities resulting from mestization among the ancient

Arabs and Persians. In Mombasa, the Swahili maintain close relationships with Arabs, some native to Kenya and some Yemeni (Ministry of Tourism, 2003). They have a wide range of socio-economic activities, religious and cultural values. They are family or clan oriented. They are renowned as sailors, traders and artisans. They are a welcoming, hospitable people and enjoy meeting people from other places and cultures. They are traditional Sunni Muslims. The most important holidays for these people are religious like *Eid al-Fitr* that marks the end of the month of Ramadan. *Eid al-Hajj* celebrates the yearly pilgrimage to Mecca. Each Eid is celebrated by praying, visiting relatives and neighbours, and eating special foods and sweets. During the month of Ramadan, Swahili (along with all other) Muslims fast from sunrise to sunset. *Maulidi* or the Prophet Muhammad's birthday is widely celebrated by Muslims. The Swahili people's houses vary depending on a family's means and the type of town in which they reside. 'Stone towns', like Lamu and Old Town in Mombasa, are characterized by large stone houses, some divided into apartments. Some Swahili people living in 'country towns' like Kisauni still occupy houses made of hardened mud and stones, although these are less common than houses of stone or coral. Most homes have electricity, indoor plumbing, several bedrooms and a living room. Access to water is critical for Muslims who must wash before prayers (Bakari, 1981).

The Swahili people's socio-economic activities, religious and cultural values may greatly influence their physical activity levels, dietary practices and knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension. Resulting from religion and cultural influences, these people have specific dietary habits. By religion, Swahilis who are Muslims are prohibited from eating pork or drinking alcohol. The Swahili staple food has a lot of African, Middle Eastern and Indian influence in taste, thus most of their cooking is rich in spices (cloves, cardamom, black pepper). Popular Swahili cuisine includes *wali*, that is, rice cooked in coconut milk, which is served with thick tomato-based meat, bean or vegetable stews or fish, and *pilau*, a spicy variety of *wali.* Goat meat and chicken curries are traditionally popular during special occasions. They also eat a lot of different grains, vegetables and fruits including beans, peas, tomatoes, potatoes, okra, kale, spinach, mangoes, coconut and bananas. Sweet tea with milk is also served several times a day (Ministry of Tourism, 2003). Most of the Swahili community's foods are high in fat and sugar, a composition that appears to expose this community to overweight and obesity.

1.2 The statement of the problem

The Coast Provincial General Hospital Diabetic Clinic indicates a marked increase in cases of diabetes and hypertension among the Swahili people. The clinic records indicate that about 54% (majority) of all diabetes patients are the Swahili people (CPGH, 2008).

The Swahili people of the Kenyan coast have a wide range of socio-economic activities, religious and cultural values which may greatly influence their physical activity levels, dietary practices and knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension. Therefore there was need to conduct research to determine the association between the socio-economic status, physical activity levels, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, dietary practices, overweight, obesity and the prevalence of diagnosed diabetes and hypertension among the Swahili people and seek to explain the high prevalence of diabetes and hypertension in this community.

1.3 Purpose of the study

The study was designed to determine the association between socio-economic status, physical activity levels, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, dietary practices, overweight, obesity and the prevalence of diagnosed diabetes and hypertension among the Swahili community of Mombasa County.

1.4 Objectives

The selected factors associated with chronic diseases of lifestyle were assessed using the objectives below:

1. To determine the socio-economic status of the Swahili community in Old Town and Kisauni districts.
2. To determine knowledge, awareness and attitudes of the Swahili community towards diet, overweight, obesity, diabetes and hypertension.
3. To evaluate the dietary practices and habits and physical activity levels of the Swahili community in Old Town and Kisauni districts.
4. To determine the prevalence of overweight and obesity in the Swahili community of Old Town and Kisauni districts.

5. To determine the prevalence of diagnosed diabetes mellitus and hypertension in the Swahili community of Old Town and Kisauni districts.
6. To determine the association between the socio-economic status, physical activity levels, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, dietary practices, overweight, obesity and the prevalence of diagnosed diabetes and hypertension among the Swahili community of Old Town and Kisauni districts.

1.5 Research questions

1. What is the socio-economic status of the Swahili community in Old Town and Kisauni districts?
2. What are the levels of knowledge, awareness and attitudes of the Swahili community towards diet, overweight, obesity, diabetes and hypertension?
3. What are the dietary practices and habits and physical activity levels of the Swahili community in Old Town and Kisauni districts?
4. What is the prevalence of overweight and obesity in the Swahili community of Old Town and Kisauni districts?
5. What is the prevalence of diagnosed diabetes mellitus and hypertension in the Swahili community of Old Town and Kisauni districts?
6. Is there any association between the socio-economic status, physical activity levels, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, dietary practices, overweight, obesity and the prevalence of diagnosed diabetes and hypertension among the Swahili community of Old Town and Kisauni districts?

1.6 Significance of the study

The majority of the world's population lives in the developing world therefore an increasing rate of lifestyle diseases in developing countries could be the reason behind the continuing dramatic worldwide increase in these diseases. In order to blunt the impact of the increasing prevalence of these diseases, it was crucial to study their association with risk factors and recommend ways of reducing their prevalence in the developing countries (Levenson *et al.*, 2002).

A meeting organized by the World Health Organization in Kampala in 2008 justified the need to carry out a study on lifestyle diseases. In this meeting, medical professionals warned of the upsurge in diet-related diseases. They sounded an alert over an increase in non-communicable diseases such as cancer, diabetes and hypertension. It was also noted that regional countries are lacking data on these diseases. The Ministry of Health Kenya Annual Health Sector Status report 2008 also recognized that these diseases have not received the priority attention in public health policies and that donor driven agenda prioritize infectious diseases hence the need to research on lifestyle diseases. The World Health Organization emphasizes the importance of looking at social, cultural, political, physical and structural influences for effective prevention and management of overweight and obesity which are risk factors of lifestyle diseases (WHO, 2009). This study therefore involved a socio-economic status, physical activity, knowledge, awareness, attitudes and dietary practices survey which has provided data in the area of lifestyle diseases. Religious and cultural values were also looked into since they influence physical activity levels and dietary practices leading to the development of overweight and obesity.

The findings of this study are important in providing a baseline that would help stakeholders come up with timely dietary and lifestyle interventions that would be used in the prevention of obesity and lifestyle diseases. Such interventions like sustainability of consumption of healthy diets require financial investments which are small when compared with the resources needed for the treatment and management of these diseases as well as the losses due to morbidity and mortality. These findings are beneficial to policy makers, diabetes organizations among other organizations, nutrition departments in colleges and hospitals and the general public.

1.7 Limitations of the study

The study was a one-time cross sectional survey. It was not able to capture the long term impact and/or effect of the selected factors on the prevalence of overweight, obesity and diagnosed diabetes mellitus and hypertension. To tackle this problem several tools were used for data collection. Factors like dietary habits and practices were assessed using both the food frequency questionnaire and 24-hour recall.

Clinical diagnosis of diabetes mellitus and hypertension was not done. The prevalence of these lifestyle diseases was based on self-reports by individuals already diagnosed in hospitals.

1.8 Assumption of the study

Members of the households were available and willing to participate in the study.

1.9 Scope of the study

This study was conducted in Mombasa County targeting the Swahili community from Old Town and Kisauni districts that were purposively selected as study areas. The study looked at socio-economic status, physical activity, dietary practices, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, overweight, obesity and the prevalence of diagnosed diabetes and hypertension among men and women aged 30 to 70 years old in various households in villages of these districts.

The study also assumed a comparative approach to determine any significant differences that existed between the Old Town and Kisauni districts' respondents. Old Town is an ancient Swahili area situated on the south-east side of Mombasa Island comprising of the Fort Jesus, narrow winding streets and alleyways where historic Swahili houses with carved wooden balconies and massive doors can be viewed (Appendix 21.0). This area is inhabited by a mix of local, Arab, Asian, Portuguese and British settlers (Mombasa Info, 2009a). It has a high population of the Swahili people therefore the community here possessed more Swahili culture and characteristics hence had slightly different dietary habits and practices compared to Kisauni district ('country town') community which had slightly deviated from the typical Swahili culture due to adopting other ethnic groups' cultures.

1.10 Operational definitions of terms

The following terms are defined within the context of this study.

Attitudes: The way members of the household think and feel about healthy eating, healthy body weight, physical activity, obesity, hypertension and diabetes.

Awareness: Knowing about and being interested in issues on healthy eating, healthy body weight, obesity, hypertension and diabetes.

Body Mass Index (BMI): The body weight in kilograms divided by height in meters squared (kg/m^2).

Chronic diseases of lifestyle: A group of diseases that share similar risk factors as a result of exposure, over many decades, to unhealthy lifestyle. These diseases usually emerge in middle age after long exposure to an unhealthy lifestyle involving tobacco use, lack of regular physical activity and consumption of diets rich in highly saturated fats, sugars, and salt.

Dietary habits and practices: Dietary habits were defined as habitual decisions an individual or community makes when choosing what foods to eat as influenced by culture among other factors. These habits were indicated by the frequency scores in the food frequency questionnaire. The dietary practices referred to the various foods preparation/ cookery methods inclusive of the ingredients and spices used in food preparation.

Knowledge: Information, understanding and skills on the various dietary habits and practices, obesity and lifestyle diseases. The information, understanding and skills could be gained through either formal and informal education or experience.

Lifestyle diseases: Diseases that are influenced by lifestyle and specific behavioural factors like diet and physical activity, biological factors like pancreas dysfunction and societal factors which include a complex mixture of interacting socio-economic, cultural and environmental factors. In this study lifestyle diseases were defined as diagnosed diabetes and hypertension.

Obesity: Excessive body fat content. It was indicated by a BMI of greater than 30 and waist circumference of greater than 88 cm for women and greater than 102 cm for men (WHO, 2003).

Overweight: Excess weight relative to height. It was indicated by a BMI of 25 to 30 (WHO, 2003).

Physical activity: Any bodily movement that requires energy expenditure. The indicators of physical activity were based on questions in the global physical activity questionnaire which was developed by the World Health Organization for physical activity surveillance in countries (WHO, 2004).

Socio-economic status: The status of the members of the household based on the educational levels, occupation and income (financial background). The socio-economic status of the household members was indicated by various questions in the questionnaire.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature in the area of chronic diseases of lifestyle globally and in developing countries. It focuses on diabetes mellitus and hypertension as the specified lifestyle diseases of study, their risk factors and the association between socio-economic status, physical activity, obesity, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, dietary practices and the prevalence of diagnosed diabetes and hypertension. A conceptual framework is used to explain the relationships amongst the various variables.

2.2 Chronic diseases of lifestyle

Chronic diseases of lifestyle are a group of diseases that share similar risk factors as a result of exposure, over many decades, to unhealthy lifestyle. These diseases usually emerge in middle age after long exposure to an unhealthy lifestyle involving tobacco use, lack of regular physical activity, and consumption of diets rich in highly saturated fats, sugars, and salt (Steyn *et al.,* 2006). The diseases have been strongly associated with unhealthy lifestyle habits, including inappropriate nutrition and lack of exercise (Eyre & Robert, 2004). This lifestyle results in development of hypertension, dyslipidemia, diabetes, and obesity that act independently and synergistically. Inappropriate nutrition and inactivity increase the risk of diabetes, osteoporosis, obesity and cardiovascular diseases (Webb *et al.,* 1998).

Chronic diseases of lifestyle increase in frequency as countries become more industrialized (Steyn *et al.,* 2006). The burden of these diseases is increasing globally and poses a major public health concern, a large part of which is preventable. Chronic diseases of lifestyle like diabetes, osteoporosis, cardiovascular diseases, stroke and cancer are by far the leading cause of mortality in the world, representing 60% of all deaths. Out of the 35 million people who died from these diseases in 2005, half were under 70 and half were women (WHO, 2005). These diseases are a major contributor to the burden of disease in developed countries, and are increasing rapidly in developing countries (Lopez *et al.,* 2006). Deaths caused by chronic diseases dominate mortality statistics in developing countries. In 2001, these diseases in the developing countries contributed approximately 60% of 56.5 million total reported deaths in the world. The locus of the burden resides in the developing world, as it has been projected that, by

2020, about three-quarters of mortality due to ischaemic heart disease, stroke, and diabetes will occur in developing countries (WHO, 2005). Chronic diseases of lifestyle have an impact on the burden of disease in Sub-Saharan Africa. In Kenya, these diseases contribute to half of the top ten leading causes of morbidity (MOH, 2007). In 2002 these diseases contributed over 31.8% of total mortality. In 2007 the diseases contributed over 33% of total mortality (WHO, 2007). This increase in lifestyle diseases is mainly due to demographic transitions and changing lifestyles of populations associated with urbanization.

Urbanization is a major risk factor for these diseases' epidemic. It occurs as economies grow and become modernized and populations migrate from rural to urban. Studies have shown that urbanization leads to dietary changes towards adoption of the western diet, which is high in animal proteins, fat and sugar (Reddy *et al.,* 2002). This is often accompanied by lifestyle changes including alcohol consumption, cigarette smoking and physical inactivity, hence increasing the population's risk for lifestyle diseases (Vorster, 2005). It has been reported from cross-sectional studies in South Africa that the people who have spent a larger proportion of their lives in an urban setting had significantly higher rates of diabetes and hypertension than those who have spent only a small proportion of their lives in the city (Steyn *et al.,* 2006). Mombasa County is an urban area therefore there is an impact of urbanization on the emergence of chronic diseases of lifestyle.

Chronic diseases of lifestyle are largely due to preventable risk factors such as, high blood cholesterol, high blood pressure, obesity, physical inactivity, unhealthy diet, tobacco use and inappropriate use of alcohol (Steyn *et al.,* 2006). These risk factors can be classified as modifiable and non-modifiable. Modifiable determinants include factors that can be altered, such as individual and community influences, living and working conditions and socio-cultural factors. On the other hand, non-modifiable determinants include those factors that are beyond the control of the individual, such as age, sex, ethnicity and hereditary factors. Studies show that there is a relationship between risk factors for these diseases like, socio-economic status, knowledge, awareness and attitudes, physical activity, dietary habits, obesity and the prevalence of hypertension and diabetes mellitus. A study on prevalence of overweight, obesity and self-reported chronic diseases among residents in Malaysia reported a relationship between overweight, obesity and chronic diseases of lifestyle (Nazri *et al.,* 2008). In another study on

prevalence of obesity and its associated comorbidities amongst adults, Gothankar (2009) reported an association between obesity, hypertension and diabetes. The survey on these risk factors among the Swahili community of the Kenyan coast was done to indicate any association between the factors and the prevalence of overweight, obesity, diabetes and hypertension.

2.2.1 Diabetes

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin, which is, a hormone that regulates blood sugar or alternatively, when the body cannot effectively use the insulin it produces. There are two main forms of diabetes; Type 1 diabetes, which is characterized by a lack of insulin production. Without daily administration of insulin, type 1 diabetes is rapidly fatal. The other form is Type 2 diabetes which results from the body's ineffective use of insulin. About 90% of people with diabetes around the world have type 2. There are around 200 million people, who have the condition and numbers, are expected to reach 300 million by 2025 (King *et al.*, 1998). It is largely as a result of excess body weight and physical inactivity (WHO, 2008). About 90% of type 2 diabetes is attributable to excess weight (Mokdad *et al.*, 2000). Weight gain leads to insulin resistance through several mechanisms. Insulin resistance places a greater demand on the pancreas to produce insulin. At the same time, physical inactivity, both a cause and consequence of weight gain, also contributes to insulin resistance (WHO, 2006). Type 2 diabetes is associated with morbidity and reduced life expectancy and it may remain undetected for a number of years. The adoption of a Western-type lifestyle has resulted in populations changing to a diet high in saturated fat and sugar, with a reduction in physical activity levels leading to obesity (Zimmet, 2000). This has resulted in an epidemic of what has been termed ''diabesity'' (Astrup & Finer, 2000).

The diabetes epidemic relates particularly to type 2 diabetes, and is taking place both in developed and developing nations. The prevalence of this type of diabetes was found to be 4.2% in adult Kenyans (Christensen *et al.*, 2008). However when stratified by residence, the urban-rural ratio of diabetes prevalence was found to be 6:1. There was no significant difference in diabetes prevalence between females and males. The prevalence of glucose intolerance (diabetes + IGT) was almost 2:1 when comparing the group of participants >40 years of age to the group of participants <40 years of age (Christensen *et al.*, 2008). The 2007 Diabetes atlas indicates a higher prevalence of diabetes in urban areas compared to the rural areas and majority of affected

people range between 30 and 59 years of age. Almost half of diabetes deaths occur in people under the age of 70 years and almost 80% of these deaths occur in low and middle-income countries (WHO, 2008). The prevalence of this type of diabetes is therefore higher in the urban areas and among middle-age individuals. Middle-age individuals in Kisauni and Old Town districts of Mombasa County formed the study sample.

Changes in the human environment, human behaviour and lifestyle, have accompanied globalization, and these have resulted in increasing rates of both obesity and diabetes. The Swahili people reside in an urban area and their behaviour and lifestyle is dictated by their culture. This study involved a survey on the lifestyle factors of the Swahili community like their dietary habits and physical activity levels. These are some of the risk factors for obesity and diabetes. Inappropriate nutrition and inactivity increase the risk of diabetes, osteoporosis, obesity and cardiovascular diseases (Webb *et al.,* 1998).

2.2.2 Hypertension

Hypertension is a highly prevalent risk factor for cardiovascular diseases (CVDs) throughout the industrialized world. It is becoming an increasingly common health problem worldwide because of the increasing prevalence of contributing factors such as obesity, physical inactivity and an unhealthy diet (Singh *et al.*, 2000). The current prevalence in many developing countries, particularly in urban societies, is already as high as those seen in developed countries (Knor, 2001). Worldwide hypertension is estimated to cause 7.1 million premature deaths and 4.5% of the disease burden. One billion people had hypertension in the year 2000 and 1.56 billion people are expected to have this condition by 2025 (WHO, 2002). It is estimated that between 10 million and 20 million people in Sub-Saharan Africa have hypertension. It has also been estimated that adequate hypertension treatment of these people could prevent about 250,000 deaths. However, hypertension in Sub-Saharan Africa is universally under diagnosed or inadequately treated hence extensive end-organ damage and premature death are often seen. Furthermore, hypertension frequently co-exists with other NCD risk factors, such as diabetes (Cappuccio *et al.,* 2000). Earlier surveys showed that the lowest prevalence of hypertension occurred in the poorest Sub-Saharan Africa countries, and as affluence increased, the prevalence increased. The surveys also revealed that hypertension was more common in urban than in rural settings in the region (Nissinen *et al.,* 1988). Socioeconomic status and urbanization are

predictors of hypertension. Zimbabwean women doing traditional work-related activities on rural communal land had lower blood pressures than did those women who were working for a wage on large-scale, commercial agricultural farms. The latter group, in turn, had lower blood pressures than women who earned a living in more industrial mining areas (Hunter *et al.,* 2000). Similarly, researchers (Steyn, *et al.,* 1996) found in the black community of Cape Town, South Africa, that the duration of urbanization independently predicted the presence of hypertension. Mombasa County is an urban area hence the presence of hypertension among the members of the Swahili community was predicted.

Most epidemiological studies report obesity, unhealthy diets and physical inactivity as contributing factors to increased prevalence of hypertension. Therefore, changes in lifestyle that lead to weight loss reduces the incidence of hypertension. A study at the University of Padua in Italy found that overweight people who lost between 9 per cent and 13 per cent of their body weight experienced a drop in their systolic and diastolic blood pressure (Kearney *et al.,* 2005). Another study in the Luo rural community of Kenya indicated that some of the changes in BP associated with urbanization could be mediated by the people's diet which is composed of high fat foods (Poulter, 2000).

The association between hypertension and obesity has been documented in countries in Sub-Saharan Africa. In Zimbabwe, Mufunda *et al.* (2000) found this strong association, as did Rotimi *et al.* (1995) in populations of West African descent. Despite this clear association it has been suggested that the effect of obesity in black people is less than in people of other ethnic groups. Most of the supporting evidence for this viewpoint is based on studies carried out with African Americans in the United States. A small study in South Africa suggested similar findings (Walker *et al.,* 1990). The association between obesity and hypertension was studied in the Swahili community.

2.3 Overweight and obesity

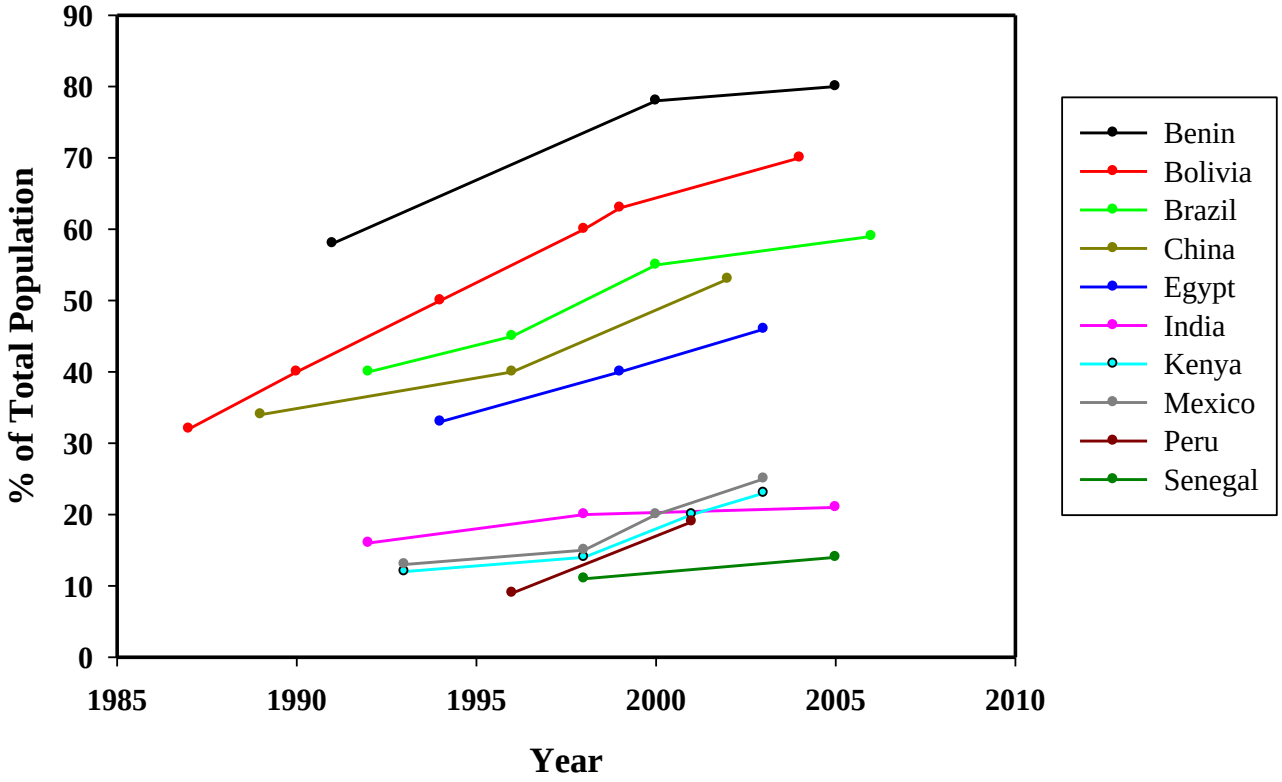
Obesity is defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight (in kilograms) divided by the square of his or her height (in meters). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight (WHO, 2003).

In addition to BMI, it is important to indicate the amount of abdominal fat mass. Abdominal fat is reported by measuring the waist circumference or the waist-to-hip circumference ratio. The waist circumference provides a better correlate with abdominal fat mass than the waist-to-hip ratio (Janssen *et al.*, 2002). High abdominal fat mass is frequently referred to as central obesity. This form of obesity has been shown to have more morbidity than if the fat distribution is predominantly on the hips (WHO, 2000). Central obesity is associated with metabolic syndrome. The key features of this condition are raised blood pressure, raised insulin and triglyceride levels, reduced high-density lipoprotein (HDL)-cholesterol levels, and insulin resistance. The condition is strongly atherogenic and predisposes to an elevated risk of diabetes and cardiovascular disease (Fontaine *et al.*, 2003; Peeters *et al.*, 2003; Solomon and Manson, 1997; WHO, 2000). Researchers have confirmed that abdominal fat deposition measured anthropometrically by waist circumference is an indicator of cardiovascular risk. A study that was reported by Janssen *et al.* (2002) showed that 14924 participants in the Third National Health & Nutrition Examination were categorized into groups by BMI and waist circumference. The aim was to see if the prevalence of HTN, dyslipidemia, type 2 diabetes and other metabolic risk factors was greater in those with high WC measurement compared with those of average WCs within the same BMI group. They found that women who were normal weight, overweight and obese with high WC values had greater health risk than those within the same BMI ranges with lower (normal) WC values. Men who had a high WC and were overweight were at risk of CVD, whereas those who were normal weight with a high WC were at risk of metabolic syndrome. This highlights that the values of WC as well as BMI are an indication of lifestyle disease (LD) risk.

In 2005 approximately 1.6 billion adults were overweight and at least 400 million adults were obese. By 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese (WHO, 2005). Overweight and obesity are now on the rise in low and middle-income countries, particularly in urban settings (Finkelstein, 2003). Urbanization, associated with changing dietary patterns and less physical activity and a rise in socioeconomic status, is occurring across Sub-Saharan Africa countries. In a study on obesity and regional fat distribution in Kenyan populations Christensen *et al.* (2008) reported a high prevalence of overweight and obesity. The prevalence of overweight was 39.8% in the urban population and 15.8% in the rural population while obesity was 15.5% in the urban population and 5.1% in the

rural population. Cheserek *et al.* (2012) reported the prevalence of overweight and obesity in elderly people living in urban areas of Lake Victoria Basin as 13.2% and 9.1% respectively. Therefore urbanization is a major risk factor for overweight and obesity.

Overweight and obesity have in the past decade, joined malnutrition, and infectious diseases as major health problems threatening the developing world. Figure 2.1 shows overweight and obesity trends in some developing countries. At least 2.6 million people each year die as a result of being overweight or obese. The rates of obesity have tripled in developing countries due to adoption of a Western lifestyle which involves decreased physical activity and overconsumption of cheap, energy-dense food (WHO, 2006). Physical inactivity and unhealthy diets are major contributors to overweight (WHO, 2002). Overweight and obesity are major risk factors for a number of chronic diseases of lifestyle. The growing prevalence of type 2 diabetes, cardiovascular disease, and some cancers is tied to excess weight (WHO, 2006). Joubert *et al.* (2007) found that increased body mass index (BMI) was associated with hypertensive diseases and osteoarthritis. The association between overweight, obesity and diagnosed diabetes and hypertension was studied in Kisauni and Old Town districts.



Source: Martorell *et al.* (2000)

Figure 2.1 Overweight and obesity trends in some developing countries

2.4 Food consumption and Dietary habits and practices

Nutrition is a major modifiable determinant of chronic diseases of lifestyle, with scientific evidence supporting the view that alterations in diet and activity have effects on health throughout life. The dramatic changes occurring in people's diets around the world are referred to as the nutrition transition. People consume more fats, more animal based products, and more sugar, as well as more processed foods and less fiber (UN-FAO, 2006). Lifestyle diseases are linked to high consumption of energy dense foods, made of animal origin and foods processed or prepared with added fat, sugar and salt (Bourne *et al.*, 2002). Unhealthy diets, especially those which have a high content in fats, free sugars and salt and physical inactivity are among some of the leading causes of these diseases including cardiovascular diseases (CVD), type 2 diabetes and certain cancers (WHO, 2004). About 2.7 million deaths are attributable to diets low in fruits and vegetables. Worldwide, low intake of fruits and vegetables is estimated to cause about 19% of gastrointestinal cancer, about 31% of coronary heart disease, and 11% of stroke (WHO, 2002).

Nutrition patterns are influenced by many factors, including individual preference, culture, traditions, and beliefs. People are normally proud of who they are and where they come from.

Each person belongs to a specific group or a specific location. The foods that people feed throughout their childhoods most often stay with them throughout their lives like favourite food types. Even in the midst of globalization where many aspects of living are a concern, people hold onto the cultural cooking practices that are known to be the best and have helped them to shape up to the people they are and what they believe about life in general (Morgan, 2000). However, that does not mean that all types of cooking are healthy. In the US for instance, in Georgia, Mississippi and Alabama, majority of the population is overweight or obese. This has a lot to do with the famous Southern cooking that has been traditionally based on staples like fatback, fried potatoes, fried chicken, fried cabbage, fried catfish, fried eggs and a lot of other fried items. Besides widespread obesity rates, there are also increased levels of lifestyle diseases (Balarajan, 2001). The Swahili community of the Kenyan coast has specific cooking methods and diets based on their culture. The use of coconut milk and sugars in their cooking is a contributing factor to high energy intake. The Swahili staple food has a lot of Indian influence in taste, thus most of their cooking is rich in spices. Popular Swahili cuisine includes *wali*, that is, rice cooked in coconut milk, which is served with a thick meat stew or fish, and *pilau*, a spicy variety of *wali*. Goat meat and chicken curries are traditionally popular during special occasions. They also eat a lot of different grains, vegetables and fruits including beans, peas, tomatoes, potatoes, okra, kale, spinach, mangoes, coconut and bananas (Ministry of Tourism, 2003). Many Swahili foods are high in fat, sugar and coconut milk, a composition that exposes this community to overweight and obesity which are risk factors for diabetes and hypertension.

2.5 Physical activity

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. It is a key determinant of energy expenditure, and thus is fundamental to energy balance. Physical inactivity, that is, a lack of physical activity is an independent risk factor for lifestyle diseases. It is associated with increased levels of obesity, breast cancer, colon cancer, osteoporosis, stress, anxiety and depression. It is one of the major underlying causes of mortality in the world. It is estimated to cause 1.9 million deaths globally (WHO, 2009). Chronic diseases of lifestyle associated with physical inactivity are the greatest public health problem in most countries around the world (WHO, 2009). Many studies across Sub-Saharan Africa have revealed the impact of a sedentary lifestyle on emerging chronic disease risk factors. The physical activity of the Nigerian civil servants studied by Forrest *et al*.

(2001) was mostly attributed to occupational activities. Low levels of physical activity were correlated to weight, body mass index (BMI), waist-to-hip ratio, blood pressure, insulin levels, and total and low-density lipoprotein (LDL) cholesterol in men. Similarly, Sobngwi *et al*. (2002) in Cameroon as well as Aspray *et al*. (2000) in Tanzania concluded that physical inactivity was associated with obesity, diabetes, and hypertension in the people they studied in urban and rural settings in both Cameroon and Tanzania. A qualitative study in Cameroon also found that the reduced physical activity accompanying sedentary occupations in the cities explained the higher rate of obesity observed in people with these sedentary occupations (Treloar *et al.,* 1999). Steyn *et al*. (1999) showed an independent association between low levels of physical activity and having diabetes in a poor, peri-urban community near Cape Town. The association between physical inactivity among the Swahili people and prevalence of diagnosed diabetes and hypertension was studied.

It has been shown that moderate amounts of physical activity are associated with health benefits and can help reduce various chronic diseases related to lifestyle (Blair *et al.,* 2001). Therefore different types and amounts of physical activity are required for different health outcomes. At least 60% of the world's population fails to complete the recommended amount of physical activity required to induce health benefits. This is partly due to insufficient participation in physical activity during leisure time and an increase in sedentary behavior during occupational and domestic activities. An increase in the use of passive modes of transport has also been associated with declining physical activity levels (WHO, 2009). In the urban settings, people tend to do less aerobic exercise. They use public transport and thus walk less, tend to do less labour-intensive work and watch television even in the poorer urban settings, compared to those living in rural settings (Steyn *et al.,* 2006). Mombasa County is an urban area where vehicles are the modes of transport and most of the individuals have jobs that do not involve a lot of movement hence sedentary behaviour. Old Town is right in downtown where residents do not have to walk far to access their amenities including shopping. There was therefore need to study whether physical activity was associated with the chronic diseases of lifestyle. Further, it was necessary to see if there was a difference between physical activity levels in Old Town and Kisauni districts.

2.6 Socio-economic status

Previously, lifestyle diseases were thought to be diseases of the affluent, but poor populations are now equally affected. This is largely due to the environment in which the poor reside, and socio-economic circumstances that influence their physical activity patterns and diets hence consumption of high energy carbohydrates compared to expensive high protein diet (Mvo *et al.*, 1999). The relationship between obesity and poverty is complex; being poor in one of the world's poorest countries, that is, in countries with a per capita gross national product (GNP) of less than $800 per year is associated with underweight and malnutrition, whereas being poor in a middle-income country with a per capita GNP of about $3,000 per year is associated with an increased risk of obesity (WHO, 2006). Socio-economic factors like education, occupation and income, have a major influence on nutrition, physical activity and health and as a result, on individual and community disease patterns. This is indicated by the dramatic rise in prevalence of cardiovascular diseases (CVDs), type 2 diabetes, obesity and other lifestyle diseases in developing and newly developed nations, particularly in the Pacific and Indian Ocean region, and in Asia (Zimmet, 2000). These socio-economic factors among the Swahili community were studied.

Chronic diseases of lifestyle have a great negative economic impact. This economic impact is majorly on individuals, families, the health system and society at large. Since these diseases affect people in their productive years, they reduce productive labour and earning capacity at a household level (Suhrcke *et al.*, 2006). Many of these diseases including diabetes do not cause sudden death; they instead cause progressive illness and debilitation. In this way, the diseases reduce productivity of the individual, draining away their resources hence aggravating poverty. Treatment of these diseases puts much strain on the already overburdened health system, because of the additional resources required (MOH, 2007). Lifestyle diseases are an under-estimated cause of poverty and a barrier to economic development. These diseases including diabetes are estimated to reduce GDP by up to 5% in many low and middle-income countries (WHO, 2006).

The WHO projects increases in deaths and illness due to chronic diseases in low and middle-income countries up to 2030. This is shown in figure 2.2.

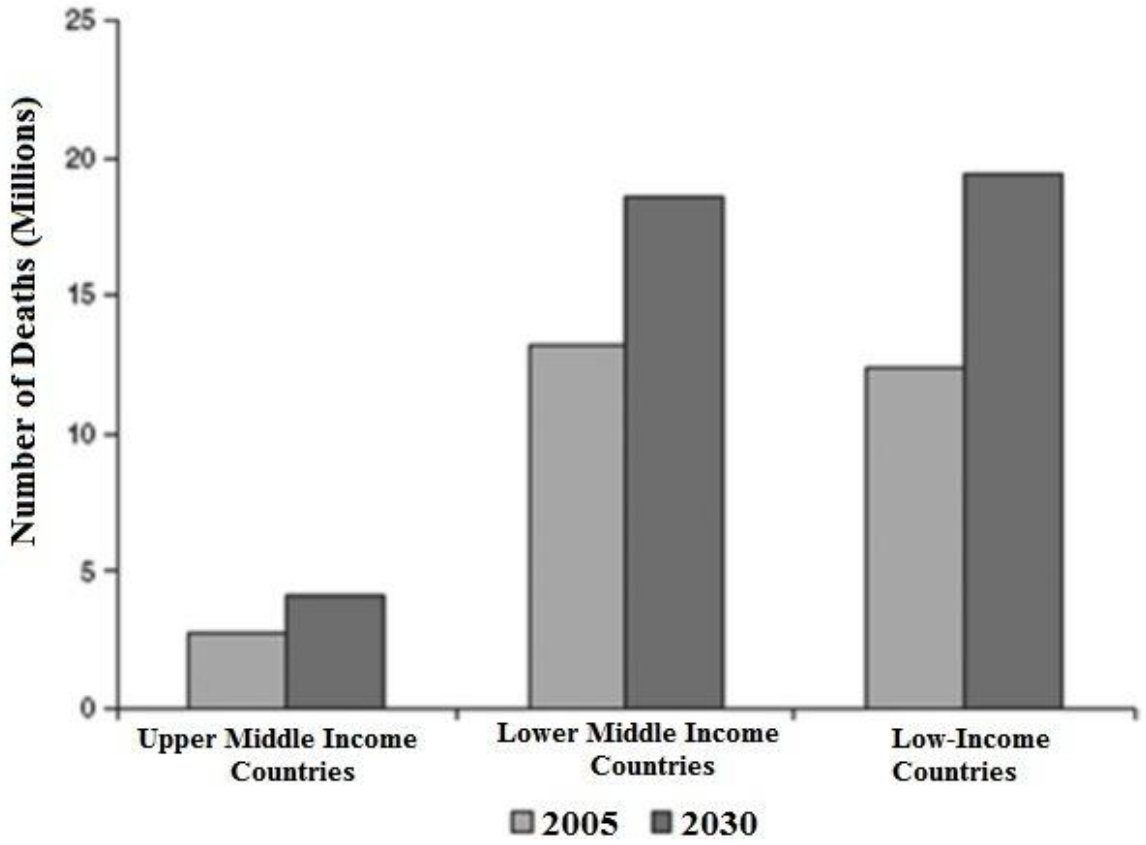


Figure 2.2 WHO projections of increases in chronic lifestyle diseases

The Kenya National Bureau of Statistics states income groups categories as: lower income group where individuals earn KES 23,670 or less per month, middle-income group earns KES 23,671 to KES 120,000 per month and upper income group earns above KES 120,000 per month (KNBS, 2010). Income is one of the factors that define socio-economic status in the study.

2.7 Knowledge and awareness

World Health Report (2002) shows that most of the global burden of lifestyle disease risk occurs in the developing world. The report states that this is a result of already high and increasing risk factor levels and population's lack of awareness or no knowledge about the causes and prevention measures. The Swahili people's knowledge on lifestyle disease causes and prevention measures would indicate their risk of developing these diseases. As knowledge of lifestyle diseases and health increases, the wealthy are able to reduce the frequency that they suffer from these conditions while incidence of the diseases increases among poor and minority

populations. If this trend repeats in developing countries, the very poorest of the world's poor will be the ones most at risk (WHO, 2002).

Dietary habits and physical exercise, are the most important factors to consider for combating lifestyle disease as said by Christopher Murray, executive director of the Cluster on Evidence and Information Policy at WHO. Murray cites successes in Japan and Finland, where entire populations have been able to significantly improve their health. It was reported that in many countries, too much focus is placed on one-on-one interventions among people at medium risk for lifestyle disease. A much better use of resources would be to focus on those at elevated risk and to use other resources to introduce population-wide efforts aimed at reducing risk factors through multiple socio-economic and educational policies and programs (Murray & Lopez, 1997). The Ministry of Health Kenya Annual Health Sector Status report indicates that there is widespread lack of awareness of lifestyle diseases among the policy makers and general public hence the need to create awareness (MOH, 2007).

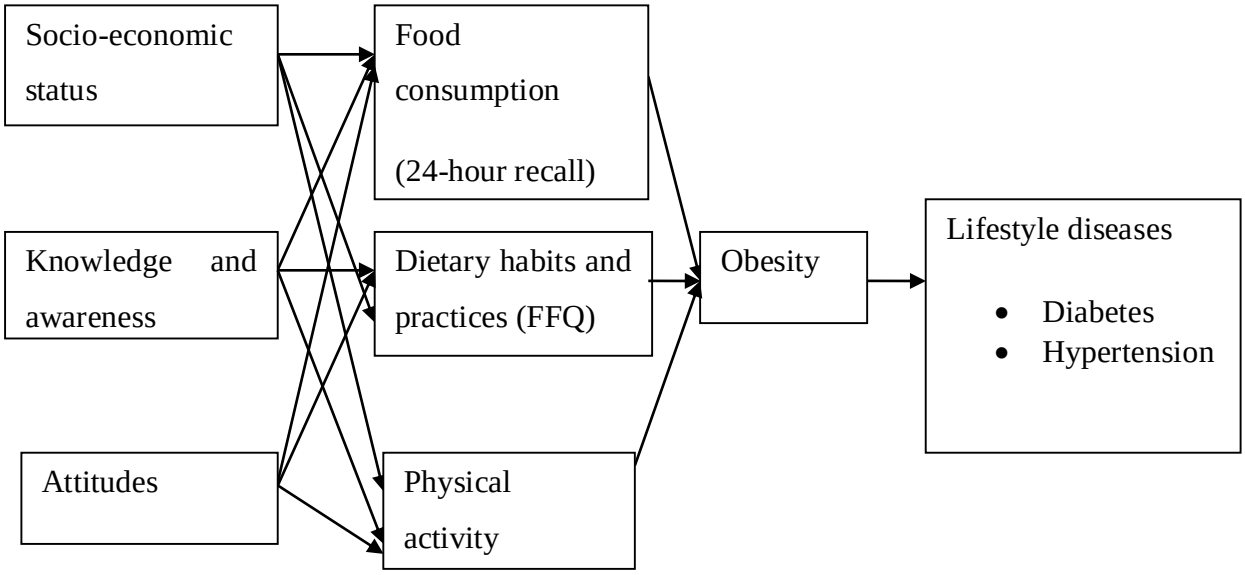
2.8 Attitudes and Beliefs

Beliefs and attitudes about body image of some individuals have been found to increase the risk for developing lifestyle diseases like type 2 diabetes and hypertension. In many Sub-Saharan Africa countries, an increased level of body fat is associated with beauty, prosperity, health, and prestige, despite its negative impact on health. Thinness, in contrast, is perceived to be a sign of ill health or poverty and is something to be feared and avoided, particularly in recent years, when it has been associated with AIDS (Treloar *et al.,* 1999). In disadvantaged communities in South Africa, food is highly valued because food security has not always been ensured. Researchers found it to be socially unacceptable for an individual to refuse to eat food that was offered to them (Mvo *et al.,* 1999). Brown & Konner (1987) also reported that the majority of the less developed regions had ideals of feminine beauty that include plumpness. It is therefore unsurprising that studies have shown that black women in South Africa also do not perceive being overweight or obese as a health risk (Ndlovo & Roos 1999). Mvo *et al.* (1999) and Puoane *et al.* (2006) reported that although a large percentage of African women were overweight and obese, few perceived themselves like so. The belief that thinness is associated with personal problems and sickness, especially HIV and AIDS seems to be a barrier to maintaining normal body weight in some individuals (Puoane *et al.,* 2005a). Nutrition patterns

are influenced by many factors like culture, attitudes and beliefs hence accompanying beliefs about body weight are socio-cultural factors related to food intake and preparation, which partly contributes to obesity in some individuals (Puoane *et al.,* 2006). The Swahili people have a wide range of socio-economic activities and cultural values which influence their beliefs and attitudes towards dietary intake, obesity, diabetes and hypertension. These people have socio-cultural factors related to food intake and preparation. Most of their foods are prepared using coconut milk. Coconut milk has a fat content around 17% (Yong *et al.,* 2009). Swahili snacks are high in fat and sugars hence contributing to obesity among the individuals in this community.

2.9 The conceptual framework

The conceptual framework below shows the causes of obesity, diabetes and hypertension due to lifestyle and specific behavioural factors, biological factors and societal factors which include a complex mixture of interacting socio-economic, cultural and environmental factors. The independent variables, socio-economic status and knowledge, awareness and attitudes towards diet, obesity and lifestyle diseases have direct effect on food consumption, dietary habits and physical activity of the Swahili community. The food consumption, dietary habits and physical inactivity on the other hand may lead to the development of obesity which is a major risk factor for lifestyle diseases; diabetes and hypertension which are the dependent variables. The conceptual framework thus served as a guide in determining and quantifying the causes of these chronic diseases of lifestyle in the Swahili community. The operationalized conceptual framework for the study is shown in the figure 2.3 as follows:



Extraneous Variable- Socio-economic status

Figure 2.3 Interaction between risk factors that lead to development of chronic diseases of lifestyle (diabetes and hypertension)

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter discusses the research design adopted, study sites, the study population, sampling and sample size, instrumentation, data collection procedures and data analyses.

3.2 Research design

The research design assumed both quantitative and qualitative approaches and was a one-time cross-sectional survey involving men and women aged 30 to 70 years old.

The study also assumed a comparative approach to determine any significant differences that existed between the Old Town and Kisauni districts' respondents. Old Town has a high population of the Swahili people therefore the community here possessed more Swahili culture and characteristics hence had slightly different dietary habits and practices compared to Kisauni district community which had slightly deviated from the typical Swahili culture due to adopting other ethnic groups' cultures.

3.3 Location of the study

The study was conducted in Mombasa County of Coast Province (Appendix 20.0). Mombasa County is Kenya's oldest and second largest city. It is situated in the South-Eastern part of Coast Province. It covers an area of 229.6 Km^2. Water mass accounts for 65 Km^2. It borders Kilifi to the North, Kwale to the South and West and the Indian Ocean to the East. The county lies between latitudes 3°– 80'and 4° –10'South of the Equator and between longitudes 39° – 80' East of the Greenwich Meridian. This County is an island linked to the mainland by a road and a railway bridge to the northwest and a further road bridge to the north coast. A vehicular ferry links the island with the south coast at Likoni centre (Mombasa Info, 2009b).

3.4 Study population

The study population consisted of men and women aged 30 to 70 years old, in Mombasa County. Economically productive individuals between the ages of 30 and 64 years of age are at risk of mortality attributed to lifestyle diseases (Roglic *et al.,* 2005). Almost half of diabetes deaths occur in people under the age of 70 years. The National Health Examination Survey in China on chronic lifestyle diseases involved adults aged 30 to 70 years old (WHO, 2008).

Chronic diseases of lifestyle usually emerge in middle age after long exposure to an unhealthy lifestyle involving tobacco use, lack of regular physical activity and consumption of diets rich in highly saturated fats, sugars, and salt (Steyn *et al.*, 2006). The age gap of 30 to 70 years old was therefore used to achieve the study objectives since most studies on chronic lifestyle diseases involve this age group and the group is at a high risk of mortality from these diseases.

3.5 Sampling and sample size

The sampling frame consisted of men and women residing in Old Town and Kisauni districts, as the two study clusters. Both of these two districts were purposively selected for the study. The unit of analysis was the individual households, represented by the selected members of the households, who were administered with and responded to the survey instruments. A man and woman were randomly picked from each household. Simple random sampling was used where the members of the household picked papers from a hat and one man and woman were selected.

The sample size was calculated using the Fischer's formula recommended by Mugenda & Mugenda (2003) below.

$$n = \frac{Z^2pq}{d^2}$$

Where:

n = the desired sample size (if target population is greater than 10,000)

z = the standard normal deviate at the required confidence level

p = the proportion in target population estimated to have characteristics being measured

q = 1-p

d = the level of statistical significance set

The proportion in the target population estimated to have characteristics (obesity) being measured was 16%. The prevalence of obesity was about 15.5% in Kenyan urban population (Christensen, 2008).

Therefore, $n= (1.96)^2 \times (0.16) \times (0.84)/ (0.05)^2$

n = 207 households from Old Town and Kisauni districts.

Household lists of Old Town and Kisauni districts were obtained from the National Centre of Statistics government offices in Mombasa County. The lists indicated 12,747 and 13,903 households from Kisauni district and Old Town district respectively. Proportionate sampling was used to get the specific number of households from each of the two study sites.

From Kisauni district, 12,747/26,650 × 207 = 99 households

From Old Town district, 13,903/ 26,650 × 207 =108 households

Systematic sampling was then used to randomly pick the 207 households (every 11^{th} household) from both of the two study sites, to constitute the study sample. In each household a man and woman were selected hence 414 participants.

Sub-sampling was done to get samples for food consumption data collection. A 24-hour dietary recall was taken from members of a sub-sample from each of the two study sites. Each sub-sample constituted of one third of the sample population (33 households from Kisauni district and 36 households from Old Town district). Gay (1981) suggests that for correlational research, a minimum of 30 cases is recommended per sample. Systematic sampling was used to pick these households from the bigger sample of 99 households in Kisauni district and 108 households in Old Town. Each 3^{rd} house was picked within the bigger sample. A man and woman were selected in each house using simple random sampling by picking papers from a hat hence 66 and 72 individuals from Kisauni district and Old Town district respectively.

3.6 Exclusion criteria

The exclusion criteria affected the non-Swahili people and sick or bed ridden individuals

3.7 Instrumentation

Several methods of data collection were used in this study including: a research questionnaire, 24 hour recall, food frequency questionnaire, anthropometric assessment, physical activity assessment, Focus Group Discussions, Key Informants Interviews and Observation.

3.7.1 Research questionnaire

In a study of free living people it was necessary and possible to obtain information by asking questions. Socio-economic, knowledge, awareness, attitudes and demographic data was collected through a household survey using a semi-structured researcher administered questionnaire. Socio-economic status was based on the educational levels, occupation and income of the interviewed household members. Knowledge, awareness and attitudes were addressed using questions on balanced diet, healthy eating, healthy body weight, obesity, diabetes, hypertension, diabetes and hypertension (Appendix 1.0). One point was awarded for each correct answer and zero point for a wrong answer. A likert scale was then developed to categorize the levels of knowledge as poor (7-9 points), average (4-6 points) and good (0-3 points) (Elaine & Christopher, 2007). Awareness responses were either Yes or No whereas attitudes responses were 'good' or 'bad'. A likert scale was developed to classify the attitudes of the Swahili community as 'good' or 'bad' and awareness as Yes or No (Likert, 1932).

3.7.2 Dietary assessment

More than one method of assessing dietary intake is recommended as one method is susceptible to biases (Tinker *et al.,* 2001). Two methods of dietary assessment were used in this study; a food frequency questionnaire modified from the EPIC-Norfolk food frequency questionnaire (Welch et al., 2005) and a 24-hour recall which was taken from members of a sub-sample from each of the two study sites.

3.7.3 Anthropometric assessment

Anthropometry is the measurement of the human body and usually comprises a series of non-invasive, inexpensive and easy to perform methods of estimating body composition. Several studies have shown linear correlations between anthropometric measures like waist measurements and weight/ height^2 (BMI) (Tran and Weltman 1989; Lean, 1995; Lean & Han 2002).

3.7.3.1 Body Mass Index (BMI)

Body mass index is an index of body size commonly used to classify people as being under weight, normal weight, overweight or obese. The BMI which measures nutritional status was calculated as a ratio between weight in kilograms and height of the respondent in meters squared (kg/m^2) and compared with internationally recommended cut-off points for status (WHO, 2003). A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight

Weight of the respondents was measured to the nearest 0.1 kilograms using the SECA scale. The respondents were weighed barefooted while standing upright. The respondents' heights were measured using a portable stadiometer to the nearest 0.1 cm. The BMI was subsequently determined from these measures.

3.7.3.2 Waist circumference

The waist circumference (WC) was measured using a body tape midway between the lowest rib and the iliac crest following a quiet expiration (Han *et al.,* 1995). WC above 88 cm and 102 cm for women and men respectively was categorized as abdominally obese (WHO, 2003).

3.7.3.3 Skin Fold Thickness

Skin fold thickness, measured by skin fold caliper is a simple, reasonably accurate way of assessing body fat. Skin fold thickness of the respondents was measured mid-point between the acromiale (lateral edge of the acromial process, e.g. bony tip of shoulder) and the radiale (proximal and lateral border of the radius bone, approximately the elbow joint), on the mid-line of the posterior (back) surface of the arm (over the triceps muscle). The arm was required be relaxed with the palm of the hand facing forwards (supinated). A vertical pinch, parallel to the long axis of the arm, was then made. The skin was pinched at an appropriate site to raise a double layer of skin and the underlying adipose tissue, but not the muscle (Durnin & Womersley, 2007). The measurements were taken to the nearest 0.1 mm using a skin fold caliper.

3.7.3.4 Mid-upper Arm Circumference, Arm Muscle Area and Arm Fat Area

Mid-upper arm circumference (MUAC) was measured using a MUAC tape on the left arm to the nearest 0.1 cm at the midpoint of the humerus (between the shoulder and elbow)

without compressing the tissue. With the left arm bent, a body tape was used to find the midpoint of the arm between the shoulder and the tip of the elbow. The measurement was then taken on the left upper arm while the arm is hanging down the side of the body and relaxed (Frisancho, 1990).

Arm Muscle Area and Arm Fat Area were then calculated using the skin fold thickness and mid-upper arm circumference measurements (Frisancho, 1993). Arm Muscle Area (AMA) and Arm Fat Area (AFA) were used to assess body fat and indicate obesity. The formula for calculating AMA and AFA are as follows:

AMA= $[MUAC – (TSF * 3.14)]^2 / (4 * 3.14)$ (MUAC= Mid-upper arm circumference and TSF= Skin fold thickness)

AFA= $[MUAC^2 / (4 * 3.14)]$ - AMA (Frisancho, 1993)

3.7.4 Physical activity assessment

Physical activity is difficult to assess. Questionnaires can give a good picture of patterns of perceived activity but do not indicate intensity or fitness. Intensity can be gauged by direct measurement using accelerometers as answers to questionnaires are very subjective. There are many physical activity questionnaires available validated for various aspects of physical activity for the example the global physical activity questionnaire that was used in this study (WHO, 2004).

The Global Physical Activity Questionnaire (GPAQ) was developed by WHO for physical activity surveillance in countries. It collects information on sedentary behavior and physical activity participation in three settings or domains which include: activity at work, travel to and from places and recreational activities. The GPAQ was validated by a WHO expert group working on physical activity measurement. Around 50 developing countries are now using the GPAQ for physical activity data collection (WHO, 2004). This study intended to assess physical activity in the three settings, that is, activity at work, travel to and from places and recreational activities. The GPAQ was therefore used as it is in order to capture these aspects. The interviewed household members' mean physical activity was described using an indicator called metabolic equivalents (METs) then categorized in 3 levels of physical activity as low, moderate and high. This calculation and categorization was done using the GPAQ guide (WHO, 2004).

3.7.5 Focus Group Discussions

The aim of this phase was to elicit dietary habits and practices particularly food preparation or cookery methods from women of the Swahili community. Focus groups usually range in size from 8 to 12 participants (Morgan, 2000). Ten volunteers from each of the study site (Kisauni and Old town districts) were selected and invited to a Focus Group Discussion, to respond to a few structured questions that sought to elicit information on Swahili dietary habits and practices with particular emphasis on type of foods consumed and their preparation methods. A Focus Group Discussion guide was used (Appendix 2.0). Information derived from the Focus Group Discussions was used to complement that from household survey. Women were purposively selected to be involved in these discussions because they were involved in food preparation.

3.7.6 Key Informants Interviews

In order to investigate community knowledge, awareness and attitudes towards dietary habits, obesity and lifestyle diseases this study proposed to use in-depth interviews with some key informants from each of the two study sites. These informants were identified by the community members based on their positions in the community and interaction with the community members. The focus group discussion checklist was used here but in this case as a guide to seek in-depth information over and above what was collected from focus group discussion and household survey.

3.7.7 Observation

Throughout the research period, observation (ocular) research technique of data collection was used to complement the information being sought by the questionnaire. Some of the observations made were on the Swahili community's way of life, their dietary habits, cookery ingredients and food preparation methods during data collection. These observations were used to verify the information given by the respondents.

3.8 Validity of the instrument

Validity is the accuracy, soundness or the effectiveness with which an instrument measures what it is intended to measure (Wiersma, 1995). In this study, validation of the instrument (questionnaire) was done to ensure that the content and the format of the questionnaire were consistent with the study variables. In this case face validation, content and

construct of the questionnaire were assessed by experts from the department of Human Nutrition in Egerton University. Comments from the experts were incorporated into the instruments before being used in the field. Pre-testing of the questionnaire was done in ten (10) households in Ganjoni district, where people have similar background and dietary practices with those sampled for the study.

3.9 Reliability of the instrument

Internal consistency technique was used to test reliability of the survey instruments. In this case, Cronbach's alpha which is a general form of Kuder-Richardson (K-R) 20 formula was used (Mugenda & Mugenda, 2003). The Cronbach's alpha value was 0.83 hence good internal consistency.

3.10 Ethical issues and data collection

Ethical considerations

The researcher obtained an introductory letter from the University's graduate school before carrying out the study. This facilitated the acquisition of a research permit from the National Council of Science and Technology authorizing the carrying out of the research among Swahili people in Mombasa County. The researcher also sought for permission from the administration offices to be allowed to carry out the study in the County. Individuals' informed consent was obtained before interviewing them and this was after explaining to them the purpose of the study and how the results from the study will be used. They were also assured of strict confidentiality of all the information collected in the study. This was done by ensuring that their names were not included in the questionnaires.

Actual data collection

Data was collected from men and women aged 30-70 years from 207 households in Old Town and Kisauni districts. A semi-structured interviewer administered research questionnaire was used to collect data on demographic information, socio-economic status, knowledge, awareness, attitudes and physical activity. Patterns of dietary habits were recorded by the researcher using the dietary questionnaire whereas food consumption was recorded using a 24-hour dietary recall from sub-samples of the study population. Questions in the questionnaire were translated in Swahili language by the researcher where necessary. All anthropometry was

recorded by the researcher. Finally focus group discussions and in-depth interviews were conducted by the researcher.

3.11 Data analyses

Following the coding and entry of the data, both descriptive and inferential analyses of data was undertaken, using the Statistical Package for the Social Sciences version 11.5 computer software. Appropriate descriptive analysis was used to generate frequency distributions, tables and other illustrations, and inferential analyses to indicate relationships between various independent and dependent variables. Bivariate and multivariate analyses which involved cross-tabulations, linear regressions, nominal regressions and logistic regressions were done to measure the strength of relationships between the variables. The linear regressions were used to show the association among the variables in the conceptual framework. The nominal regressions indicated the predictors of obesity, diagnosed diabetes and diagnosed hypertension (dependent variables). The logistic regressions on the other hand determined the odds of being obesity, diabetic and hypertensive. The Difference in Proportions test (Appendix 19.0) was used to test for differences between the Old Town and Kisauni districts findings while Chi-square test at 95% confidence intervals and a p-value <0.05 was used to test any significant association between the various variables. Descriptive analysis was undertaken for the Focus Group Discussion and the Key Informant interviews to complement the analyses from the questionnaire survey findings and also to address the study objectives. Table 3.0 shows a summary of the data analyses.

Table 3.0 Summary of data analyses

	Research Questions	**Test Statistics**
1.	What is the socio-economic status of the Swahili community in Old Town and Kisauni districts?	Descriptive statistics (Frequency distributions, Tables) Chi-square test
2.	What are the knowledge levels, awareness and attitudes of the Swahili community towards dietary practices, overweight, obesity and lifestyle diseases?	Descriptive statistics (Frequency distributions, Tables) Difference in proportions test
3.	What are the dietary practices, habits and physical activity levels of the Swahili community in Old Town and Kisauni districts?	Descriptive statistics (Frequency distributions, Tables) Difference in proportions test
4.	What is the prevalence of overweight and obesity in the Swahili community of Old Town and Kisauni districts?	Descriptive statistics (Frequency distributions, Tables) Difference in proportions test
5.	What is the prevalence of diagnosed diabetes mellitus and hypertension in the Swahili community of Old Town and Kisauni districts?	Descriptive statistics (Frequency distributions, Tables) Difference in proportions test
6.	Is there any association between the socio-economic status, physical activity levels, knowledge, awareness and attitudes towards diet, obesity, diabetes and hypertension, dietary practices, overweight, obesity and the prevalence of diagnosed diabetes and hypertension in the Swahili community of Old Town and Kisauni districts?	Chi-square test, Logistic regressions, Linear regressions, Nominal regressions

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1 Introduction

Results and discussions of the study are presented based on objectives in this section. The areas covered include: socio-demographic characteristics of the households, socio-economic status of the household members who were interviewed, their knowledge, awareness and attitudes, dietary practices and habits and physical activity levels, the prevalence of overweight and obesity in the Swahili community, prevalence of diagnosed diabetes mellitus and hypertension in this community and associations among the different variables.

4.2 Household socio-demographic characteristics

A total of 207 households (99 from Kisauni district and 108 from Old Town) were included in the study. 414 household members (198 from Kisauni district and 216 from Old Town) were interviewed. Out of this, there were 99 women and 99 men were from Kisauni district and 108 women and 108 men from Old Town district. The mean age of the household members in Kisauni district was 44 years whereas in Old Town it was 45 years. Table 4.1 shows mean age of the interviewed household members. Compared to the Kenya Demographic Survey (KDHS) findings for urban residents of 2008-09 where the mean household size is 3.1, the mean number of household members in Kisauni district was 3.4 whereas in Old Town it was 3.8. The slightly higher number of household members in the Swahili community could be explained by the fact that relatives lived together in one household, as observed during the interviews. The Swahili people are family or clan oriented (Bakari, 1981). The parents, married children, their spouses and grandchildren all lived in the same household.

Table 4.1 Mean Age of the Interviewed Household Members

Study area	Gender	Mean Age (years)	SD	Range
Kisauni district	Females	43	5.24	31-57
(n=99 households)	Males	45	5.23	35-58
	Total (Females and Males)	44	5.37	31-58
Old Town	Females	44	5.13	32-57
(n=108 households)	Males	47	4.85	35-58
	Total (Females and Males)	45	5.31	32-58
Total (Kisauni and Old Town)		45	5.34	31-58

About 98% and 2% of the women interviewed in Kisauni district were married and widowed respectively compared to 97% and 3% of the women in Old Town district. All the men in both districts were married. Majority of household members whose age ranged from 30 to 70 years were married unlike the members aged less than 30 years who had cases of divorce and separation. These members were excluded from the study because of their age. Their marital status was however indicated in the questionnaire since they were household members (Appendix 1.0).

4.3 Socio-economic status of the Swahili community in Old Town and Kisauni districts

Socio-economic status was defined in this study as the status of the members of the household based on their educational levels, occupation and income. Distribution of these variables is shown below. The association between the variables and other risk factors in the study are shown later in this chapter.

4.3.1 Educational levels

The educational levels of the interviewed household members in Kisauni district and Old Town district were classified into six groups: no formal education, some primary education, primary education completed, some secondary education and more than secondary education, a classification that is similar to education classification in the Kenya Demographic Health Survey Report (KDHS, 2008-09). Table 4.2 shows the education levels of the interviewed household members. About 36.8% of the Swahili community in both Kisauni and Old Town districts had completed primary school education, 3.1% had no formal education and very few (4.6%) had more than secondary school education. The individuals that had more than secondary school education reported attending technical colleges after secondary school where they took courses like tailoring and catering for the women and clerical courses, computer courses, driving and mechanics courses for the men. The results of this study somewhat differ from the education levels statistics of Kenyan Coast which indicate that 34.1% of the individuals in the Coast have some primary school education, 17.6% of have no formal education and 6.4% have more than secondary school education (KDHS, 2008-09). The Swahili community is one of the communities in the Kenyan Coast. Other communities include: the Mijikenda, the Taita and other communities which have migrated from other parts of Kenya.

There was statistically significant difference between the educational levels of men and women from both the study areas using chi-square test ($p<0.05$; 95% C.I). Majority (53.6%) of the women in Kisauni district had completed primary school education and majority (74.7%) of the men had some secondary school education compared to Old Town district where majority (58.4%) of the women had some primary school education and majority (73.2%) of the men had completed primary school education. The lower educational levels in Old Town district could be attributed to the fact that besides formal education, children from the Swahili community go for Islamic religious classes called *madrasa*, where they are taught to read and write in Arabic language (Ministry of Tourism, 2003). It was observed during the interviews in Old town that girls and boys of primary school going age attended these classes hence may explain the minimal formal education among members of this community. The Swahili community from Kisauni district on the other hand had slightly deviated from the typical Swahili culture hence they emphasized formal education among their people and not *madrasa* classes. The few that went for madrasa classes did so during weekends as reported by the Key Informant from Kisauni district. Further it was reported that this had been borrowed from other neighbouring non-Muslim communities which take formal education seriously and benefit from it. Allen (1993) states most parents in the Swahili community today, particularly in urban areas, recognize the value of formal education in preparing their children for employment.

Table 4.2 Education Levels of the Interviewed Household Members

Study Area	Educational background	Females (%)	Males (%)	P value *	Total (%)
Kisauni	No formal education	3	2		2.5
	Some primary	21.2	0		10.6
	Primary completed	53.6	2		27.8
	Some secondary	5.1	74.7		39.9
	Secondary completed	12.1	14.1		13.1
	More than secondary	5.1	7.1	0.000*	6.1
Old Town	No formal education	3.7	3.7		3.7
	Some primary	58.4	0.9		29.7
	Primary completed	18.5	73.2		45.9
	Some secondary	7.4	11.1		9.3
	Secondary completed	6.5	10.2		8.3
	More than secondary	5.6	0.9	0.000*	3.2
Total (Kisauni & Old Town)	No education	3.4	2.9		3.1
	Some primary	39.8	0.5		20.2
	Primary completed	36.1	37.6		36.8
	Some secondary	6.3	42.2		24.6
	Secondary completed	9.2	12.3		10.7
	More than secondary	5.3	4.0		4.6

*P value of chi squared test comparing educational levels of females and males in Kisauni and Old Town districts.

4.3.2 Occupation

The occupation of the interviewed household members was classified in three groups: unemployed or housewives, formal employment and business. This was based on the responses of the household members who said they were either unemployed, housewives, formally employed or had businesses. Table 4.3 shows the occupations of the interviewed household members. There was statistically significant difference between the occupational background of men and women from both the study areas using chi-square test ($p=<0.05$; 95% C.I). Most women from both study areas were housewives or unemployed whereas the men were employed and most had businesses. This can be explained by the Swahili community culture and religion where the women are expected to stay home while the men are the sole breadwinners for the family. During the Key Informant Interview in Old Town, it was reported that, '*pahala pa*

mwanamke ni nyumbani, waume ndio wanaotoka kuwatafutia.' This is translated as, 'A woman's place is in the house. It is the men who go out to seek for employment and provide for the family.' The women who had businesses, 26.3% from Kisauni district and 25.4% from Old Town, were involved in preparing and selling Swahili snacks outside their houses, at the road side and streets. This was observed in Old Town, late in the afternoon where women went out to prepare and sell Swahili foods and snacks. The women in Kisauni district also reported being involved in this business. About 36% of the women were either unemployed or housewives, as required of their culture and religion to stay at home and the few that worked were involved in the business of selling Swahili foods and snacks. The men on the other hand, had businesses and some were formally employed. There was no statistically significant difference between the occupation of the interviewed household members in Kisauni and Old Town districts using the difference in proportion test at a 95% Confidence Interval.

Table 4.3 Occupations of the Interviewed Household Members

Study Area	Occupational background	Females (%)	Males (%)	P value *	Total
Kisauni	Housewife/ Unemployment	68.4	2		35.2
	Formal employment	5.3	27.3		16.3
	Business	26.3	70.7	0.010*	48.5
Old town	Housewife/ Unemployment	69.6	3.7		36.7
	Formal employment	5.0	28.7		16.8
	Business	25.4	67.6	0.000*	46.5
Total (Kisauni and Old town)	Housewife/ Unemployment	69.1	2.9		36.0
	Formal employment	5.2	28.0		16.5
	Business	25.9	69.1		47.5

*P value of chi squared test comparing occupational background of females and males in Kisauni and Old Town districts

4.3.3 Income (earnings per month)

Monthly income of the interviewed household members was categorized as KES 0-5000, KES 5001-10000, KES 10001-20000, KES 20001-30000 and KES 30000 and above. This was done in order to get estimates of the household members' monthly income. The Kenya National Bureau of Statistics states income groups categories as: lower income group where individuals earn KES 23,670 or less per month, middle-income group earns KES 23,671 to KES 120,000 per month and upper income group earns above KES 120,000 per month (KNBS, 2010). Based on this categorization, majority (about 55.8%) of the individuals in both Kisauni and Old Town districts were in the lower income group while the rest (44.3%) were in the middle income group. All the interviewed individuals in this study were either in the lower income group or the middle income group.

Table 4.4 shows the income of the interviewed household members. There was statistically significant difference between the income of men and women from both the study areas using chi-square test ($p=<0.05$; 95% C.I). Men earned more than women. Majority of the men (88.9 % and 86.1% in Kisauni district and Old Town respectively) earned KES 30000 and above hence in the middle income group whereas majority of the women (89.7% and 90.2% in Kisauni district and Old Town respectively) earned between KES 0 and 10000 therefore in the lower income group. This could be attributed to the fact that most women stayed at home as housewives and the few that were working were involved in small businesses like selling Swahili foods in small scale in the streets which provided them with some income. The few women who were formally employed also earned some income. These women reported to be involved in clerical jobs and some were teachers where they earned a regular monthly income. There was no statistically significant difference between the income of the interviewed household members in Kisauni and Old Town districts using the difference in proportion test at a 95% Confidence Interval.

Table 4.4 Income of the Interviewed Household Members

Study Area	Income (per month in KES)	Females (%)	Males (%)	P value*	Total (Females and Males)
Kisauni	0-5000	46.4	2		24.2
	5001-10000	43.3	0		21.5
	10001-20000	6.1	0		3.1
	20001-30000	3.2	9.1		6.2
	30001 and above	1	88.9	0.001*	45
Old town	0-5000	43.7	3.7		23.6
	5001-10000	46.5	0		23.3
	10001-20000	6.8	0		3.4
	20001-30000	2.2	10.2		6.2
	30001 and above	0.8	86.1	0.000*	43.5
Total (Kisauni and Old town)	0-5000	45.2	2.9		23.9
	5001-10000	44.2	0		22.4
	10001-20000	6.5	0		3.3
	20001-30000	2.8	9.7		6.2
	30001 and above	0.9	87.4		44.3

*P value of chi squared test comparing income of females and males in Kisauni and Old Town districts.

4.4 Knowledge, awareness and attitudes of the Swahili community towards diet, overweight, obesity, diabetes and hypertension.

Knowledge, awareness and attitudes of the interviewed household members were assessed using questions in the questionnaire (Appendix 1.0). Some aspects of knowledge, awareness and attitudes were in the focus group discussions' checklist (Appendix 2.0). Questions on balanced diet, healthy eating, healthy body weight, obesity, diabetes and hypertension were asked to assess the knowledge of the Swahili community (Appendix 1.0). Results indicated that majority (63.8%) of the Swahili community had average knowledge level, 6.8% had good knowledge levels and the rest (29.5%) had poor knowledge as indicated in Table 4.5. There was no statistically significant difference between the knowledge levels of the interviewed household

members in Kisauni and Old Town districts using the difference in proportion test at a 95% Confidence Interval. The Swahili community had poor to average knowledge in the aspects of healthy eating, healthy body weight, obesity, diabetes and hypertension. World Health Report (2002) states that a population's lack of knowledge and awareness about causes and prevention measures of lifestyle diseases is a risk factor for developing these diseases. Hence due to the poor to average knowledge levels, the Swahili community is at a risk of developing lifestyle diseases.

Table 4.5 Knowledge Levels of the Interviewed Household Members

Knowledge level	Kisauni district	Old town	Total (Kisauni and Old Town)
Good (7-9 points)	5.6%	7.9%	6.8%
Average (4-6 points)	63.6%	63.9%	63.8%
Poor (0-3 points)	30.8%	28.2%	29.5%

Awareness of the interviewed household members was also based on questions that addressed healthy eating, healthy body weight, obesity, hypertension and diabetes. The responses to awareness questions were classified as Yes and No. Questions that sought the attitudes of the interviewed household members towards consuming fruits and vegetables, boiling foods as opposed to frying, and being overweight or obese, diabetic and hypertensive were asked (Appendix 1.0). Most (70.1%) of the interviewed household members were aware and majority (61.8%) had positive attitudes towards aspects on healthy eating, healthy body weight, obesity, diabetes and hypertension. Table 4.6 shows the awareness and attitudes of the interviewed household members. There was no statistically significant difference between awareness levels of the interviewed household members in Kisauni and Old Town districts using the difference in proportion test at a 95% Confidence Interval.

Awareness and attitudes of the household members were also captured during the focus group discussions. During these discussions, questions on attitudes included: What is considered healthy eating in the Swahili community? , What is the Swahili community's attitude towards taking fruits and vegetables every day? What is the Swahili community's preference between

consuming fresh fruit juices and commercial or homemade flavoured sugary drinks? How does the Swahili community perceive being overweight? How does the Swahili community perceive physical activity? and How does the Swahili community perceive diabetes and hypertension? The responses were, "Healthy eating is eating meat, fruits, milk and other good foods that can be afforded by the rich people." "We consume fruits in homemade fresh fruit juice and bananas when eating *pilau*. Vegetables are not common in the Swahili diet except amaranths cooked using coconut milk." "We prefer homemade fruit juices." "Overweight people are rich people with no problems in life but they are always diagnosed with hypertension." "In the Swahili community people do not engage in physical activity, they use vehicles to travel short distances."(*Kwa waswahili hakuna mazoezi mtu akitaka kwenda pahali kidogo mpaka tuktuk ama matatu)*. "Diabetes and hypertension are very bad diseases associated with consuming to much fat in the diet. "Further in the discussion group it was reported that, '*Chakula cha Kiswahili kina mafuta na nazi nyingi. Ndio asili yetu. Twajua mafuta mengi yanadhuru lakini nacho chakula cha kuchemsha hakina ladha*.' This is translated as, 'Swahili foods are high in fat and coconut milk. That is our culture. We know that a lot of fat is not good for health but boiled foods are not palatable.'

The interviewed members were aware of obesity, diabetes and hypertension. They had positive attitudes towards healthy eating and lifestyle but their culture hindered them from putting it into practice. This is because their cooking practices were determined by their culture, the practices came down generation to generation and they were part of their lives. Even in the midst of globalization where many aspects of living are a concern, people hold onto the cultural cooking practices that are known to be the best and have helped them to shape up to the people they are and what they believe about life in general. However, that does not mean that all types of cooking are healthy (Morgan, 2000). The Swahili community holds onto its cultural cooking practices that involve food preparation using too much fat, sugar and coconut milk which may contribute to unhealthy eating hence developing obesity and chronic diseases of lifestyle.

Table 4.6 Awareness and Attitudes of the Interviewed Household Members

Awareness	Kisauni and Old Town	Attitudes	Kisauni and Old Town
Yes	70.1%	Good	61.8%
No	29.9%	Bad	38.2%

4.5 Dietary practices and habits and physical activity levels of the Swahili community in Old Town and Kisauni districts.

4.5.1 Food consumption and dietary practices and habits

Nutrient intake

Food consumption was assessed using 24-hour dietary recall and analyzed using Nutri-survey program. The 24-hour dietary recall was taken from members of a sub-sample from each of the two study sites.

The nutrient intake of the individuals studied indicated comparable intakes between both Kisauni and Old Town districts. Percentage of calories coming from fat and carbohydrates was slightly higher in the subjects from Old Town district than those in Kisauni district, which could be attributed to higher consumption of Swahili foods and snacks in Old Town district (Table 4.7). This difference was not statistically significant using the difference in proportion test at 95% Confidence Interval. The percent calories coming from fat was 31% for the study group from Kisauni district and 33% for the group from Old Town, 15% came from proteins for the group in Kisauni district and 12% for the group in Old Town and rest (54%) from carbohydrates for Kisauni district and 55% for Old Town. The individuals in Kisauni district had mean energy intake of 2578.5 kcal and those in Old Town had mean energy intake of 2987.5 kcal. Since the study looked at over-nutrition which resulted to overweight and obesity and their co-morbidities: diabetes and hypertension, macro-nutrient intake of the Swahili community was given emphasis. Table 4.7 shows the mean daily macronutrient intake of the interviewed household members. There was statistically significant difference in energy, carbohydrates and fat intake between Kisauni and Old Town districts. There was no statistically significant difference in protein intake between the two districts. Individuals from Old Town district had a higher energy, carbohydrate and fat intake than those in Kisauni district. The Swahili people in Old Town consumed the typical Swahili diet that is high in fat, sugars and coconut milk hence the higher calorie intake

than the community in Kisauni district. It was reported during the focus group discussion in Kisauni district, that apart from the typical Swahili dishes the community in Kisauni district consumes foods from other communities like *ugali* and *fish*. The women said, '*Mbali na vyakula vya kikwetu, huwa twala sima na samaki*.' This is translated as, 'Other than our typical foods we eat *ugali* and fish.' Therefore, the Swahili community from Kisauni district had diversified its diet by consuming foods from other communities which are not as high in fat and sugars as their typical foods.

Table 4.7 Mean Daily Macronutrient Intakes of the Interviewed Household Members

	Kisauni district (n=66 individuals) Mean ± SD	Old Town (n=72 individuals) Mean ± SD	Sig. (P= 0.05) (t-test)
Energy (kcal)	2578.5 ± 314.6	2987.5 ± 352.5	P<0.05
Carbohydrates (g)	341.2 ± 41.6	347.5 ± 41.0	P<0.05
Carbohydrates (% of energy)	54	55	
Fat (g)	88.8 ± 10.8	94.6 ± 11.2	P<0.05
Fat (% of energy)	31	33	
Protein (g)	97.6 ± 11.9	78.1 ± 9.2	P>0.05
Protein (% of energy)	15	12	

Dietary practices and habits

Dietary practices and habits were assessed using the food frequency questionnaire modified from the EPIC-Norfolk food frequency questionnaire (Welch et al., 2005) (Appendix 1.0). Table 4.8 shows frequency of some of the Swahili foods that were mostly consumed. These foods include: *wali, pilau, biriyani,* which are spicy varieties of rice cooked with coconut milk and served with *kitoweo* (beef or chicken stew), *mahamri* (doughnut-like snacks flavoured with coconut milk and spices), *mbaazi* (pigeon peas cooked with coconut milk) and coconut.

Other Swahili foods consumed included: *samaki wa kupaka* (fish cooked in coconut milk), *uji wa mchele* (porridge made from rice flour), *katlesi* (mashed potatoes coated with egg white), *viazi vya jeera* (spicy mashed potatoes), *tambi* (pasta), *sharbati ya tende* (milk shake prepared using coconut milk and dates), *viazi vya tamu* (sweet potatoes cooked in coconut milk), *vibibi* (pancakes cooked with coconut milk) and *mkate wa Sinia* (baked bread flavoured with

coconut milk). These foods are high in fats and sugars (Appendix 13.0). The high fat and sugar content was observed in the streets of Mombasa County as the foods and snacks were being prepared for sale. Frequency in consumption of these foods is not shown in Table 4.8 because the foods are mostly consumed during special occasions and religious occasions like Muslim fasting period (Ramadhan), *maulidi* and *eid* as reported by the women in the Focus Group Discussions and Key Informant Interviews. These occasions occur once or twice in a year but consumption of these foods may contribute to obesity because the foods are prepared and consumed in large quantities during this period.

Table 4.8 shows frequency in consumption of common foods like *wali, pilau, biriyani, mahamri, mbaazi* and coconut in the Swahili households. The difference in proportion test at 95% Confidence Interval indicated statistically significant difference in *biriyani, ugali, sukuma wiki* and coconut milk intake between Kisauni and Old Town districts. Members of the Swahili households in Old Town district had a higher intake of coconut milk and *biriyani* than those in Kisauni district. The Swahili community in Old town possesses more Swahili culture and characteristics therefore had a high and frequent consumption of foods prepared with coconut milk which is one of this community's dietary practices (Ministry of Tourism, 2003). Coconut milk is obtained primarily by extracting juice by pressing the grated coconut's white kernel or by passing hot water through grated coconut using *kifumbu* (a traditional Swahili sieve), which extracts the oil and aromatic compounds. It has a fat content around 17% (Yong *et al.,* 2009). On the other hand, members of the Swahili households in Kisauni district consumed foods like *ugali* and *sukuma wiki* (kales) which are not typical Swahili foods. The Swahili community in Kisauni district had slightly deviated from the typical Swahili culture hence consumed foods that are common among non-Swahili communities. During the focus group discussions in Old Town it was reported that, 'Foods like *ugali, sukuma wiki* (kales) and *githeri* (mixture of maize and beans) are not common in the Swahili culture.'

Table 4.8 Frequency in Consumption of Swahili Foods in the Swahili Households

Study area	Foods	Number of times (%)				
		1/day	5-6/wk	2/wk	1/wk	Almost never
Kisauni	*Wali*	0	63.6	35.4	1.0	0
	Pilau	0	4.0	79.8	15.2	1.0
	Biriyani	0	2.0	17.2	73.7	5.1
	Kitoweo (beef)	0	35.4	61.6	2.0	1.0
	Kitoweo (chicken)	0	0	14.1	57.1	28.8
	Mahamri	2	24.4	56.6	14.1	3.0
	Mbaazi	0	0	9.1	73.7	17.2
	Coconut	0	70.9	11.1	5.1	1.0
	Ugali	0	0.7	18.9	21.8	58.6
	Sukuma wiki	0	0.4	16.4	40.1	43.1
Old town	*Wali*	0	67.1	32.4	0.5	0
	Pilau	0	0.9	81.9	16.7	0.5
	Biriyani	0	2.8	26.9	67.9	2.8
	Kitoweo (beef)	0	53.7	44.9	0.9	0.5
	Kitoweo (chicken)	0	0	20.4	70.4	9.5
	Mahamri	0.9	38.0	55.1	4.6	1.4
	Mbaazi	0	0	17.6	74.1	8.3
	Coconut	0	82.2	15.3	6.5	1.4
	Ugali	0	0	0	0.4	99.6
	Sukuma wiki	0	0	0	1.8	98.2
Total (Kisauni and Old town)	*Wali*	0	65.5	33.8	0.7	0
	Pilau	0	2.4	80.9	15.9	0.7
	Biriyani	0	2.4	23.2	70.5	3.9
	Kitoweo (beef)	0	44.9	52.9	1.4	0.7
	Kitoweo(chicken)	0	0	17.4	64.0	18.6
	Mahamri	1.4	31.4	55.8	9.2	2.2
	Mbaazi	0	0	13.5	73.9	12.6
	Coconut	0	79.7	13.3	5.8	1.2
	Ugali	0	0.35	9.45	11.1	79.1
	Sukuma wiki	0	0.2	8.2	20.95	70.65

Dietary habits and practices of the Swahili community were also captured in the focus group discussions. The women were very responsive when answering "Describe the Swahili diet and dietary habits". They said, “The Swahili diet is high in fat, spices and sugars. They mentioned *wali, pilau, biriyani, mahamri* and *mbaazi* as the Swahili foods that are commonly consumed. "Foods like *tambi, kaimati, sharbati ya tende, uji wa mchele, samaki wa kupaka* among others are prepared and consumed during special occasions like ramadhan,” They said. It was also reported that three meals and two snacks are served in Swahili households and dining out was not common in this community. They preferred eating their meals at home. Food preparation and cookery methods were also discussed. The following were the representative responses given on this subject: “The ingredients used for preparation of most Swahili dishes include: cinnamon, cardamon, black pepper, mixed spices, tamarind among other spices.” “Most of the foods are deep fried.” “The fat used for frying is vegetable oil commonly known as *uto*.” In the study on dietary habits of the sub-urban Saudi Arabian community which is similar to the Swahili community, Bader & Khalid (2008) reported that around half of the participants eat extra meals regularly, two snacks between three main meals. More than three quarters (78%) do not eat meals from outside, and (84.5%) do not take fast food and the type of fat and oil used were mostly of vegetables source (83.9%). Historically, the Swahili people developed as Arab and Persian traders established business contacts. They have close association with Arabic and Islamic cultures (Ministry of Tourism, 2003). This explains the similarity in dietary habits between the Saudi Arabian and Swahili communities.

Dietary habits of the Swahili community involved preparation and consumption of high fat, sugar and coconut milk foods. These foods were frequently consumed in the households.

4.5.2 Physical activity levels

Physical activity was assessed using the Global Physical Activity Questionnaire (GPAQ) (WHO, 2004). Table 4.9 shows the physical activity levels of the interviewed household members. Majority (75.8%) of the interviewed household members in both Kisauni and Old Town districts had low levels of physical activity. About 81.3% and 70.8% of the individuals in Kisauni and Old Town respectively had low levels of physical activity. The difference in proportion test at 95% Confidence Interval indicated statistically significant difference between physical inactivity in Kisauni district and Old Town district. Individuals in Kisauni district had

lower physical activity levels than those in Old town. This was indicated in the focus group discussions where it was reported that, '*Kwa waswahili hakuna mazoezi mtu akitaka kwenda pahali kidogo mpaka tuktuk ama matatu'.* This is translated as 'In the Swahili community people do not engage in physical activity, they use vehicles to travel short distances'. Old Town district is situated in an area that has no grounds for physical or recreational activity; the houses are very crowded. Despite the availability of grounds for physical or recreational activity in Kisauni, members of this district did not engage in physical activity.

The physical inactivity can be attributed to the occupation of especially women who were mainly housewives and those that worked had businesses that involved sitting down, cooking and selling the Swahili foods and snacks hence minimal movement. The culture and religion required the women to stay home as the men go out to work which translated into physical inactivity among the women who just had minimal movements around the house. The men on the other hand said they were not physically active. Few men said they went to the gym, for swimming and some jogged hence 2.7% and 21.5% of the interviewed household members had high and moderate physical activity levels respectively. Generally, in the urban settings, people tend to do less physical exercise. Public transport is mostly used thus walking is minimal. People watch television even in the poorer urban settings, compared to those living in rural settings (Steyn *et al.,* 2006). Mombasa County is an urban area where majority of the people use public transport and are involved in jobs that are less labour-intensive hence sedentary behavior during occupational activities.

Table 4.9 Physical Activity Levels of the Interviewed Household Members

Study area	Physical activity level	Percentage
Kisauni district	High	1.5%
	Moderate	17.2%
	Low	81.3%
Old town	High	3.7%
	Moderate	25.5%
	Low	70.8%
Total (Kisauni and Old town)	High	2.7%
	Moderate	21.5%
	Low	75.8%

4.6 Prevalence of overweight and obesity in the Swahili community of Old Town and Kisauni district.

The Swahili community had their weights and heights measured and Body Mass Index (BMI) calculated. BMI was used to classify the individuals as underweight, normal weight, overweight and obese. Overweight was defined by a BMI of 25 to 30 and obese by a BMI of above 30 (WHO, 2003). There was a high (87.2%) prevalence of overweight and obesity among the interviewed household members in both Kisauni and Old Town districts. The mean BMI in both study areas was above 25 hence the high prevalence overweight and obesity. However the mean BMI values were neither statistically significant between the districts nor the gender. About 48.5% and 35.9% of the interviewed household members in Kisauni district were overweight and obese respectively compared to 37.5% and 52.3% respectively in Old Town district. The difference in proportion test at 95% Confidence Interval indicated statistically significant difference between overweight and obesity levels in Kisauni and Old Town districts. Old town had more (52.3%) obese individuals which could be attributed to the physical inactivity and high caloric intake by the Swahili community in this district. Their dietary habits involved consumption of high fat and sugar Swahili foods and snacks. The community in Kisauni district on the other hand consumed other foods that were not typical of this community which may be the explanation of their lower caloric intake. However, their physical activity level

was low hence the cases of overweight and obesity among individuals in this district. Table 4.10 and Figure 4.1 show the prevalence of overweight and obesity in Kisauni and Old town districts.

Table 4.10 Prevalence of Overweight and Obesity in Kisauni and Old Town Districts

Study Area		N	Female (%)	Male (%)	Total (%)
Kisauni	Total no. of individuals	198			100%
	Underweight	2	2.0	0.0	1.1
	Normal weight	29	17.2	12.1	14.7
	Overweight	96	46.5	50.5	48.5
	Obese	71	34.3	37.4	35.9
	BMI: mean (SD)		28.69 (3.58)	28.68 (5.20)	28.7 (4.45)
Old town	Total no. of individuals	216			100%
	Underweight	4	3.7	0.0	1.9
	Normal weight	18	11.1	5.6	8.3
	Overweight	81	36.1	38.9	37.5
	Obese	113	49.1	55.6	52.3
	BMI: mean (SD)		30.18 (3.55)	29.73 (5.79)	29.95 (4.80)
Total (Kisauni and Old town)	Total no. of individuals	414			100%
	Underweight	6	2.9	0.0	1.4
	Normal weight	47	14.0	8.7	11.4
	Overweight	177	41.1	44.4	42.8
	Obese	184	42.0	46.9	44.4
	BMI: mean (SD)		29.23 (5.53)	29.47 (3.63)	29.35 (4.67)

SD- Standard deviation

High prevalence of overweight and obesity has been noted in other studies. Mohammed *et al.* (2002) reported prevalence of overweight and obesity as 36.68% and 39.65% respectively in the Saudi Arabian study group. Further, it was reported that 31.55% and 49.15% of the Saudi women and 41.91% and 29.94% of the Saudi men were overweight and obese respectively. The Swahili community is similar to the Saudi Arabians since the Swahili people originated from ancient Arabs (Ministry of Tourism, 2003). The Saudi men had a higher prevalence of overweight than the Saudi women. It was noted in the current study that Swahili men had a slightly higher prevalence of overweight and obesity than the Swahili women. This gender difference was observed to be opposite in the study by Christensen *et al.* (2008) where women were found to be more overweight and obesity than men. The prevalence of obesity in

individuals is depends on their exposure to obesity risk factors. Urbanization, physical inactivity and unhealthy diets are major risk factors for obesity (WHO, 2002). The study on obesity and regional fat distribution in Kenyan populations by Christensen *et al.* (2008) indicated the prevalence of overweight as 39.8% in the urban population and 15.8% in the rural population. Obesity was 15.5% in the urban population and 5.1% in the rural population. This study was carried among Luo, Kamba and Maasai in rural and urban Kenya. The Swahili community is from the Coast province of Kenya and the study area, Mombasa County, is an urban area. The Swahili, Luo, Kamba and Maasai communities have different lifestyle, socio-economic activities and cultural values that may influence the development of overweight, obesity and lifestyle diseases.

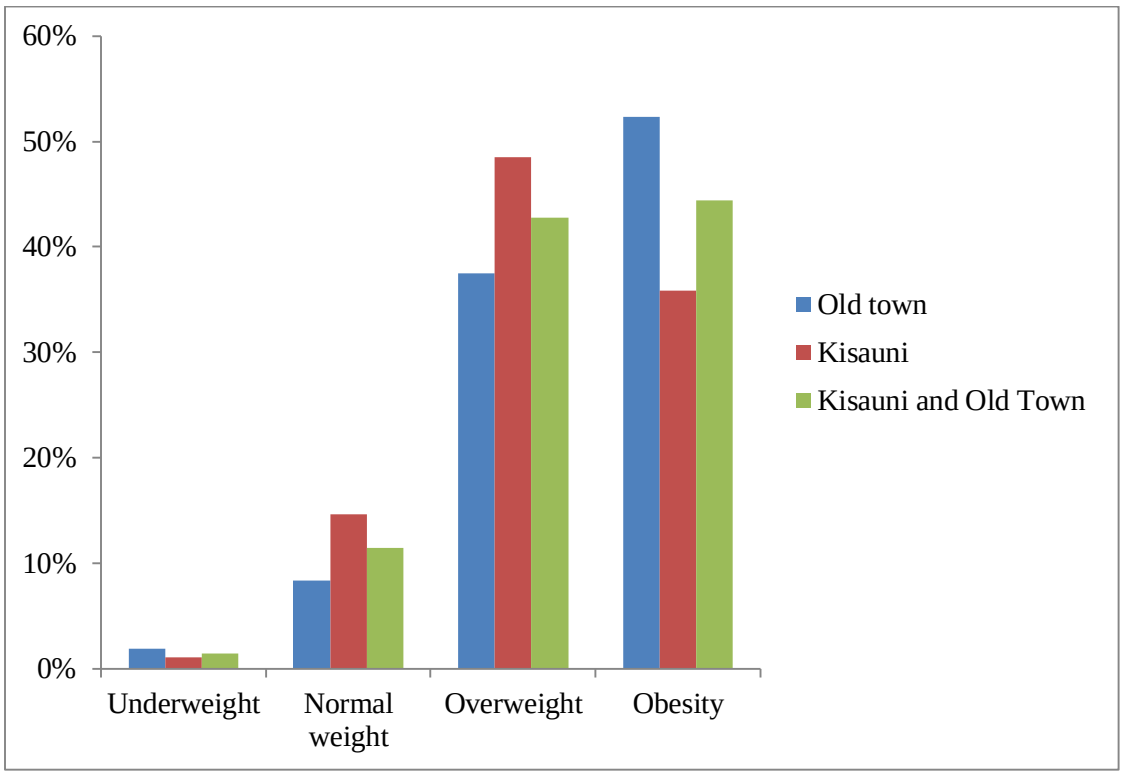


Figure 4.1 Prevalence of overweight and obesity (defined by BMI) in Kisauni district and Old town

Waist circumference

Waist circumference was measured to assess abdominal or central obesity in the interviewed household members of Kisauni and Old Town districts. It was measured using a body tape midway between the lowest rib and the iliac crest following a quiet expiration. Central obesity was defined by a waist circumference above 88cm and 102cm for women and men respectively (WHO, 2003). About 73.2% and 60.6% of the interviewed individuals in Kisauni district and Old town respectively were centrally obese. There was no statistically significant difference in waist circumference between men and women in both Kisauni district and Old Town district. The difference in proportion test at 95% Confidence Interval indicated statistically significant difference between waist circumference of the individuals in Kisauni district and those in Old town. The individuals from Kisauni district had a higher waist circumference than those from Old Town. The community in Kisauni district had lower caloric intake since they consumed less of the typical Swahili foods but their physical activity level was very low hence the higher cases of central obesity. This kind of obesity in Kisauni could also be attributed to this community's attitudes towards obesity. It was mentioned in the Focus Group Discussions in Kisauni district that obese people are from a higher socio-economic class. 'The affluent have big bellies,' they said. It was also reported that, '*Mwanaume tajiri ni kitambi. Wamejaaliwa lakini nayo pressure haiwakwepi*'. This is translated as, 'A rich man is defined by his pot belly. They are blessed but they are always hypertensive.' This community's attitude increases the risk of being obese and developing lifestyle diseases because they associate obesity with being affluent. Attitudes about body image of some individuals were found to increase the risk for developing obesity and lifestyle diseases like type 2 diabetes and hypertension (Puoane *et al.,* 2005). The women also associated obesity with beauty among women. The lean people were thought of as poor and not beautiful. '*Mwanamke aliyenawiri ni mrembo*,' they said. This is translated as 'A fat (overweight) woman is beautiful.' In many Sub-Saharan Africa countries, an increased level of body fat is associated with beauty, prosperity, health, and prestige, despite its negative impact on health. Thinness, in contrast, is perceived to be a sign of ill health or poverty and is something to be feared and avoided, particularly in recent years, when it has been associated with AIDS (Treloar *et al.,* 1999). The prevalence of obesity in Kisauni district was higher using waist circumference categories than when using BMI. This indicates the importance of measuring waist circumference to determine central obesity which is a risk factor for lifestyle diseases.

The anthropometry of the upper arm, which is a set of measurements of the shape of the upper arms, was assessed. The principal anthropometry measures are the upper arm length, the triceps skin fold (TSF), and the mid-upper arm circumference (MUAC). The derived measures include the arm muscle area (AMA), the arm fat area (AFA), and the arm fat index. Although they are not directly convertible into measures of overall body fat weight and density, these measures are and have been used as rough indicators of body fat. Arm muscle area (AMA) and arm fat area (AFA) were used to assess body fat and indicate obesity. The results of AMA and AFA were interpreted using percentiles (Frisancho, 1993). In Kisauni, 35 individuals (17.7%) had their AMA above the 95th percentile and 77 individuals (38.9%) had their AFA between 75th and 90th percentile. In Old town, 44 individuals (20.4%) had their AMA above the 95th percentile and 81 individuals (37.5%) had their AFA between 75th and 90th percentile. The AFA values of the Swahili community lied in high percentiles hence high body fat that is associated with obesity and its co-morbidities. In the study on obesity and regional fat distributions in Kenyan populations, it was reported that the Luo had the highest AMA whereas the Kamba had the lowest AFA and the Maasai had the highest AFA (Christensen *et al.,* 2008). The Swahili community is from the Kenyan Coast. They have cultures that are different from the Luo, Kamba and Maasai hence the difference in the AMA and AFA results.

4.7 Prevalence of diagnosed diabetes mellitus and hypertension in the Swahili community

Diabetes mellitus and hypertension were the lifestyle diseases that were studied. These diseases were not clinically diagnosed in this study. However, those interviewed were asked to report having been diagnosed at a health facility. This was one of the limitations of the study.

Table 4.11 and Figure 4.2 show the prevalence of diagnosed diabetes mellitus and hypertension in the Swahili community of Old town and Kisauni districts. About 11.1% and 39.9% of the interviewed household members in Kisauni district had diagnosed diabetes and hypertension respectively compared to 14.8% and 44.0% respectively in Old Town district. This difference was not statistically significant using the Difference in Proportion test at 95% Confidence Interval. There were more people with hypertension than with diabetes. The prevalence of both diagnosed diabetes and hypertension was slightly higher in Old Town district than in Kisauni district. This can be attributed to physical inactivity and the dietary habits of the

Swahili community in Old town, which involve consumption of high sugar, high fat foods and snacks, a composition that exposes this community to overweight and obesity which are risk factors for diabetes and hypertension. Physical inactivity and unhealthy diets are major contributors to overweight (WHO, 2002). Overweight and obesity are major risk factors for a number of chronic lifestyle diseases like diabetes and hypertension (WHO, 2006).

In the study on prevalence of overweight and self-reported chronic diseases among residents in Malaysia, Nazri *et al.* (2008) reported that 8.5% and 16.4% males and females respectively had diabetes whereas 4.8% and 10.4% males and females respectively had hypertension. The contrast in these results and the ones of the current study is attributed to the different study areas and communities.

Table 4.11 Prevalence of Diagnosed Diabetes Mellitus and Hypertension

Study Area		Female (%)	Male (%)	Total (%)
Kisauni	Diagnosed diabetes	11.1	10.1	11.1
	Diagnosed hypertension	33.3	42.4	39.9
Old town	Diagnosed diabetes	14.8	15.7	14.8
	Diagnosed hypertension	40.7	50.9	44.0
Total (Kisauni and Old town)	Diagnosed diabetes	13.0	13.0	13.0
	Diagnosed hypertension	37.2	46.9	42.0

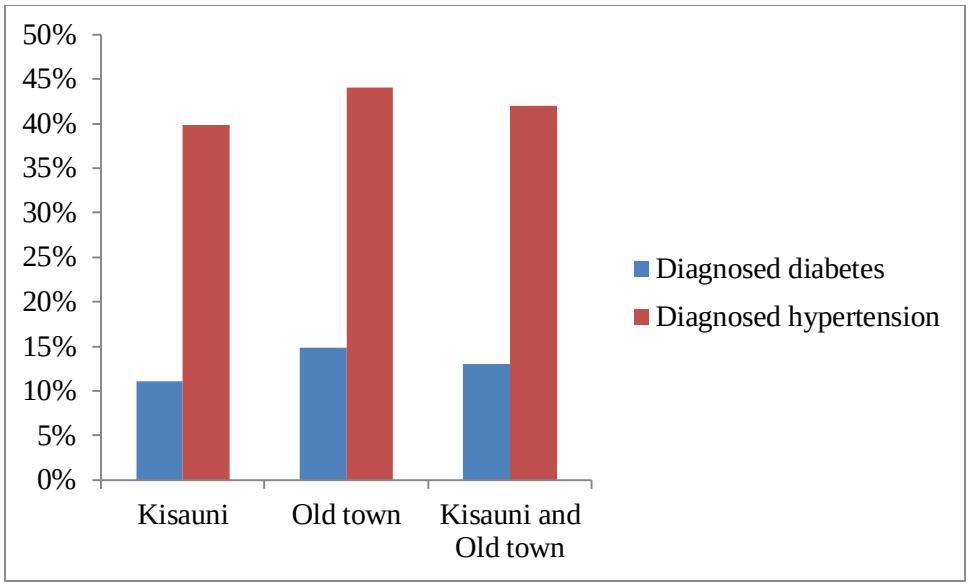


Figure 4.2 Prevalence of diagnosed mellitus and hypertension

4.8 Association between the risk factors for chronic diseases of lifestyle

Chi-square test was used to show the association between the various variables. Table 4.14 shows the association between the various variables.

4.8.1 Association between socio-economic status (S.E.E) and knowledge, awareness and attitudes, dietary habits, physical activity levels (PA), overweight and obesity and diagnosed diabetes and hypertension

Socio-economic status was defined in this study as the status of the members of the household based on the educational levels, occupation and income. Socio-economic status of the interviewed household members (from Kisauni and Old Town districts) as defined by their educational levels and occupation was significantly associated with their knowledge levels and dietary habits using Chi-square test ($p<0.05$, 95% C.I). The individuals with less formal education and those that were housewives and unemployed had lower knowledge scores compared to those who had higher formal education and those that were employed. This could be attributed to the low educational levels of these individuals which made them less knowledgeable. The World Health Report (2002) states that a population's lack of knowledge is a risk factor for lifestyle diseases. On the hand, high coconut milk consumption, a dietary practice among the Swahili community was indicated among individuals with less formal

education and housewives. This could be explained by the adherence to culture by individuals with less formal education. The women practiced their cultural cookery methods hence high coconut milk consumption since most of their foods are prepared using coconut milk. *Biriyani* consumption was also indicated among individuals with less formal education and housewives.

Income, an indicator of socio-economic status was significantly associated with physical activity, BMI, diagnosed diabetes and hypertension among the interviewed household members in Kisauni and Old Town districts using Chi-square test ($p<0.05$, 95% C.I). Most members of the study group were physically inactive and categorized in the lower and middle income group. People with lower income had less physical activity than people with higher income. Socio-economic factors like income have a major influence on nutrition, physical activity and health hence leading to the development of obesity and lifestyle diseases (Zimmet, 2000). Mohammed *et al.* (2002) reported higher rates of overweight and obesity among middle and high-income, physically inactive men and women. Lifestyle diseases are no longer thought to be diseases of the affluent. The poor people are also affected due to the environment in which they reside and their socio-economic circumstances that influence their diets and physical activity patterns hence resulting to development of obesity, diabetes and hypertension (Mvo *et al.*, 1999). This explains the association between income, obesity, diabetes and hypertension in this study.

4.8.2 Association between knowledge and dietary habits, physical activity levels (PA), overweight and obesity and diagnosed hypertension

Knowledge of the interviewed household members in Old town, on balanced diet, healthy eating, healthy body weight, obesity, diabetes, hypertension, diabetes and hypertension, was significantly associated with their dietary habits, physical activity levels, BMI and diagnosed hypertension using Chi-square test ($p<0.05$, 95% C.I). Minimal knowledge was associated with increased the prevalence of obesity, diabetes and hypertension. People with less knowledge had low levels of physical activity, high calorie food intake (high coconut) and were obese, diabetic and hypertensive. The Swahili people's knowledge on causes and prevention measures of lifestyle diseases indicated their risk of developing these diseases since the burden of lifestyle diseases occurs as a result of people's lack of knowledge about the diseases (World Health Report, 2002).

4.8.3 Association between dietary habits practices and physical activity (PA), overweight and obesity and diagnosed diabetes and hypertension

Dietary habits of the interviewed household members in Kisauni and Old Town districts were significantly associated with their physical activity levels, BMI and diagnosed diabetes and hypertension using Chi-square test ($p<0.05$, 95% C.I). Dietary habits of the members of this community involved consumption of Swahili foods that are high in sugars, fats and coconut milk. Lifestyle diseases are linked to high consumption of energy dense foods, made of animal origin and foods processed or prepared with a lot of fat, sugar and salt (Bourne *et al.,* 2002). Unhealthy diets, especially those which have a high content in fats, free sugars and salt and physical inactivity are among some of the leading causes of these diseases including cardiovascular diseases (CVD), type 2 diabetes and certain cancers (WHO, 2004).The dietary habits of the Swahili people were therefore a risk factor for obesity and its related comorbidities.

4.8.4 Association between Physical activity (PA) and Overweight and obesity

Physical activity levels in Old Town district were statistically significantly associated with overweight and obesity using Chi-square test ($p<0.05$, 95% C.I). Overweight and obese individuals had low physical activity levels. In a study on physical activity among middle-aged West African women, more walking was associated with a three-unit lower BMI (Sobngwi, 2004). Therefore increased physical activity among members of the Swahili community would lead to a decline in the cases of overweight and obesity. A qualitative study in Cameroon also found that the reduced physical activity accompanying sedentary occupations in the cities explained the higher rate of obesity observed in people with these sedentary occupations (Treloar *et al.,* 1999).

Logistic regressions were performed to determine the odds of being overweight and obese. This was done to explain physical inactivity as a risk factor for overweight and obesity. In Kisauni district, the odds that someone who was physically inactive was 1.28 times likely to be obese than the individuals who were physically active. In Old Town district, the odds were 0.49 times. The association between obesity and physical activity was significant in Old Town. Similar findings are indicated in the study among the Saudis where Mohammed *et al.* (2002) reported an association between obesity in the Saudi population and physical inactivity. He also

reported that mean BMI is increased by decreased physical activity. Logistic regressions between dietary intake and obesity did not show statistically significant association between the two. Logistic regressions between overweight and physical inactivity did not show statistically significant association between the two. Table 4.12 shows the factors associated with obesity in this study.

Table 4.12 Factors Associated With Being Obese in the Swahili Community

Study area	Factor	Obesity		
		OR	95% CI	P value
Kisauni district	Physical inactivity	1.28	0.62,2.66	0.511
Old town	Physical inactivity	0.49	0.27,0.88	0.018*

OR- Odds of being obese when one is physically inactive, P<0.05, CI- Confidence Interval

4.8.5 Association between overweight and obesity and the lifestyle diseases

Overweight and obesity levels of the individuals in Kisauni and Old Town districts were statistically significantly associated with diagnosed diabetes and hypertension (p<0.05, 95% C.I). Waist circumference in both study areas was statistically significantly associated with hypertension using Chi square test (p<0.05, 95% C.I). High waist circumference has been shown to increase risk of lifestyle diseases by 35 percent compared to normal waist circumference (Dagenais *et al.,* 2005). In addition, in one large study of more than 27,000 people, those with the highest waist circumference were 20 times more likely to get type 2 diabetes and hypertension than those with the lowest waist circumference (Wang *et al.,* 2005).

Obesity as assessed by BMI and waist circumference in this community was associated with hypertension and diabetes. These results are similar to that of a study on prevalence of obesity and its associated comorbidities, where Gothankar (2009) reported a statistically significant association between BMI (>=25) and diabetes (p<0.05) and BMI and hypertension (p<0.05). Other results in a study on overweight, obesity, central adiposity and associated chronic diseases in Cuban adults, Diaz *et al.* (2009) indicated that obesity was significantly more frequent in diabetics and hypertensive individuals. The association between hypertension and obesity has been documented in countries in Sub-Saharan Africa. In Zimbabwe, Mufunda *et al*. (2000) found this strong association, as did Rotimi *et al.* (1995) in populations of West African

descent. Most studies support the association between overweight, obesity and lifestyle diseases hence they are major risk factors for a number of chronic diseases of lifestyle. The growing prevalence of type 2 diabetes, cardiovascular disease, hypertension and some cancers is tied to excess weight (WHO, 2006).

Logistic regressions were performed to determine the odds of being diabetic and hypertensive thus explain overweight and obesity as a risk factor for lifestyle diseases. In Kisauni district, the odds that someone who was obese (BMI>30) was 5.87 times likely to be diabetic than the individuals who had a BMI<30. In Old town the odds were 3.20 times. On the hand, in Kisauni district the odds that someone who was obese (BMI>30) was 1.67 times likely to be hypertensive than the individuals who had a BMI<30. In Old town the odds were 1.02 times. The association between obesity and diabetes was significant in both Kisauni and Old Town districts. The association between obesity and hypertension was statistically insignificant in both districts. Logistic regressions between overweight and diabetes and overweight and hypertension did not show statistically significant association between these variables. Table 4.13 shows the factors associated with being diabetic or hypertensive.

Table 4.13 Factors Associated With Being Diabetic and Hypertensive

Study area	Factor	Diabetic			Hypertensive		
		OR	95% CI	P value	OR	95% CI	P value
Kisauni district	Obesity	5.87	2.17,15.80	0.000*	1.67	0.93,1.02	0.087
Old town	Obesity	3.20	1.37,7.50	0.007*	1.02	0.60,1.75	0.934

OR- Odds of being diabetic or hypertensive when one is obese, P<0.05, CI- Confidence Interval

Table 4.14 Associations between the Various Variables Using Chi-Square Test

Study Area			X^2	P<0.05
Kisauni district (n=198)	S.E.E (Education and occupation)	Knowledge	91.2	0.000
		Dietary habits	33.3	0.015
	S.E.E (Income)	PA	35.6	0.001
		Obesity	33.9	0.000
		Diagnosed DM	10.12	0.037
	Dietary habits	PA	28.2	0.000
	Overweight, obesity	Diagnosed DM	12.63, 11.74	0.006, 0.003
		Diagnosed HTN	19.17, 14.76	0.000, 0.000
	Waist circumference	Diagnosed HTN	4.35	0.037
Old Town district (n=216)	S.E.E (Education and occupation)	Knowledge	150.6	0.000
		Dietary habits	39.3	0.003
	S.E.E (Income)	PA	21.6	0.006
		Obesity	11.9	0.018
		Diagnosed DM	11.79	0.019
	Knowledge	Dietary habits	84.2	0.000
		PA	36.6	0.002
		Obesity	27.1	0.001
		Diagnosed HTN	24.8	0.002
	Dietary habits	PA	119.6	0.000
		Obesity	8.27	0.041
		Diagnosed DM	12.54	0.006
	Physical activity (PA)	Obesity	23.89	0.000
	Overweight, obesity	Diagnosed DM	8.31, 9.46	0.04, 0.002
		Diagnosed HTN	14.38, 16.96	0.002, 0.000
	Waist circumference	Diagnosed HTN	9.28	0.002

Based on the bivariate associations, results of Chi-square test among the various variables were summarized in Figure 4.3 as part of the operationalized conceptual framework (Figure 2.3).

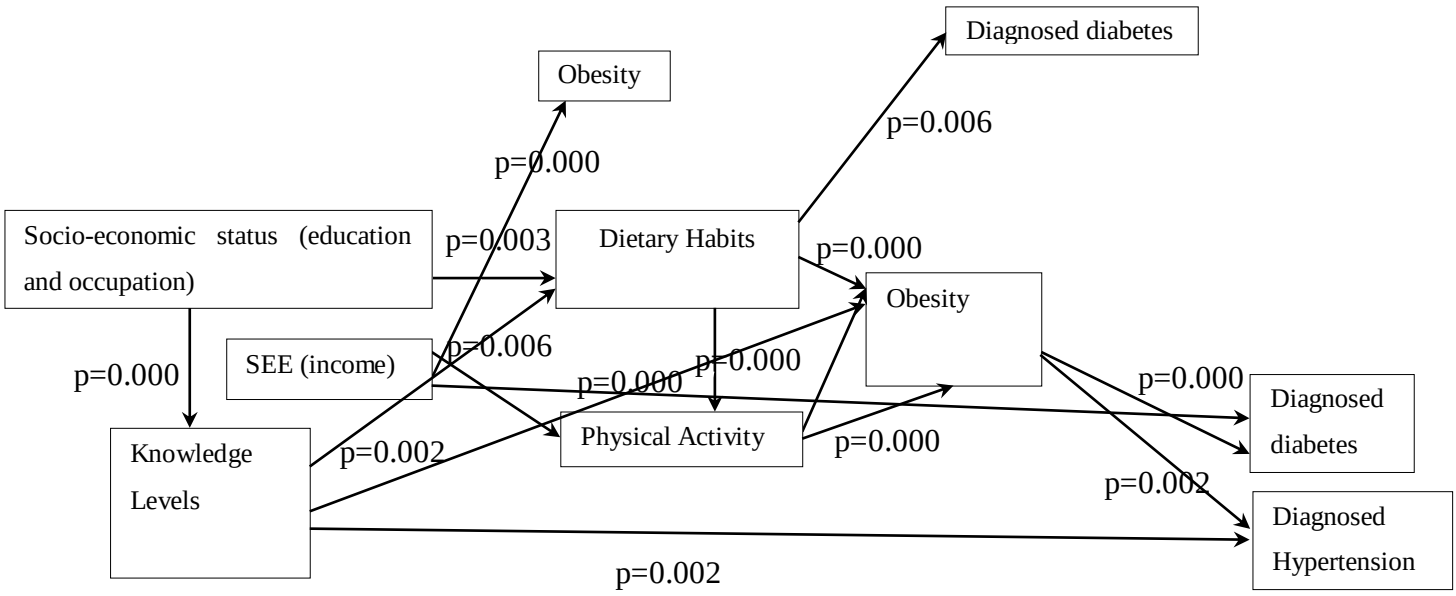


Figure 4.3 Associations among various variables in the conceptual framework

4.9 Multivariate analysis

Multivariate analysis was then performed to show the association among the various variables. Linear regression was performed to determine the association among physical activity levels, socio-economic status and knowledge. Income variable was used to represent socio-economic status. The model for predicting physical activity using income and knowledge scores below was developed from the regression. Results of the linear regression are indicated in Table 4.15.

PA= 1739.15 – 10.75I – 51.6 KS; p=0.005

Where; PA- Total Physical Activity, I- Income and KS- Knowledge scores

Table 4.15 Associations among Total Physical Activity, Income and Knowledge Scores

					95% CI	
	b	**Standard error**	**β**	**Sig.**	**Lower**	**Upper**
Constant	1739.15	0.978				
Income	10.75	0.331	0.621	0.005	10.11	11.98
Knowledge score	51.6	0.276	0.574	0.005	51.1	53.3

(**R^2=0.40, p= 0.005**)

There was a statistically significant association among income, knowledge and physical activity levels (r^2=0.40, p=0.005). Both income and knowledge influenced the physical activity levels of the Swahili community. An increase in income decreases the total physical activity levels. Socio-economic factors like income have a major influence on physical activity and as a result, on individual and community disease patterns. This is indicated by the dramatic rise in prevalence of cardiovascular diseases (CVDs), diabetes, obesity and other lifestyle diseases in developing, middle and high income nations (Zimmet, 2000).

Nominal regressions were also performed to indicate associations among the various variables. The following models were developed from the regressions. These models indicated the predictors of diabetes and hypertension. Results of the nominal regressions are indicated in Tables 4.16, 4.17, 4.18, 4.19 and 4.20

DM (Kisauni and Old Town) = 1.16 + 1.61 (Obesity) + 16.97 (Knowledge on Obesity) – 16.9 (Knowledge on healthy eating) + 1.78 (Knowledge on DM) + 0.38 (Physical Activity) p= < 0.000

DM (Kisauni district) = 18.06 + 1.83(Obesity) + 0.19 (Knowledge on obesity) – 17.76 (Knowledge on healthy eating) + 1.32 (Knowledge on DM) + 1.22 (Physical Activity) p= < 0.000

DM (Old Town) = 0.91 + 1.33 (Obesity) + 18.06 (Knowledge on obesity) – 17.14 (Knowledge on healthy eating + 2.45 (Knowledge on DM) – 0.28 (Physical Activity) p= < 0.000

HTN (Kisauni and Old Town) = 0.004 + 0.37 (Obesity) + 1.03 (Knowledge on Obesity) – 1.51 (Knowledge on healthy eating) + 0.44 (Physical Activity) – 0.54 (Knowledge on HTN) p= 0.003

HTN (Old Town) = 1.12 + 0.09 (Obesity) + 0.39 (Knowledge on obesity) – 1.78 (Knowledge on healthy eating) + 0.38 (Physical Activity) – 0.57 (Knowledge on HTN) p= 0.044

Table 4.16 Predictors for Diagnosed Diabetes in Kisauni and Old Town Districts

Diagnosed diabetes[a] (Kisauni and Old Town)			**Exp(B)**		**95% CI for Exp(B)**	
Variable and constant	**b**	**Standard error**		**Sig.**	**Lower**	**Upper**
Constant	1.16	1.005		0.249		
Obesity	1.61	0.360	0.753	0.000	2.460	10.099
Knowledge on obesity	16.97	0.814	4.985	0.000	4.729	11.575
Knowledge on healthy eating	16.9	0.000	4.540	0.000	4.540	4.540
Knowledge on DM	1.78	0.460	5.917	0.000	2.404	14.563
Physical Activity	0.38	0.389	1.461	0.330	0.682	3.129

p= 0.000 a-The reference category is: Yes (Diabetic)

Table 4.17 Predictors for Diagnosed Diabetes in Kisauni District

Diagnosed diabetes[a] (Kisauni district)					**95% CI for Exp(B)**	
Variable and constant	**b**	**Standard error**	**Exp(B)**	**Sig.**	**Lower**	**Upper**
Constant	18.06	0.944		0.000		
Obesity	1.83	0.549	6.255	0.001	2.132	18.349
Knowledge on obesity	0.19	0.000	1.206	0.001	1.206	1.206
Knowledge on healthy eating	17.76	0.000	1.943	0.001	1.943	1.943
Knowledge on DM	1.32	0.620	3.750	0.033	1.111	12.650
Physical Activity	1.22	0.598	3.378	0.042	1.046	10.908

p= 0.000 a-The reference category is: Yes (Diabetic)

Table 4.18 Predictors for Diagnosed Diabetes in Old Town District

Diagnosed diabetes[a] (Old Town)					95% CI for Exp(B)	
Variable and constant	**b**	**Standard error**	**Exp(B)**	**Sig.**	**Lower**	**Upper**
Constant	0.91	1.270		0.472		
Obesity	1.33	0.495	3.764	0.007	1.428	9.920
Knowledge on obesity	18.06	0.957	7.007	0.000	7.007	7.007
Knowledge on healthy eating	17.14	0.000	3.608	0.000	3.608	3.608
Knowledge on DM	2.45	0.764	11.526	0.001	2.577	51.555
Physical Activity	-0.28	0.534	0.753	0.594	0.264	2.142

p= 0.000 a-The reference category is: Yes (Diabetic)

Table 4.19 Predictors for Diagnosed Hypertension in Kisauni and Old Town Districts

Diagnosed hypertension[a] (Kisauni and Old Town)					95% CI for Exp(B)	
Variable and constant	**b**	**Standard error**	**Exp(B)**	**Sig.**	**Lower**	**Upper**
Constant	0.004	0.569		0.994		
Obesity	0.37	0.220	1.346	0.177	0.875	2.071
Knowledge on obesity	1.03	0.893	2.796	0.250	0.486	16.000
Knowledge on healthy eating	-1.51	0.775	0.221	0.052	0.048	1.010
Physical Activity	0.44	3.052	1.548	0.081	0.948	2.528
Knowledge on HTN	-0.54	4.897	0.581	0.027	0.359	0.940

p= 0.003 a-The reference category is: Yes (Hypertensive)

Table 4.20 Predictors for Diagnosed Hypertension in Old Town District

Diagnosed hypertension[a] (Old Town) Variable and constant	b	Standard error	Exp(B)	Sig.	95% CI for Exp(B) Lower	Upper
Constant	1.12	0.823		0.176		
Obesity	0.09	0.303	1.093	0.770	0.603	1.980
Knowledge on obesity	0.39	1.292	1.479	0.762	0.117	18.627
Knowledge on healthy eating	-1.78	1.081	0.168	0.099	0.020	1.400
Physical Activity	0.38	0.333	1.466	0.251	0.763	2.816
Knowledge on HTN	-0.57	0.363	0.567	0.118	0.279	1.155

p= 0.044 a-The reference category is: Yes (Hypertensive)

Diagnosed diabetes among interviewed household members in both Old Town and Kisauni districts was predicted by obesity, knowledge on obesity and knowledge on diabetes. Physical inactivity was a lesser predictor of diabetes in this community. In Old town, the major predictors of hypertension were obesity, knowledge on obesity and physical inactivity. Lack of knowledge on obesity and lifestyle diseases among members of the Swahili community increased the risk of developing these diseases. The World Health Report (2002) shows that lack of knowledge is a risk factor for lifestyle diseases. In the study on knowledge and perceptions of diabetes in a semi-urban Omani population, Mohammed *et al.* (2008) reported lack of knowledge as a major risk factor for diabetes mellitus among members of this community. It was further demonstrated that significant numbers of Omanis lacked the knowledge and perceptions required to prevent and cope with increasing prevalence of diabetes in Oman. Therefore lack of knowledge is a major predictor of lifestyle diseases. Physical inactivity and obesity on the other hand are risk factors for these diseases. Physical inactivity and unhealthy diets are major contributors of overweight (WHO, 2002). Overweight and obesity are major risk factors for a number of chronic lifestyle diseases hence the growing prevalence of diabetes, cardiovascular disease, and some cancers is tied to excess weight (WHO, 2006).

CHAPTER FIVE
CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

Conclusions and recommendations from the research work presented are discussed here. This chapter also gives suggestions for further research in this area.

5.2 Conclusion

From the study results, the following conclusions were made:

1. Socio-economic status of the Swahili community aged 30-70 years as indicated by their educational levels, occupation and income showed that about 36.8% of the individuals had at least primary school education. Most (69.1%) of the women in this community were housewives while the men had businesses and most of them were employed. As for the economic status, all the members of the study group were categorized either in the lower income group or middle income group.
2. As for the knowledge, awareness and attitudes, majority of the members of this community had poor to average knowledge and were aware of healthy eating, obesity, diabetes and hypertension. They had positive attitudes towards healthy eating, healthy body weight, physical activity, obesity and lifestyle diseases.
3. The Swahili community's dietary habits and practices involved consumption of Swahili foods that were high in fats, sugars and coconut milk. Most (75.8%) of the members of the Swahili community had low physical activity.
4. There was a high prevalence of overweight and obesity in Mombasa County (both Kisauni and Old town districts), 42.8% and 44.4% respectively. The prevalence of overweight and obesity was 48.5% and 35.9% respectively in Kisauni district and 37.5% and 37.5% and 52.3% respectively in Old Town district.
5. The results of the self-reported chronic diseases indicated 11.1% and 39.9% of the Swahili community in Kisauni district had diagnosed diabetes and hypertension respectively whereas 14.8% and 44.0% of the community in Old town had diagnosed diabetes and hypertension respectively.

6. As for the associations among variables: physical activity levels in Old town were statistically significantly associated with overweight and obesity. Overweight and obesity levels of the Swahili community in both Kisauni and Old Town districts were statistically significantly associated with diagnosed diabetes and hypertension. Waist circumference of the Swahili community was statistically significantly associated with hypertension.
7. There was statistically significant difference between the overweight and obesity levels of the Swahili community in Kisauni district and Old Town district. There was also a significant difference between the physical activity levels of the Swahili community in Kisauni district and Old Town district. This was indicated by the Difference in proportion test at 95% Confidence Interval.
8. Lack of knowledge, physical inactivity and obesity were major predictors of the lifestyle diseases. Overweight and obesity were risk factors for these diseases. The major contributors of overweight and obesity were physical inactivity and unhealthy diet.

5.3 Recommendations

The following are recommendations resulting from the study conclusions:

1. Educational policies and programs should be developed to improve knowledge levels among the members of the Swahili community. The community should be educated on lifestyle disease causes and prevention in order to reduce their risk of developing the diseases. Lack of knowledge is indicated by the nominal regressions as a major predictor of developing obesity, diabetes and hypertension.
2. Sustainability of consumption of healthy diets and physical activity should be acquired through education on healthy eating and the importance of physical activity. This will help reduce obesity which is a risk factor for diabetes and hypertension.
3. Screening for obesity followed by health education of obese persons for weight reduction should also be done for early prevention of comorbidities like hypertension and diabetes. Research has shown that losing weight can significantly reduce the risk of developing diabetes (Hamman *et al.*, 2006).

5.4 Suggestions for further research

There is need to carry out follow-up and intervention studies in the area of chronic diseases of lifestyle so as to determine the impact and/or effects of the risk factors on the

development of lifestyle diseases as well monitoring and evaluating the reduction of these diseases where intervention is applied.

There is also need to carry out further studies on the Swahili foods. This involves carrying out laboratory analysis of the different Swahili foods to determine their quality in terms of nutrient composition. Swahili foods processing, production, storage and preservation should also be studied. All this is geared towards developing and/or modifying recipes in the Swahili community in order to improve quality and nutritional health benefits of the foods.

Lipid profile should be done among members of the Swahili community to show their body fat composition and relate it the community's dietary intake to determine any association.

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APPENDICES

Appendix 1.0 Questionnaire for Nutrition Survey in Old Town, Mombasa.

Questionnaire Code_____

DATE OF INTERVIEW:…….. VILLAGE……

LOCATION…… DIVISION…….. DISTRICT……

Household ID #	
Time interview started	
Time interview ended	

Please answer the following questions. (Translate in Kiswahili where necessary)

SECTION (1): DEMOGRAPHIC AND HOUSEHOLD SOCIO-ECONOMIC INFORMATION

Total number of people in the household _____

ID #	Relation to the h/h head	Age	Sex	Marital status	Education	Occupation	Income	Diabetes (diagonised)	HTN

SECTION (2): ANTHROPOMERTY

	1st reading	2nd reading	Average				
Wt (kg)				BMI	Waist(cm)	TSF	MUAC
Ht (m)							

SECTION (3): KNOWLEDGE, AWARENESS AND ATTITUDES INFORMATION

Questions	Awareness	Awareness source	Knowledge
What is a balanced diet?			
What is healthy eating?			
Which is the healthy body weight?			

Have you heard of obesity? Yes No If yes, explain			
Have you heard of Diabetes/ High Blood Sugar? Yes No			
Have you heard of Hypertension/High Blood Pressure? Yes No			
What causes Diabetes/ High Blood Sugar?			
What causes Hypertension/ High Blood Pressure?			

Attitudes Questions

1. What do you think and feel about eating fruits and vegetables every day? _____
2. What do you think and feel about boiling and steaming food instead of frying? _____
3. What do you think and feel about being fat? _____

4. What do you think and feel about a doctor who tells you that you are overweight or obese?

   _____

5. What do you think and feel about diabetes/high blood sugar?

   _____

6. What do you think and feel about hypertension/high blood pressure?

   _____

SECTION (4) PHYSICAL ACTIVITY INFORMATION

Global Physical Activity Questionnaire

A) Activity at work

1. Does your work involve vigorous intensity activity that causes large increase in breathing or heart rate like carrying heavy loads, digging or construction work for at least 10 minutes continuously? Yes No
2. If No, does it involve moderate intensity activity that causes small increases in breathing or heart rate like brisk walking or carrying light loads for at least 10 minutes continuously? Yes No
3. In a typical week, on how many days do you do vigorous intensity activities as part of your work? _____
4. How much time do you spend doing vigorous intensity activities at work on a typical day? _____
5. In a typical week, on how many days do you do moderate intensity activities as part of your work? _____
6. How much time do you spend doing moderate intensity activities at work on a typical day? _____

B) Travel to and from places

1. Do you travel to and from places in a matatu, tuktuk or any other public means of transport? Yes No
2. In a typical week, on how many days do you travel in a matatu, tuktuk or any other public means of transport? _____

3. Do you walk or use a bicycle for at least 10 minutes to get to and from places? Yes No
4. In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places? _____
5. How much time do you spend walking or bicycling for travel on a typical day? _____

C) Recreational Activities

1. Do you do any vigorous intensity sports, fitness or recreational (leisure) activities that cause large increases in breathing or heart rate like running or football for at least 10 minutes continuously? Yes No
2. If No, do you do any moderate intensity sports, fitness or recreational activities that cause a small increase in breathing or heart rate like brisk walking for at least 10 minutes continuously? Yes No
3. In a typical week, on how many days do you do vigorous intensity sports, fitness or recreational activities? _____
4. How much time do you spend doing vigorous intensity sports, fitness or recreational activities on a typical day? _____
5. In a typical week, on how many days do you do moderate intensity sports, fitness or recreational activities? _____
6. How much time do you spend doing moderate intensity sports, fitness or recreational activities on a typical day? _____

D) Sedentary Behaviour

1. How much time do you usually spend sitting or reclining on a typical day? _____

SECTION (5) PATTERNS OF DIETARY HABITS AND FOOD CONSUMPTIO

A) Food Frequency Questionnaire

For each of the food listed, check the box indicating how often the specified foods are consumed in the past one week

Foods	6+ /day	4-6 /day	2-3 /day	1/day	5-6 /week	2/week	1/week	Almost never
Grains/starch								
Rice								
Wali								
Pilau								
Biriyani								
pasta(tambi)								
Pancake(vibibi)								
sweet potatoes(viazi vya tamu)								
irish potatoes								
ugali								
porridge								
bread								
Mkate wa sinia								
mahamri-1								
kaimati-1								

chapati-1								
Vegetables								
Sukuma								
Cabbage								
Spinach								
Amaranthas								
Cowpeas leaves								
Mnavu								
Tomato								
Carrots								
Fruits								
mango								
Pineapple								
Pawpaw								
banana								
orange								
Dairy & dairy products								
Milk								
Ghee								
Butter								

Meat & meat products								
beef, camel, mutton- ½ cup								
Chicken								
duck								
Fish								
Pulses/ Legumes								
Beans								
Mbaazi								
Others								
Tea								
coffee								
soda								
Flavoured juices								
Fat								
sugar								
salt								
coconut								

24-Hour Dietary Recall

a) What did you eat from the time you woke up yesterday to today morning?

Meal type	Time	Name of dish	Where prepared	Preparation method	Ingredients used	Amount

Meal type	Where prepared	Methods of preparation
Prebreakfast	Home	Boiled
Breakfast	Purchased at food store	Fried
Morning snack	Other households	Stewed
Lunch	Restaurant	Boiled
Afternoon snack	others (specify)	Roasted
Dinner/Supper		Eaten raw
Evening snack		Fermented
Others (specify)		Baked
		Others (specify)

Appendix 2.0 Focus Group Discussion Checklist

Questions for Focus Group Discussions

Swahili diet and dietary habits

Describe the Swahili diet

Are there foods that are prepared and consumed during special occasions? Which occasions? What foods?

List at least 10 dishes that are common in most household menus.

How often are meat and eggs consumed in most households? Which type of meat?

How many meals are served per day in most households? Name the meals. Are the meals regular?

Is dining out common in most households in the Swahili community? How often?

Food preparation/ Cookery methods

What are the ingredients (including spices) used in preparation of these dishes.

Describe the cookery procedures/recipes of these dishes.

What are the common food cooking methods in most households?

What type of fat is used for cooking in most households?

Swahili community attitudes

What is considered healthy eating in the Swahili community?

What is the Swahili community's thought on taking fruits and vegetables everyday?

What is the Swahili community's preference between consuming fresh fruit juices and commercial or homemade flavoured sugary drinks? What is common among these two in most households?

How does the Swahili community perceive being fat (overweight/ obesity)?

How does the Swahili community perceive physical activity? Who should do physical activity?

How does the Swahili community perceive diabetes and hypertension?

Knowledge and Awareness

What do you think causes diabetes and hypertension?

Culture and Religion

Does the Swahili community hold some taboos concerning food? Which ones?

Does religion prohibit consumption of some foods? Which foods?

Does culture prohibit consumption of some foods? Which foods?

Food preservation

What are the food preservation methods used by the Swahili community?

Appendix 3.0 Observation Checklist

Food preparation/ Cookery methods

Swahili culture

Food/ dietary habits

Notes

Appendix 4.0 Key Informant Interview Checklist

Socio-economic status of the women: Education, Occupation and Income

Swahili culture and religion

Swahili dietary habits

Appendix 5.0 Consent Form

Form code _____

Dear Respondent,

CONSENT STATMENT

Hello, my name is Faith Ngundi Ndungi. I am a student pursing a Master of Science degree in Nutritional Sciences at Egerton University. As part of my course requirements, I am currently conducting a research study to assess selected factors associated with lifestyle diseases among the Swahili community of Mombasa district. To meet this objective, I kindly request you to participate in this study by volunteering to provide information asked. The results of this survey will provide a clear understanding of the association between socio-economic status, knowledge, awareness, attitudes, physical activity, dietary habits, practices and the prevalence of obesity, diabetes mellitus and hypertension. The results will also provide baseline information to help stakeholders come up with interventions that will be used in prevention of risk factors of these lifestyle diseases.

Whatever information you provide will be kept strictly confidential and will not be shared or discussed with other persons. Thank you very much in advance.

Will you volunteer to participate in this study?

YES

NO

For the Respondent

Consent granted _____

Signature

Appendix 6.0 Letter from the Graduate School

EGERTON UNIVERSITY
Tel: Pilot: 254-51-2217620
254-51-2217877
254-51-2217631
Dir.line/Fax: 254-51-2217847
Cell Phone
P.O. Box 536 - 20115
Egerton, Njoro, Kenya
Email: eugradschool@wananchi.com
www.egerton.ac.ke

OFFICE OF THE DIRECTOR GRADUATE SCHOOL

Ref: EM18/2186/08 Date: 21 January 2011

Ms. Faith Ngundi Ndungi,
Egerton University,
Department of Hum. Nutri. & Pre-clin. Studies.,
P. O. Box 536,
EGERTON.

Dear Ms. Ndungi,

RE: CORRECTED PROPOSAL

This is to acknowledge receipt of two copies of your corrected proposal, entitled **"Association between Risk Factors for Chronic Diseases of Lifestyle and Prevalence of Diagnosed Hypertension and Diabetes in the Swahili Community of Mombasa Kenya".**

You are now at liberty to commence your fieldwork.

Thank you.

Yours sincerely,

Prof. M.A. Okiror,
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

c.c. Supervisors

MAO/qma

Appendix 7.0 Research Permit

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed with-out prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

GPK6055t3mt10/2009

HARAMBEE

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS— see back page)

PAGE 2

THIS IS TO CERTIFY THAT:

Prof./Dr./Mr./Mrs./Miss.....FAITH NGUNDI NDUNGI.....

of (Address) EGERTON UNIVERSITY P.O. BOX 536, EGERTON

has been permitted to conduct research in .....Location,

.....MOMBASA.....District,

.....COAST.....Province,

on the topic.Association between risk factors for chronic diseases of lifestyle and prevalence of diagnosed hypertension and diabetes in the swahili community of Mombasa, Kenya.

for a period ending.....31ST DECEMBER,20 11.....

PAGE 3

Research Permit No.....NCST/RRI/12/1/MED-011/18.....

Date of issue.....03/02/2011.....

Fee received.....SHS 1,000.....

Applicant's Signature

Secretary National Council for Science and Technology

Appendix 8.0 Research Authorization from National Council for Science Technology

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref: **NCST/RRI/12/1/MED-011/18/4**

Date: **3rd February 2011**

Faith Ngundi Ndungi
Egerton University
P. O. Box 536
EGERTON

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Association between risk factors for chronic diseases of lifestyle and prevalence of diagnosed hypertension and diabetes in the Swahili community of Mombasa, Kenya"*** I am pleased to inform you that you have been authorized to undertake research **in Mombasa District** for a period ending ***31st December 2011.***

You are advised to report to **the District Commissioner, the District Education Officer and the District Medical Officer of Health, Mombasa District** before embarking on the research project.

On completion of the research, you are expected to submit **one hard copy and one soft copy** of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:

The District Commissioner
Mombasa District

The District Education Officer
Mombasa District

Appendix 9.0 Research Authorization from District Commissioner's Officer

OFFICE OF THE PRESIDENT
PROVINCIAL ADMINISTRATION AND INTERNAL SECURITY

Telegrams:"*DISTRICTER*" KISAUNI
Telephone: Kisauni: 041-2012877
Email: dc_10kisauni@yahoo.com

DISTRICT COMMISSIONER'S OFFICE
KISAUNI DISTRICT
P.O BOX 28-80122
KISAUNI

REF: KIS/ ADM.1/6/13

DATE: 7th February, 2011

TO WHOM IT MAY CONCERN

RESEARCH AUTHORIZATION – FAITH NGUNDI NDUNGI

The above named is a student at Egerton University and has been authorized to carry out research on "Association between risk factors for chronic diseases of life style and prevalence of diagnosed hypertension and diabetes in the Swahili community of Mombasa, Kenya" for a period ending 31st December 2011.

Any assistance accorded to her while undertaking the research will be appreciated.

W. A. NGAIRA
FOR: DISTRICT COMMISSIONER
KISAUNI DISTRICT

Copy to

District Officer
KISAUNI

District Officer
BAMBURI

Appendix 10.0 Research Authorization from District Education Officer (Mombasa)

MINISTRY OF EDUCATION

Telegrams: "SCHOOLING",
MOMBASA
Telephone: Mombasa 2312420
When replying please quote
EDU/MSA/15/5
Ref And date

DISTRICT EDUCATION OFFICER
MOMBASA DISTRICT
P. O. BOX 83429
MOMBASA

7th February, 2011

TO WHOM IT MAY CONCERN

REF: RESEARCH AUTHORIZATION FOR RISK FACTORS FOR CHRONIC DISEASES OF LIFESTYLE AND PREVALENCE OF DIAGNOSED HYPERTENSION AND DIABETES IN THE SWAHILI COMMUNITY OF MOMBASA

The bearers of this letter have been granted permission to carry out the above mentioned research.

Your assistance will be highly appreciated.

ABSALOM O. ODHIAMBO
FOR DISTRICT EDUCATION OFFICER
MOMBASA DISTRICT

Appendix 11.0 Research Authorization from District Education Officer (Kisauni)

MINISTRY OF EDUCATION

Telegrams: "SCHOOLING",
MOMBASA
Telephone: KSN
When replying please quote
Tel: 0202327862/0202105189
Email: deokisauni@gmail.com

DISTRICT EDUCATION OFFICE
KISAUNI DISTRICT
P. O. BOX 10651
BAMBURI

REF: Edu/kis/1/38

8th February, 2011

TO WHOM IT MAY CONSERN

RE: RESEARCH AUTHORIZATION
FAITH NGUNDI NDUNGI.

The named person has been authorized to carry research on Association between risk factors for chronic diseases of life style and prevalence of diagnosed hypertension and diabetes in the Swahili community of Mombasa, Kenya.

You are required to provide this office with copy of your findings at the end of your research

MARY W. KANYORO
DISTRICT EDUCATION OFFICER
KISAUNI DISTRICT

Appendix 12.0 Research Authorization from Ministry of Public Health (Kisauni)

MINISTRY OF PUBLIC HEALTH AND SANITATION

Telegrams: "DISTMED", MOMBASA
Telephone: Mombasa 2494140

Ref: PH/RA/VOL.1/1

Office of The
Medical Officer of Health
Mombasa District
P. O. Box 97424
Mombasa

10/2/2011

FAITH NGUNDI NDUNGI
EGERTON UNIVERSITY
P. O. BOX 536
EGERTON

RE: RESEARCH AUTHORISATION

The above subject matter refers.

This is to confirm that we are in receipt of your letter dated 3rd February 2011. We therefore authorize you to carry out research on "Association between risk factors for chronic diseases of lifestyle and prevalence on diagnosed hypertension and diabetes in the Swahili Community of Mombasa, Kenya".

This office has no objection to the study, we request that on completion of the research you send us a copy of the report.

Thank you.

DISTRICT MEDICAL OFFICER OF HEALTH
MOMBASA DISTRICT

DR. SHEM PATTA
DISTRICT MEDICAL OFFICER OF HEALTH

Appendix 13.0 Swahili foods

Kaimati: These are pastries cooked using coconut milk and coated with sugar.

Katlesi: This are patties prepared using mashed potatoes, milk, margarine, boiled eggs or minced meat, onions, coriander, green chilies, salt, black pepper, pasta and vegetable oil.

Mahamri: These are pastries cooked using coconut milk.

Mbaazi za nazi: These are pigeon peas cooked using coconut milk, onions, tomatoes, garlic, salt and chilli powder.

Mkate wa sinia: This is a cake that has a crumbly texture because of the rice flour used in it. Ingredients used in its preparations include: rice flour, an egg, dry yeast, coconut milk, sugar and cardamom powder (*iliki*).

***Pilau and biriyani*:** These are spicy varieties of *wali.*

Samaki wa kupaka: This is fish prepared using coconut milk, turmeric powder (*manjano*), garlic, lemon juice, tomato puree, tomatoes, onions and vegetable oil.

Sharbati ya tende: This is a type of shake prepared using dates and coconut milk.

Tambi: This is pasta cooked using ghee, vegetable oil, coconut milk, sugar, cardamom powder, raisins and cinnamon sticks (*mdalasini*).

Uji wa mchele: This porridge prepared using coconut milk, rice flour and cardamom powder (*iliki*).

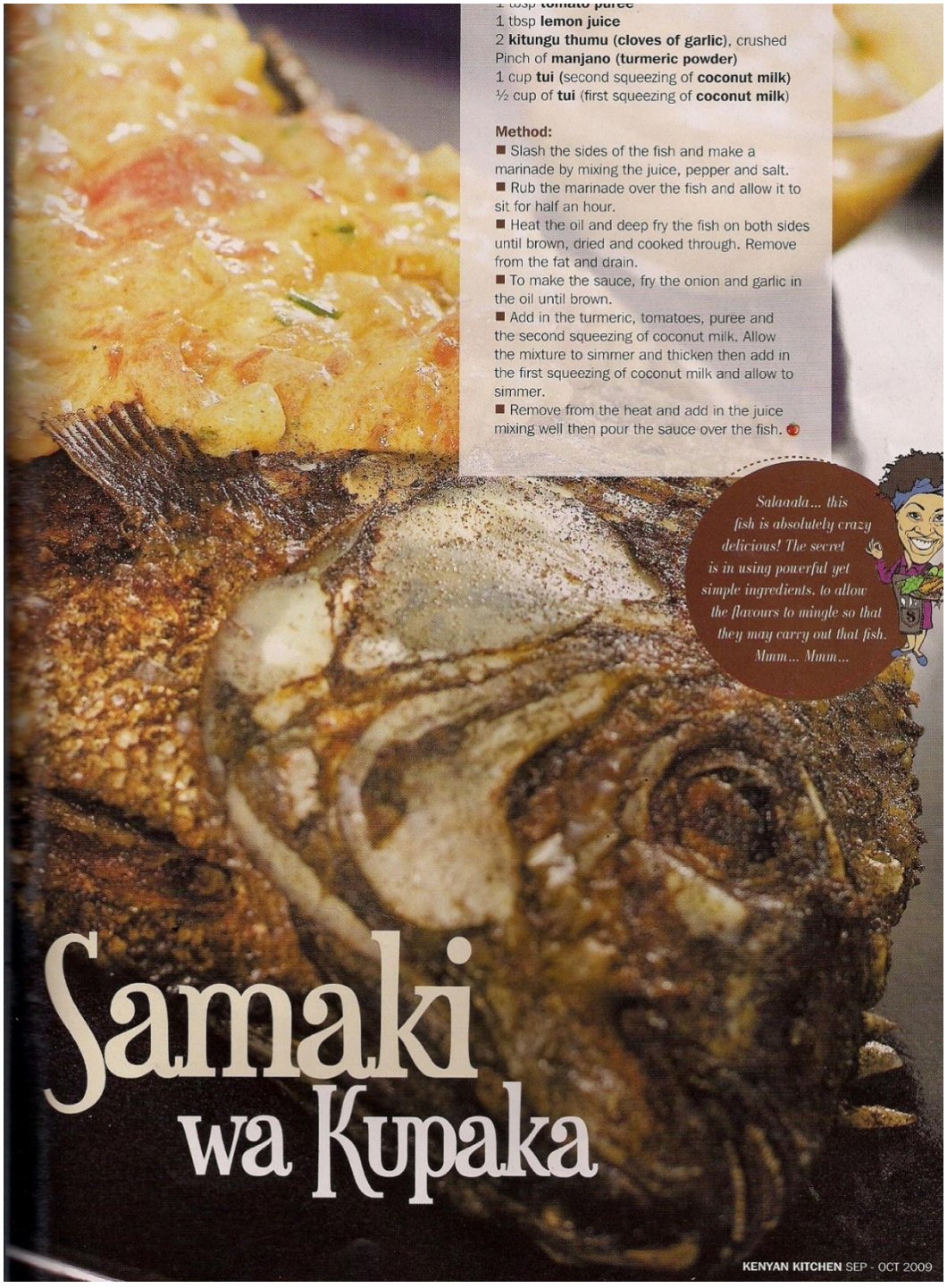
Viazi vya jeera: These are mashed potatoes cooked using milk, salt, margarine and cumin seeds (*jeera*).

Viazi vya tamu: These are sweet potatoes cooked in coconut milk. Ingredients used in its preparation include: sweet potatoes, coconut milk, sugar and cardamom powder (*iliki*).

Vibibi: This is a Swahili pancake. Ingredients used in its preparation include: self-raising flour, salt, sugar, eggs, ripe bananas, milk and vegetable oil.

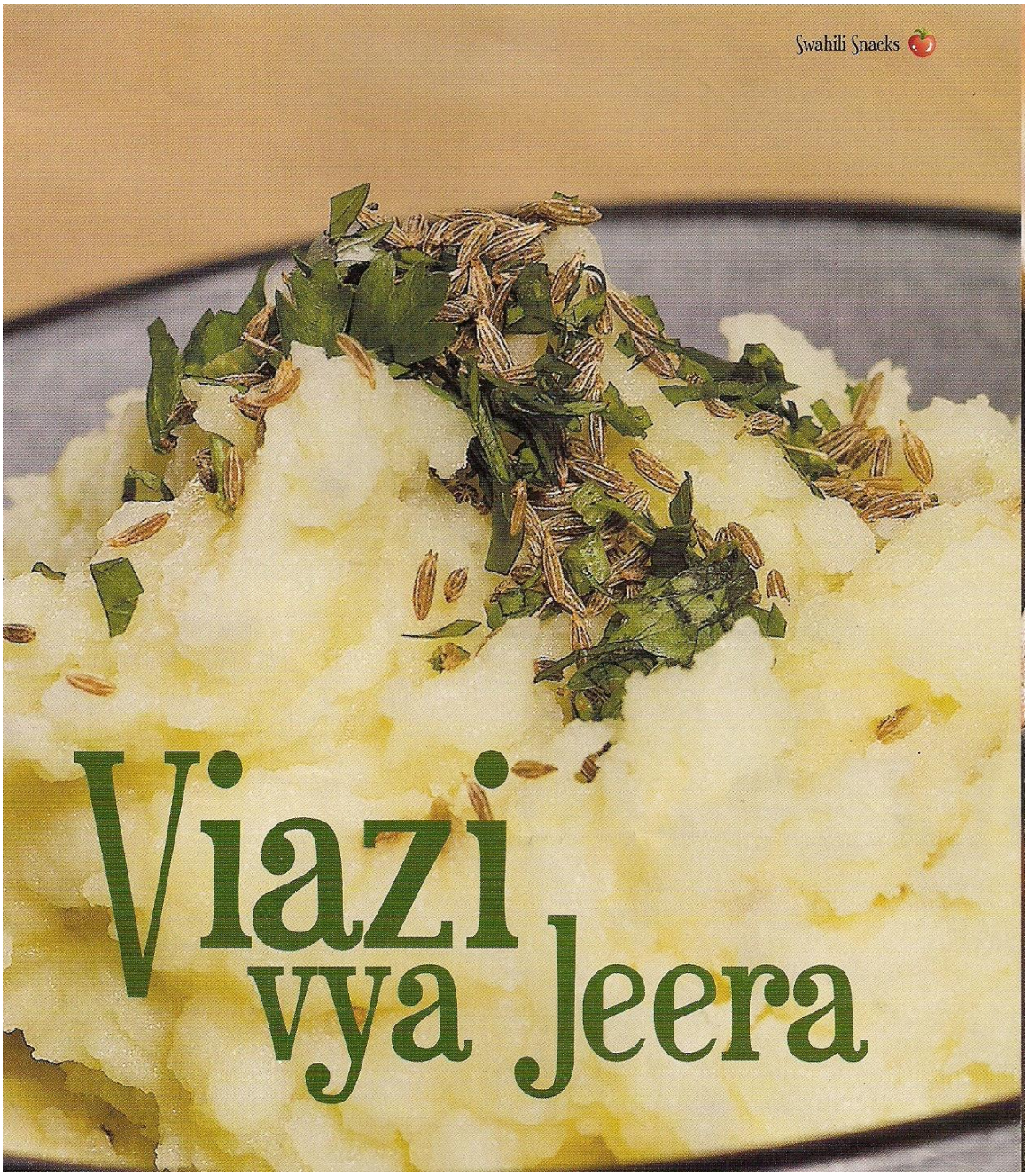
***Wali*:** This is rice cooked in coconut milk which is served with a thick meat stew or fish.

Appendix 14.0 *Samaki wa kupaka*

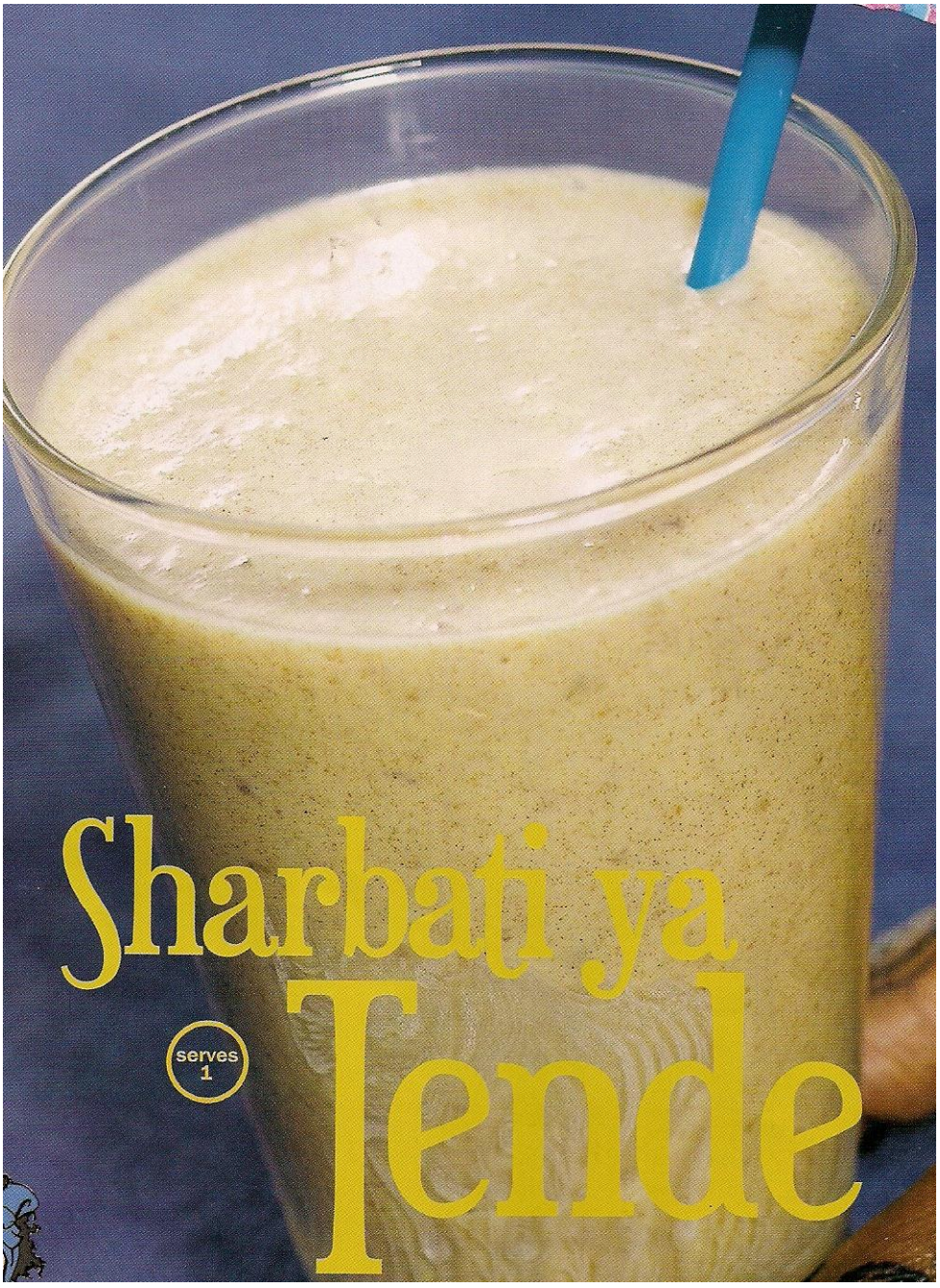


Appendix 15.0 *Katlesi*

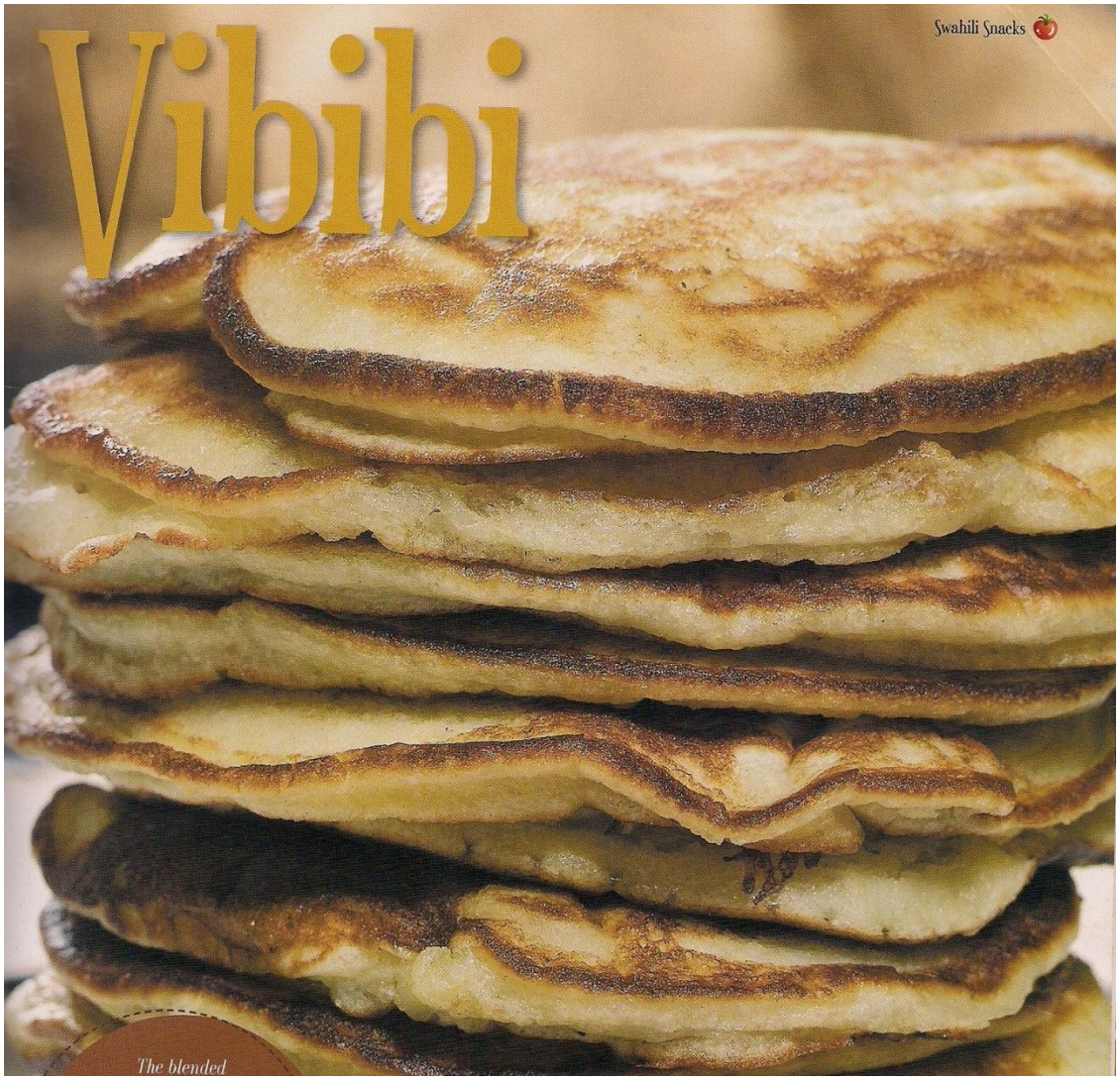
Appendix 16.0 ***Viazi vya jeera***



Appendix 17.0 *Sharbati ya tende*



Appendix 18.0 *Vibibi*



Appendix 19.0 Difference in proportion calculator

The Difference in Proportions Test for Two Proportions Calculator allows you to test for a statistically significant difference between two proportions drawn from independent samples.

For example, if 85% of Americans in the north are online and 77% of Americans in the south are online is that difference real or the result of random chance?

To determine if the difference is significant follow these steps:

1. Plug in the sample size for each of the independent groups.
2. Plug in the proportions that you wish to test.
3. Select a confidence level.
4. Click on Calculate.

Note: this procedure can be validly employed only if both samples satisfy the standard binomial requirement that n*p and n (1-p) must both be equal to or greater than 5, where n=samples size and p=percentage.

Sample 1 Total sample size from population #1.

Sample 2 Total sample size from population #2.

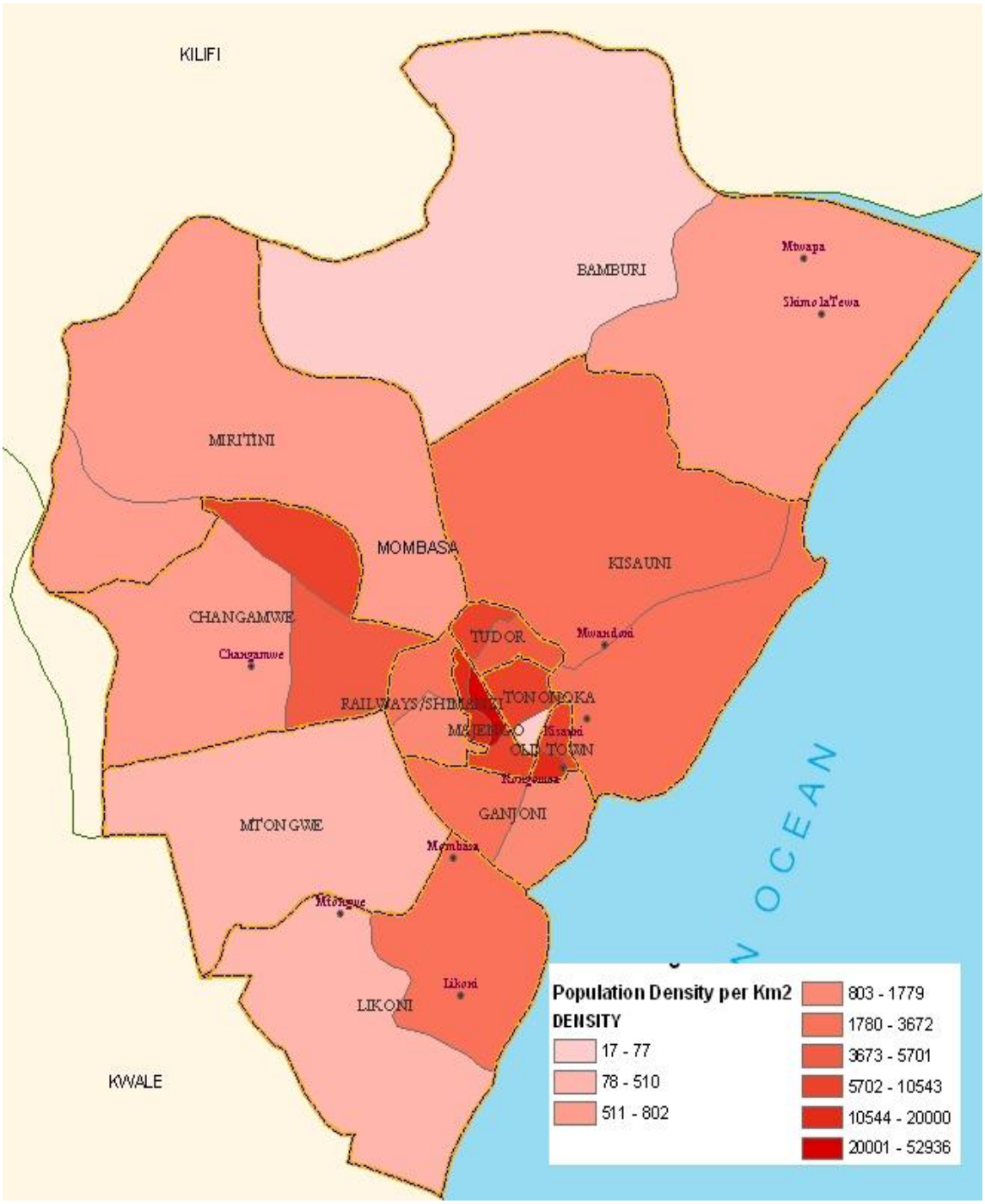
Percentage 1 First percentage for comparison
% (60% would be entered as 60 not .60).

Percentage 2 Second percentage for comparison
% (60% would be entered as 60 not .60).

Confidence Level (choose one)
%

Answer:

Appendix 20.0 Mombasa Geographical Map



Appendix 21.0 Old Town, Mombasa