PREVALENCE OF LIFESTYLE RISK FACTORS AMONG DIABETIC PATIENTS AT KENYATTA NATIONAL HOSPITAL (NAIROBI, KENYA)

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A Thesis submitted in part fulfillment for the Award of the Degree of Masters of Public Health of the University of Nairobi.

2008

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university or for any other award.

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DEDICATION

This work is dedicated first and fore most to the Almighty God, the source of all knowledge and wisdom for opening this academic door of advancement for me. Secondly, I dedicate this work to my family, my wife Dorcas, daughters Star and Ruth and son Joseph for their patient endurance during this academic journey. Let this inspire you to excel in life. Thirdly, to my parents, my late Mum Grace for challenging me to aim at this noble goal of academic excellence and my Dad who has always remained a pillar of wisdom to me. Let this confirm to you that honesty in life translates to abundance for your descendants. Lastly to my primary school Head Teacher Mr. Nthae, you saw, natured and protected this talent when it was too tender for many to notice. Always find it necessary to use your words to unvail more talent to this world.

ACKNOWLEDGEMENT

I wish to acknowledge and thank the following individuals and institutions for making this study a success. My internal supervisors Prof. Elizabeth Ngugi and Dr. Peterson Muriithi, my external supervisor Dr. Mbaabu Mathiu and the entire staff department of community health, university of Nairobi for their support, advice and contribution. My research assistants Zipporah Nyariki and Gerald Mutiso for their tremendous support in data collection. The Kenyatta National Hospital, and Kiambu District Hospital diabetic clinic staff for their warmth, kindness and support during data collection. The diabetes patients who participated in this study.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AACE	-	American Association of Clinical Endocrinologists
ADA	-	American diabetes association
AIDS	-	Acquired immunodeficiency syndrome
BMI	-	Body mass index
c	-	centigrade
CHD	-	Coronary Heart Disease
CI	-	Confidence interval
Cm	-	Centimeters
CODE-2	-	Cost of diabetes in Europe- type 2
CVDs	-	Cardiovascular Diseases
DKA	-	Diabetes Ketoacidosis
DPP	-	Diabetes prevention Programme
FAO	-	Food and agricultural organization
FFQ	-	Food frequency questionnaire
g	-	grammes
Hba1c	-	glycosylated haemoglobin
HDL	-	High-density lipoprotein
HIV	-	Human immunodeficiency virus
IDDM	-	insulin dependent diabetes mellitus
IDF	-	International Diabetes Federation
IGT	-	Impaired Glucose Tolerance
KAP	-	Knowledge Attitude And Practices
KDHS	-	Kenya Demographic and Health Survey
Kg	-	Kilograms
KNH	-	Kenyatta National Hospital
KIPRA	-	Kenya institute of policy and research analysis
Ksh	-	Kenya shillings
LDL	-	Low-density lipoprotein
M2	-	square meter

mm	-	millimeters
mmHg	-	Millimeters of Mercury
mmol/l	-	milimoles per litre
NHANES	-	National Health and Nutrition Examination Survey
NIDDM	-	Non-insulin dependent diabetes mellitus
NIH	-	National institute of health
RR	-	Relative ratio
SPSS	-	Statistical package for social sciences
STEPS	-	stepwise surveillance
T1D	-	Type 1 Diabetes Mellitus
T2D	-	Type 2 Diabetes Mellitus
UN	-	United Nations
UNEP	-	United Nations Environmental Programme
US	-	United States
USA	-	United State of America
VLDL	-	very low density lipoproteins
WHO	-	World Health Organization
WHR	-	waist-to-hip circumference ratio

OPERATIONAL DEFINITIONS

Adherence: To follow treatment protocol according to recommendation.

Lifestyle risk factor: Any attribute, characteristic or exposure of an individual, which increases the likelihood of poor diabetes outcome.

Glycemic control: Control of the blood sugar level

Random blood sugar: A test of blood sugar level, which is done when the patient has not fasted appropriately.

Body mass index: Body weight expressed per body surface area (Kg/m^2)

Serving size: in reference to fruits and vegetables, one standard serving = 80 grams (translated into different units of cups depending on type of vegetable & fruits and the standard cup measures available).

Standard drink: The net alcohol content of a standard drink is generally 10g of ethanol, which is the equivalent of 1 regular beer (285ml), a single measure of spirits (30 ml), a medium-sized glass of wine (120 ml), or a measure of aperitif (60 ml).

ABSTRACT

Introduction

Modification of lifestyle risk factors like exercise, diet, alcoholism and smoking is important in management of diabetes (5,6). Urbanisation in Kenya is likely to affect adherence to lifestyle changes. No studies have looked at lifestyle adherence among diabetes patients in Kenya.

Methodology

This descriptive cross sectional survey assessed the prevalence of lifestyle risk factors among Kenyatta National Hospital diabetic clinic patients and how this relates to diabetes control. A structured questionnaire was used to collect socio demographic as well as biophysical and biochemical data (weight, height, blood pressure & random blood sugar) from each patient.

Results and analysis

Majority of the respondents (85%) consume less than the WHO recommended five servings of fruits and vegetables per day and a significant number (42%) is not involved in any type of moderate intensity physical exercise. Forty seven percent of those who exercise do so for less than 5 days in a week. The prevalence of alcohol consumption (6.4%) and smoking (3%) is low. Moderate physical activity and consumption of fruits and vegetables was associated with better blood sugar control while gender, level of education and working status were found to be important factors in lifestyle practices.

Conclusion

Lifestyle modification needs to be emphasized in diabetes management. There is need for a population-based study on the prevalence of lifestyle risk factors for diabetes and other non-communicable diseases.

CHAPTER 1 INTRODUCTION AND BACKGROUND

1.1 Introduction

..."Whoever wishes to investigate medicine properly, should proceed thus...the mode in which the inhabitants live, and what are their pursuits, whether they are fond of drinking and eating to excess, and given to indolence, or are fond of exercise and labor, and not given to excess in eating and drinking"... Hippocrates 400 B.C (1).

...The world is living dangerously, either because it has little choice or because it is making the wrong choices about consumption and activity. Gro Harlem Brundtland Director General (2).

Diabetes mellitus is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves (3). There are two principle forms of diabetes: Type 1, formerly known as insulin-dependent, in which the pancreas fails to produce the insulin that is essential for survival. Type 2, formerly named non-insulin-dependent, which results from the body's inability to respond properly to the action of insulin produced by the pancreas. Type 2 diabetes is much more common and accounts for around 90% of all diabetes cases worldwide. People with diabetes are prone to both short-term and long-term complications. The most important long-term complications are diabetic eye disease (retinopathy and cataract), kidney damage (nephropathy), nerve damage (neuropathy), peripheral vascular disease, and foot ulceration leading to amputation, infections, heart disease and stroke. These complications are common yet severe (4). The mainstay of diabetes management is pharmacological (administration of oral hypoglycemic agents and insulin) and non-pharmacological (reduction of lifestyle risk factors). Diabetes is now managed as a cardiovascular risk factor emphasizing the control of any present risk factors, behavioural or biological (5). The behavioral (lifestyle) risk factors are of particular importance for several reasons. First they have a high bearing on the development and/or management of the biological factors like obesity, dyslipidemias and high blood pressure. Secondly, they provide a cost effective way of prevention and control of diabetes as well as other non-

communicable diseases. Thirdly, due to the chronic nature of diabetes, lifestyle modification is a lifetime process that needs constant evaluation to adopt better and more patient friendly strategies.

The role of lifestyles and living environments in influencing heath outcomes identified in the 5th century BC and are still valid today (1,2). Lifestyle practices are important in diabetes management (6). The recent increase in prevalence of diabetes and other non-communicable disease conditions has been associated with the change of lifestyles and living environments brought about by industrialization first in the developed world and now in the developing countries (7-12).

Lifestyle practices are influenced by different factors. The first and major factor is the rapid industrialization with the attendant urbanization occurring in most developing countries. This has led to overcrowding and informal settlements in most urban centres exposing people to unhealthy environments prone to infectious diseases that often complicate diabetes management. People in urban centres take up less labour intensive jobs and their means of transport is mostly motorized compared to the traditional rural agricultural environments. Globalization that comes with industrialization has also exposed people to adverse advertisements on tobacco and alcohol products as well as highly refined foodstuffs that are less healthy. This is made worse by weak policies and poor legislation on various issues like housing, transport and tobacco advertisements. The poor quality of healthcare evidenced by few and less equipped facilities, overworked health staff with poor skills and erratic supply of drugs means that patients cannot get the attention required for proper understanding and management of this chronic disease.
There are also individual factors including poverty, cultural beliefs and low level of education. Without sufficient income patients may not be able to afford a balanced diet. This coupled with the belief that overweight and some exotic foods is a sign of good life result to unhealthy diets. The low level of education also makes it hard for patients to understand management protocols and follow them correctly. Despite the presence of these challenges in Kenya, studies to determine the level of adherence to important lifestyle factors among diabetic patients are lacking. Kenya also lacks National guidelines

on the management of diabetes not to mention lifestyle practices. This study carried out at Kenyatta National Hospital was determined the prevalence of lifestyle risk factors among diabetic patients attending the diabetic clinic and how this relates to diabetes control. It was also to establish the relationship between selected socio demographic factors and adherence to lifestyle modification. The results of this study are an important contribution to the National diabetes policy and the development of effective educational materials and diabetes management protocols.

1.2 Background

1.2.1 The Burden of Diabetes in Developing Countries

The incidence of Diabetes has increased 6% annually in the United States (13) and more than that in developing countries (14,15). WHO estimates that in 2000, 177 million people were living with diabetes globally and that this is likely to increase to at least 370 million by 2030. Much of this increase will occur in developing countries, due to population growth, ageing, unhealthy diets, obesity and sedentary lifestyles (4). Additionally, while most people with diabetes in developed countries will be aged 65 years or more, in developing countries the majority will be in the 45-64 years age bracket and affected in their most productive years. The prevalence of diabetes in Africa currently ranges from 1-6% and is increasing coinciding with transformation of societies from rural active agricultural lifestyles to the sedentary urban lifestyles known to be powerfully diabetogenic (16,17). This can be explained by the economic development in developing countries, which has been associated with greater adoption of western lifestyles, resulting in a substantial increase in diabetes prevalence (18).

The cost of managing diabetes and its complications is of public health importance. Due to its chronic nature, the severity of its complications and the means required to control them, diabetes is a costly disease, not only for the affected individual and his/her family, but also for the health authorities. For example people with diabetes are prone to both short-term and long-term complications. Most direct costs of diabetes relate to the costs incurred in medical care and management of complications is the largest single component in these costs. Other costs include loss of earnings and productivity due to

significant reduction in the quality of life and life expectancy, discrimination in the employment and in the workplace. The cost of diabetes care and the loss of productivity due to illness will impose a heavy burden on many developing countries in the future. Studies in India estimate that, for a low-income Indian family with an adult diabetes patient as much as 25% of family income may be devoted to diabetes care while in the USA, a family with a child who has diabetes consume up to about 10% (4). Diabetes is estimated to account for between 5% and 10% of a nation's health budget (15).

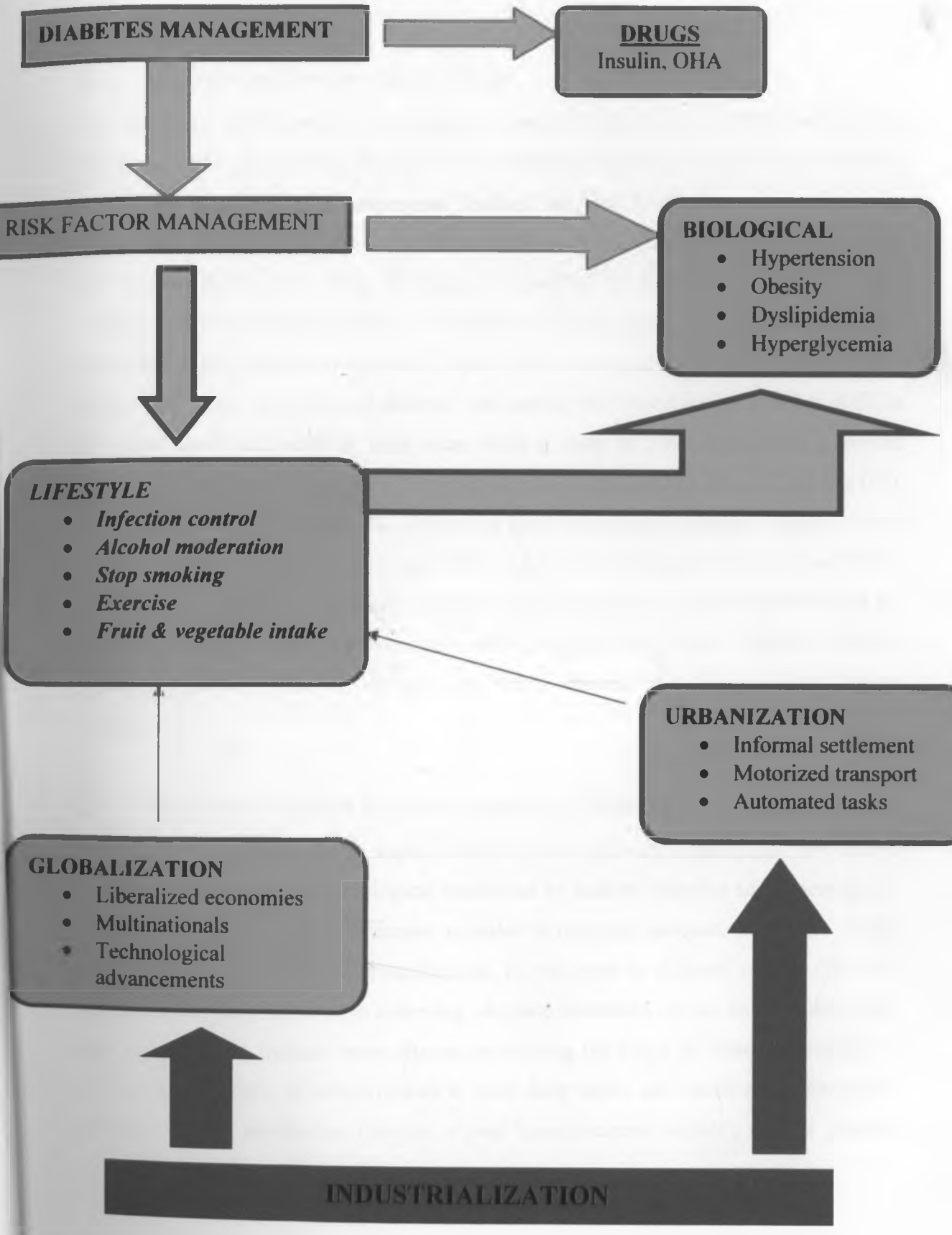
1.2.2 Lifestyles and Urbanization

Rapid economic development and the consequent improvement in living conditions and health care have resulted in declines in infant mortality and deaths from infectious diseases and therefore in increases in life expectancy in many developing countries (19,20). In contrast, adverse changes in lifestyle, such as a high intake of dietary fat and increased physical inactivity that tend to accompany industrialization and urbanization have become increasingly prevalent in these countries, and such changes may have increased the risk of chronic disease, including vascular disease and cancer (20,21) and diabetes (22). Consequently, the middle and high-class population currently consume higher fat and calorie diets and exercise less in their daily work activities. On the other hand while the low class population walk long distances to their places of work and mainly perform manual jobs, they live in the informal settlements exposed to infectious agents, pollution and malnutrition that can complicate diabetes disease management.

There is clear evidence that industrialization in developing countries is associated with rural urban migration. For example between 1950 and 1985, the urban population of industrialized countries doubled, while in the developing countries it quadrupled. Cities in developing nations, added an additional 750 million people between the years 1985 and 2000 (3). According to estimates by the UN-Habitat, nearly 50% of the population in developing countries will be urban by the year 2020 as more people abandon traditional rural areas to live and work in cities. In Kenya, the rate of urbanization is one of the highest in the world. While the estimated annual rate of growth of the urban population in Kenya is at 7.05% for the period of 1995-2000, the average for African cities is 4.37% and 2.57% for the world (23). According to the 1999 Kenya National Population and

Housing census, urban population accounted for 34.5 % (24). Further modernization in the developing countries is likely to exacerbate the diabetes problem to such an extent that a global epidemic has been predicted. If no action is taken to address the problem, the prevalence of diabetes among the adult population in developing countries is projected to increase by 170% between 1995 and 2025, as compared to a rise of 41% over the same period in the developed world (18). In Kenya for example, though population based prevalence data is lacking, the International Diabetes Federation (IDF) estimates that the prevalence of diabetes mellitus will grow from 2.5% in 2003 to 3.4% in 2025 among those 20-79 years. Over the same period the number of people 20-79 years with the disease in urban areas is expected to almost triple. With the movement of many people from their rural homes to the major urban centres, lifestyle changes are expected in diverse ways. In the urban centers many people are engaged in less strenuous or less labour intensive jobs and use motorized means of transportation as opposed to the long distance walking so prevalent in the rural populations. For example, Sobngwi E et al. recently observed a drastic reduction of walking time and pace in an urban community in sub-Saharan Africa, as compared with a rural sub-Saharan African community (a reduction by a factor of 2 to 4 for walking at a slow pace and by a factor of 6 to more than 10 for walking at a brisk pace (25). They are also more exposed to commercial promotion of less or non-healthy substances like smoking, excessive alcohol consumption and ingestion of highly refined high caloric foods. This is compounded by the high level of poverty that predispose the people to poor housing and sanitation as well as high prevalence of communicable diseases like malaria, respiratory tract infections and HIV/AIDS. In a study by Mbugua et Al. 2005, on patients with diabetic ketoacidosis (DKA) in Kenyatta National Hospital, 23.4% of the patients had overt infections that included respiratory, genito urinary system infection and septicemia while 34% had missed their insulin dose (26). This study therefore determined the prevalence of selected lifestyle risk factors among diabetic patients attending diabetic clinic in urban Kenya. It assessed the relationship of selected socio-economic factors and the patients' adherence to these lifestyle practices as well as glycemic control. Figure 1 below is conceptual framework of the interaction of different industrialization factors and diabetes lifestyle risk factors.

Figure 1: Conceptual Framework of Industrialization and Lifestyle Risk Factors



CHAPTER 2 LITERATURE REVIEW

2.1 Diabetes in developing countries

The incidence of Diabetes in developing countries is increasing at an alarming rate (4.14). By 2025, the number of people with diabetes is expected to more than double in Africa, the Eastern Mediterranean and Middle East, and South-East Asia, and rise by 20% in Europe, 50% in North America, 85% in South and Central America and 75% in the Western Pacific (15). Data on National prevalence of diabetes is lacking for most African countries including Kenya. Available data for Tanzania, which borders Kenya, shows that it has already experienced a rapid rise in the burden of diabetes disease. In the 1980s, her prevalence of type 2 diabetes was among the lowest in the world at 0.8% in cities and towns and 0.9% in rural areas while a study in 2000 highlighted a marked increase in her diabetic population in the urban (4.0%) and rural (1.3%) populations (27). IDF estimates that the prevalence of diabetes mellitus in Kenya will grow from 2.5% in 2003 to 3.4% in 2025 among those 20-79 years (15). This rapid rise in most of the developing countries is associated with the rapid increase in industrialization and the concurrent rural to urban migration, with most populations in these countries adopting lifestyles that predispose to diabetes and other chronic non-communicable disease conditions.

2.2 Important Factors in Management of Diabetes

The concept of self-care, which implies that the patient actively monitors and responds to changing environmental and biological conditions by making adaptive adjustments in the different aspects of diabetes treatment in order to maintain adequate metabolic control and reduce the probability of complications, is important in diabetes control (28). The self care behaviours involved in achieving adequate metabolic control and avoiding long-term complications include home glucose monitoring (in blood or urine), adjustment of food intake especially of carbohydrates to meet daily needs and match available insulin; administration of medication (insulin or oral hypoglycaemic agents); regular physical

activity; foot care; regular medical monitoring visits, and other behaviours (i.e. dental care, appropriate clothing, etc.) that may vary depending on the type of diabetes (29).

2.3 The Role of Lifestyle Factors in Diabetes Management

2.3.1 Diabetes and exercise

Physical activity as a therapeutic modality in patients with diabetes mellitus is important. Though in Type 1 diabetes the effectiveness of exercise as therapy has not been proved by double-blind controlled studies (30,31), the process of physical conditioning through exercise training can result in a 20% to 30% decrease in the daily subcutaneous insulin requirement (32). In Type 2 diabetes, physical activity has been shown to help decrease peripheral insulin resistance, plasma triglycerides levels, and very-low-density lipoproteins (VLDL) (33). Another beneficial effect of an exercise program is the promotion of self-discipline necessary for controlling a chronic disease. Furthermore, in an era of increasing treatment options and complexity of orally administered medications for type 2 diabetes, any therapeutic maneuver that decreases the complexity of treatment at low economic cost is cost effective. Accumulation of moderate intensity physical activity for 30 minutes on most, or preferably all, days of the week is recommended as an effective CVD prevention measure (34). Physical activity has measurable biological effects, affecting cholesterol levels, insulin sensitivity and vascular reactivity. Moreover, these effects are dose-dependant – the more exercise the greater the health benefits. However, considerable health benefits can be gained with only small increases in moderate physical activity like regular walking. Low fitness represents a similar risk for heart disease as smoking, high cholesterol, high blood pressure, high body mass index and family history, but it has a higher prevalence (34). The world health report 2002 describes the opportunities for people to be physically active in terms of four domains of their day-to-day lives: at work; for transport; in domestic duties; or in leisure time (35).

2.3.2 Diabetes and Dietary Intake

Appropriate use of diet can improve insulin sensitivity and glycemic control and decrease the need for oral medications or insulin (36). Although there is some controversy over the optimal diet for adults with type 2 diabetes (high fiber, glycemic index approaches, low versus moderate fat) (37,38), there is a consensus to increase consumption of fruits and

vegetables and decrease daily consumption of saturated fats (38, 39). A low fiber diet with a high glycemic index has been associated with an increased risk of diabetes (40,41). Previous studies have found that a reduced risk of type 2 diabetes is associated with a higher intake of cereal fiber (40-42) and polyunsaturated fat and that an increased risk is associated with a higher intake of trans fat (formed during the partial hydrogenation of vegetable oils) (43). Therefore a low-risk diet needs to have low trans fat and glycemic load and high content of cereal fiber, with a high ratio of polyunsaturated to saturated fat. A study comparing a diet containing 24 g fiber per day (high usual intake) to a diet containing 50 g fiber per day found that the intake of food high in dietary fiber improved glycemic control, reduced hyperinsulinemia, and decreased plasma lipids (36). A meta-analysis of 67 controlled clinical trials indicated that diets high in soluble fiber decrease total and LDL cholesterol, but had a small HDL lowering effect and did not affect triglycerides concentrations (44). The soluble fibres in fruits and vegetables are beneficial through modifying the metabolism of fats and carbohydrates, and play a role in controlling the levels of cholesterol and sugar in the blood. Moreover, vegetables and fruits are low in fat and energy, if eaten in their natural form, so eating them helps reduce the risk of obesity. Snowdon and colleagues examined diet in relation to diabetes among a population of 25,698 adult Seventh Day Adventists. In this population, vegetarians were half as likely as omnivores to develop diabetes over the course of 21 years follow up (45). Fruit and vegetables intake has subsequently been associated with lower risks of diabetes in non-vegetarian populations as well. Several cross-sectional studies have suggested that a higher intake of fruits and vegetables protects against development of diabetes. A population-based study in United Kingdom examined the association between fruit and vegetables intake and abnormal glucose tolerance in 1,122 middle-aged men and women without known diabetes (46). All participants underwent a glucose tolerance test and had their food consumption assessed using a food frequency questionnaire (FFQ). Non-obese participants who reported frequent intake of salad and raw vegetables throughout the year had significantly lower prevalence of type 2 diabetes and abnormal glucose tolerance test results than those who reported infrequent consumption (OR= 0.18; 95% CI: 0.04-0.81) after adjustment for age, sex and family history. Associations with fruit consumption were not significant in this study. However in another cross-sectional

study of 5,996 middle age participants not known to have diabetes, Sargeant et al observed a direct association between fruit and vegetable consumption and concentrations of glycosylated haemoglobin. Participants who reported frequent consumption of fruits and green leafy vegetables had significantly lower mean percent glycosylated hemoglobin concentrations (5.34%; standard error (SE), 0.01) than their counterparts who reported seldom or never consuming these foods (5.41%; se 0.03; p=0.046) after adjusting for age, sex, BMI, waist-hip ratio, energy intake, family history, tobacco use, alcohol intake, education, physical activity, supplement use and vegetarian diet. This remained significant after further adjustment for dietary intake and plasma concentration of vitamin C, saturated fat intake and fibre intake (47). Fruits and vegetable consumption has also been shown to confer cardiovascular benefits. In a study of 4,336 male and 6,435 female participants in the united kingdom recruited through health food shops, vegetarian societies and magazines, Key and colleagues found that the daily consumption of fresh fruit was associated with significantly reduced mortality from ischaemic heart disease (RR= 0.76; 95% CI: 0.60-0.97), stroke (RR= 0.68; 95% CI: 0.47-0.98), and for all causes combined (RR= 0.79; 95% CI: 0.7-0.90), after adjusting for smoking (48). Participants in this study were followed for an average of 17 years and 43% were vegetarians. Results from the nurses health study and the health professionals follow-up study also showed a 31% lower risk (RR= 0.69; 95% CI: 0.52-0.92) of ischaemic stroke for persons in the highest quantile of fruit and vegetable intake (median 9.2 servings per day among men, 10.2 servings per day among women) compared to those in the lowest quantile of intake (median 2.6 servings per day among men and 2.9 servings per day among women) after adjustments for age, smoking, alcohol, family history of myocardial infarct, BMI, supplement use, physical activity, hypertension, hypercholesterolaemia, total energy intake and among women postmenopausal hormone use (49). The amount of fruits and vegetables ingested per day is therefore important and WHO recommends an intake of at least 400 g vegetables (in addition to potatoes) and fruits per day (50).

2.3.3 Alcohol and diabetes management

Alcohol affects diabetes management in different ways. In people with type 2 diabetes, chronic alcohol ingestion (customary intake of 45 g/day) causes deterioration in long and short-term glucose metabolism (51). Therefore metabolic control should be carefully monitored if alcohol is an important component of a patient's diet. The effects induced by excess alcohol are reversed after abstinence from alcohol for 3 days (51,52). In adults with diabetes, chronic intake of light-to moderate amounts of alcohol (5–15g/day) is associated with a decreased risk for coronary heart disease, perhaps because of the concomitant increase in HDL cholesterol (53-55). This translates to no more than one 330mls Tusker drink, which has the lowest alcohol content in Kenya. Patterns of alcohol use have been related to the quality of diabetes self-management. Johnson, Bazargan & Bing (56) studied 392 patients with type 2 diabetes from ethnic minority groups in Los Angeles, California and found that alcohol consumption within the previous 30 days was associated with poor adherence to diet, self-monitoring of blood glucose, oral medications and appointment-keeping. Cox et al examined alcohol use in 154 older men with diabetes and found that greater alcohol use was associated with poorer adherence to insulin injections (57).

There appears to be a U- or J-shaped relationship between alcohol intake and blood pressure. Light-to-moderate amounts of alcohol do not raise blood pressure (58-62). However, a strong association exists between chronic, excessive intake of alcohol (30–60 g/day) and blood pressure elevation in men and women. Each additional 10g increment of alcohol intake above 30 g/day increases systolic blood pressure by an average of 1–2 mmHg and diastolic blood pressure by 1 mmHg. In addition to being a risk factor for hypertension, alcohol may interfere with anti-hypertensive therapy and may be a risk factor for stroke (63). WHO advises that diabetics should at least adhere to the alcohol recommendations for the general population. The Dietary Guidelines for Americans (64) recommends no more than two standard drinks per day for adult men and no more than one drink per day for adult women. The International Diabetes Federation recommends a maximum of 21 units (14 for women) per week for adult men. The equivalent of this locally is approximately no more than one drink of Tusker per day for men.

2.3.4 Diabetes and Tobacco Smoking

Smoking cessation is important in decreasing the risks of diabetes-related macrovascular and microvascular complications (33). There is increasing evidence that cigarette consumption has a synergetic effect with diabetes and increases the morbidity and mortality of type 1 and 2 diabetic patients (65-69). Smoking has been reported to be associated with hypoglycemia in previous clinical studies (70-72). The most common causes of mortality among individuals with diabetes are cardiovascular and renal complications both of which have been related to cigarette smoking (67,73). More over, smokers experience four times the risk of death from all cardiovascular disease and three times the risk of death from coronary artery disease (74). Smoking accounts for approximately 21.5% of deaths from coronary artery disease and 18% of deaths from stroke in the US, (75). There is extensive evidence that smoking cessation reduces the risk of mortality and morbidity from coronary artery disease (76). Reduction in cardiovascular risk begins immediately after smoking cessation and continues over time. Within 5-10 years after cessation, the risk is reduced to a level almost equivalent to that in nonsmokers.

2.3.5 Adherence to Lifestyle Practices

Adherence to treatment, including suggested lifestyle modification has been shown to be effective in reducing complications and disability, while improving patients' quality of life and life expectancy (77). Adherence improves the effectiveness of interventions aimed at promoting healthy lifestyles, such as diet modification, increased physical activity, non-smoking and safe sexual behaviour (78-80).

Though studies on adherence to lifestyle risk factors in Kenya are lacking, this has been shown to be low in other areas. A study conducted in India showed that dietary prescriptions were followed regularly by only 37% of patients (85), while the United States about half (52%) followed a meal plan (86). Anderson & Gustafson (87) reported good-to-excellent adherence in 70% of patients who had been prescribed a high-carbohydrate, high-fibre diet. Wing et al showed that patients with type 2 diabetes lost less weight than their nondiabetic spouses and that the difference was mainly due to poor adherence to the prescribed diet (88). In Canada, patients with type 2 diabetes randomly

selected from provincial health records, few participated in informal (37%) or organized (7.7%) physical activity programmes (89). A survey in the United States found that only 26% of respondents followed a physical activity plan (86). A study assessing the attitudes and adherence of patients who had completed outpatient diabetes counselling observed that only 52% exercised on three or more days per week after the counselling programme was completed (90).

CHAPTER 3 THE RESEARCH PROBLEM

3.1 Statement of Research Problem

The goal of diabetes treatment is to keep blood glucose levels as near normal as possible while avoiding acute and chronic complications (29,81). Its management depends not only on drug therapy but also on physical exercise, diet and other lifestyle changes (82). Patient education and full participation in diabetes control is the main channel of achieving these diabetes management goals. The quality of blood sugar control will be affected by the extent to which the patient adheres to these lifestyle factors and prescribed medication. There is strong evidence that many patients with chronic illnesses including diabetes have difficulty adhering to their recommended regimens resulting to less than optimal control and management of the illness (83). This significantly contributes to the development of complications of diabetes and their associated individual, societal and economic costs. It also results in avoidable suffering for the patients and excess costs to the health system. The magnitude of non adherence to lifestyle diabetes risk factors needs to be investigated and mitigation measures inistituted. On average more than one patient every week is admitted in KNH with diabetes ketoacidosis (26). A study done by Mwendwa et al 2005 on the risk factor profile and the occurrence of microvascular complications in short-term type 2 diabetes mellitus at Kenyatta National Hospital, Nairobi found that, 66% of the patients were obese and half of them had hypertension. Among the patients studied only 29% (one in three) had ideal blood glucose control and one quarter of the patients in the study had micro albuminuria (84). However this study examined biological risk factors only and no study has looked at the prevalence of lifestyle (behavioural) risk factors in diabetic patients in Kenya. Studies in other countries have found relatively low level of adherence to lifestyle practices.

Kenya is undergoing rapid growth of urbanisation and the associated increase of sedentary lifestyles (23,84), which are known to predispose to diabetes (16,17). This changing environment is bound to affect the patient's ability to adhere to certain lifestyle practices. Like all other behavioral factors lifestyle practices are not easy to change and their examination is an important step in developing individualized interventional

strategies. This study assessed the prevalence of the lifestyle risk factors among diabetic patients attending KNH clinic Kenya by looking at their day to day activities in their home and work environment as well as their dietary and alcohol consumption and their smoking habits. The study also aimed to establish what kind of relationship exists between these lifestyle practices and the patients' diabetes control.

3.2 The Study Justification

Lifestyle modification is a cost effective way of managing diabetes and its complications as well as other chronic non-communicable diseases associated with urbanisation. This is especially important for developing economies where resources for health care are limited. Lifestyle modification also benefits other risk conditions for diabetes such as obesity, hypertension and dyslipidemias. However like all other behavioral factors, lifestyle modification is hard to achieve and interventional measures need to be individualized for maximum impact. It is therefore important to know the degree to which diabetic patients are able to achieve this. The study is expected to benefit diabetic patients' managers in designing education strategies and materials to better achieve their management objectives by knowing what socio-cultural issues to emphasize and which demographic sub groups of patients to give specialized attention. Diabetes patients are also expected to benefit from the improved care resulting from this study. It is also expected to contribute valuable information to policy makers in developing standards and protocols for the management of diabetic lifestyles taking into consideration individual patient's socio-cultural and economic environment. While a natural survey is preferable to assess the prevalence of lifestyles that are risk factors for diabetes and other non-communicable diseases, this study will however provide an anecdote. Such a study would be important in planning health promotion and prevention interventional strategies. This is important since with changing environments the burden of diabetes as well as other related non-communicable diseases is expected to increase enormously.

3.3 The Research Questions

1) In the face of urbanisation and industrialization in Kenya, how is the adherence of diabetic patients attending KNH diabetes clinic to recommended lifestyle practices?
2) Is there a relationship between adherence to lifestyle practices and diabetes control among these patients?
3) Are there some socio-demographic and economic factors affecting patients' adherence to recommended lifestyle practices?

3.4 Research Hypotheses

1. Adherence to prescribed lifestyle practices among diabetic patients in Kenyatta National Hospital is sub optimal given the changing environment caused by rapid urbanisation and industrialization.
2. Sub-optimal adherence to recommended lifestyle practices among diabetic patients does not adversely affects their glycemic control.
3. Adherence to lifestyle practices is not related to the patients' socio-demographic characteristics.
4. Poor adherence to lifestyle practices is not associated with high prevalence of the biological risk (hyperglycemia, hypertension & overweight) conditions.

3.5 Study Objectives

3.5.1 General Objective

To assess the prevalence of lifestyle risk factors among diabetic patients in Kenyatta National Hospital and their relationship to diabetes control.

3.5.2 Specific Objectives

1. To establish the prevalence of physical inactivity among diabetic patients in Kenyatta National Hospital and its relationship to diabetes control.
2. To assess the level of fruits and vegetable consumption among diabetic patients in Kenyatta National Hospital and how this relates to diabetes control.
3. To determine the prevalence of excessive alcohol consumption and smoking among diabetic patients in Kenyatta National Hospital and its relationship to diabetes control.
4. To assess the relationship between selected socio-demographic characteristics and adherence to recommended lifestyle practices.
5. To make policy and management recommendations on lifestyle risk factors among diabetic patients in Kenyatta National Hospital.

CHAPTER 4 METHODOLOGY

4.1 Study Area

This study was carried out at the Kenyatta National Hospital (KNH) diabetic clinic in Kenya. KNH is the largest and National referral hospital in Kenya. According to the hospital's 2005-2010 strategic plan, it is the second largest hospital in Africa with a bed capacity of 1,800 and a staff establishment of 6,213. Currently the hospital has 50 wards, 20 outpatient clinics, 24 theatres and an accident and emergency department. It caters for 80,000 inpatients and more than 500,000 outpatients annually. It's also a teaching and research centre. Since 1967 it has continued to be the main institution for training medical doctors and other health professionals at diploma, undergraduate and post-graduate levels in collaboration with the University of Nairobi, Kenya Medical Training College and other institutions in Kenya. The city of Nairobi where KNH is located has a population of three million people. However, Nairobi does not have a provincial hospital and has only one district hospital with several city council clinics. As a result much of the health needs of the city are shouldered by KNH (92). The clientele of Kenyatta National Hospital is national in out look with both rural and urban catchments. The diabetic clinic is conducted every weekday. The diabetes management team is composed of nurses, a nutritionist, a clinical officer diabetologist, registrars and consultants. The clinic serves on average 30-50 clients per day except Fridays when it serves between 80-120 patients.

4.2 Study Design

This was a hospital-based descriptive cross-sectional study to establish the prevalence of specific lifestyle practices that include diet, exercise, alcohol consumption and smoking among diabetic patients. The study was carried out over a period of six weeks in the months of June and July 2007.

A historical case-control study would have been cheaper to study the same variables but the hospital records are not satisfactory as to include quantitative details of the variables of interest. The study period (being for the purpose of a thesis for a Masters Programme) was not adequate for a prospective cohort study, which is more authoritative for making a

causal relationship inference. The study therefore cannot test a hypothesis and generalization is only limited to the diabetic population in Kenyatta National Hospital.

4.3 Study Population

The study population was diabetic patients attending the Kenyatta National Hospital diabetic clinic. The patients attend this clinic on regular appointments depending on their diabetes control. These are patients who have been referred to the clinic either from the hospital ward, the outpatient department or other peripheral health facilities all over the country.

4.4 Inclusion Criteria

All patients above 18 years of age diagnosed with diabetes mellitus and attending the diabetic clinic who gave consent to participate in the study.

4.5 Exclusion Criteria

1. Diabetic patients attending the clinic who were too sick to participate in the study i.e. any patient diagnosed to have a diabetic emergency on the day of attending the clinic.
2. Diabetes patients who were pregnant.

4.6 Sampling

Consecutive sampling was used to select the study sample. The sampling frame consisted of the patients who attended the diabetic clinic. Patient recruitment and data collection was done on a daily basis.

4.7 Sample Size Determination

According to World Health Organization, adherence to long-term therapies in the general population is around 50% for the developed countries and much lower in developing countries (4). For example, in Gambia and the Seychelles, only 27% and 26%, respectively, of patients with hypertension adhere to their anti-hypertensive medication regimen (3). Adherence to lifestyle modification was assumed to be lower than that of

prescribed medications. Adherence of 25% was assumed in this study and a sample size of 317 determined as follows.

Using Fisher's formula: -

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

Where,

n- sample size,

Z- normal deviate taken as 1.96 at confidence level of 95%.

p- estimated proportion of lifestyle adherence by diabetes patients .

q- estimated proportion of lifestyle non adherence among diabetes patients.

d- acceptable degree of accuracy required taken as 0.05.

The desired sample size was 288. Allowing 10% attrition the minimum sample size was chosen as 317 patients.

4.8 Study Variables

4.8.1 Dependent Variables

The dependent variable was diabetes control of the patients as indicated by random blood sugar, arterial blood pressure and body mass index.

4.8.2 Independent Variables

These included variables related to

a) Lifestyle factors such as: -

i. Moderate physical activity,
ii. Fruits and vegetable consumption,
iii. Alcohol intake and smoking

b) Socio-demographic characteristics such as: -

i. Age
ii. Gender
iii. Education level

iv. Monthly income
v. Marital status
vi. Residence
vii. Working status

4.9 Data Collection & Study Tools

The data was collected during the months of June and July 2007. The principle researcher assisted by two trained assistants carried out the data collection. One assistant was a registered clinical officer and the other one was a higher national diploma student in clinical psychology working in the diabetes clinic. A structured questionnaire was used to collect the quantitative data. The questionnaire was adopted (with permission) from the WHO STEPS surveillance manual for non-communicable disease surveillance modified for a clinic-based survey. The modification included three main areas. 1) The coding method in the manual is made to enable data analysis by Epi info software. This was changed to suit SPSS software. 2) The sampling procedure is designed for population-based survey. This was changed to suit clinic-based survey. 3) The content of the data collected excluded lipid profile and glycosylated haemoglobin for financial reasons. The manual provides guidelines for stepwise chronic disease risk factor surveillance. It includes four major behavioural risk factors i.e. tobacco use, harmful alcohol consumption, unhealthy diet (low fruit and vegetable consumption) and physical inactivity (lack of involvement in any activities that make one breath faster than normal and their heart beat faster than normal either in their daily work, in the house or for recreational purposes including sports) and four major biological risk factors i.e. overweight and obesity, raised blood pressure, raised blood glucose and abnormal lipid profile as identified by the World Health Report 2002. Measurement of these risk factors has been proven valid and WHO recommends it for surveillance of chronic diseases (93). The questionnaire was administered to the selected patients who gave consent for the survey. Data on the socio-economic/demographic characteristics of the patients and their adherence to the above-mentioned risk factors was collected using the questionnaire. Pre testing of the study tools was done at Kiambu District Hospital, which is about 20km

from Nairobi and serving a similarly urban, and peri urban population and adjustments done accordingly.

4.9.1 Anthropometric and vital signs Measurements

The systolic and diastolic blood pressures (in mmHg) of the participants were taken using a manual sphygmomanometer. Their body weight in (Kg) was taken using a portable weighing scale with only light clothing to exclude coverings such as sweaters, coats, and headscarves. Standing height in (cm) was taken using a mounted height measuring scale with patients advised to remove their shoes and any headgear. The body weight and height were used to calculate the body mass index (BMI) for every subject using the formula;

$$BMI = \frac{\text{Body Weight (Kg)}}{\text{Height } (M^2)}$$

4.9.2 Biochemical Measurements

A drop of blood was taken from the tip of the finger to assess the random blood sugar using a calibrated (Optium Xceed) glucometre.

4.10 Data Analysis

Data from the questionnaire was entered into the statistical package for social sciences (SPSS) data editor, cleaned and analyzed. Descriptive statistics, frequency distribution tables and graphs were used to present the data. The chi squared test of significance was used to test the significance of relationship between the dependent and independent variables. Bivariate correlation analysis was used to explain the relationship between random blood sugar and selected independent variables (BP, BMI, fruits and vegetable consumption and moderate physical activity). Multivariate analysis was used to determine the strength of relationship between the dependent variables and the selected independent variables. Partial correlation was carried out to determine the relationship of random blood sugar and moderate physical activity on one hand and daily fruits and vegetable consumption on the other while controlling for blood pressure and body mass index.

4.11 Minimization of Errors and Biases

The following were done to minimise bias and errors on the quality of the data collected:

- The research assistants were trained on the study objectives and the data collection methodology.
- A structured questionnaire written in English and Kiswahili was used. This was to ensure the questions are asked and understood uniformly.
- The questionnaire was pre-tested to identify errors in the data collection tool and corrections made before the actual data collection.
- Measurement equipments well maintained and user manual instructions for glucometer adhered to.
- Confidentiality of responses was emphasized to the respondents.
- All filled questionnaires were reviewed by the principal investigator daily to ensure completeness.

4.12 Ethical Considerations

1. The Kenyatta National Hospital Ethical and Research Committee approved the study.
2. Authority to conduct the study was also obtained from the director of KNH and the diabetes clinic managers.
3. Informed written consent was obtained from every participating patient.
4. Confidentiality of the patients' responses was emphasized and ensured.

4. 13 Study Limitations

1. Being clinic based the study's respondents were self selected and cannot be representative of the general population.
2. Much of the data was gathered through self-reporting and therefore likelihood of recall bias.
3. Due to limited funds important diabetes management tests like HbA1c and lipid profiles were not done.

CHAPTER 5 RESULTS

5.1 Introduction

This chapter presents the study findings. The findings are presented in two main parts. Part one presents the descriptive results of the study population which includes; the socio-demographic characteristics of the respondents such as age, sex, marital status, education, occupation, income and residence, and the prevalence of the lifestyle factors namely; physical inactivity, fruits and vegetable consumption, alcohol intake and smoking as well as the biological risk factors including the random blood sugar, blood pressure and body mass index among the respondents. Part two of the chapter presents the analytical results showing the relationship between the various lifestyle risk factors and diabetes control as well as the relationship between the selected socio-demographic characteristics and lifestyle risk factors.

5. 2 Socio-demographic Characteristics of the Study Population

Sex Distribution

A total of 330 subjects participated in the study. These were 200 (60.6%) females and 130 (39.4%) males.

Age Distribution

The average age of the respondents was 53 (sd +/-13) years with a median of 54 years. The youngest participant was 18 years and the oldest one was 92 years. Majority of the participants 268 (83%) were over 40 years old and about a third 96 (30%) were over 60 years of age. Only 17% were 40 years and below. Figure 2 displays the age distribution of the respondents.

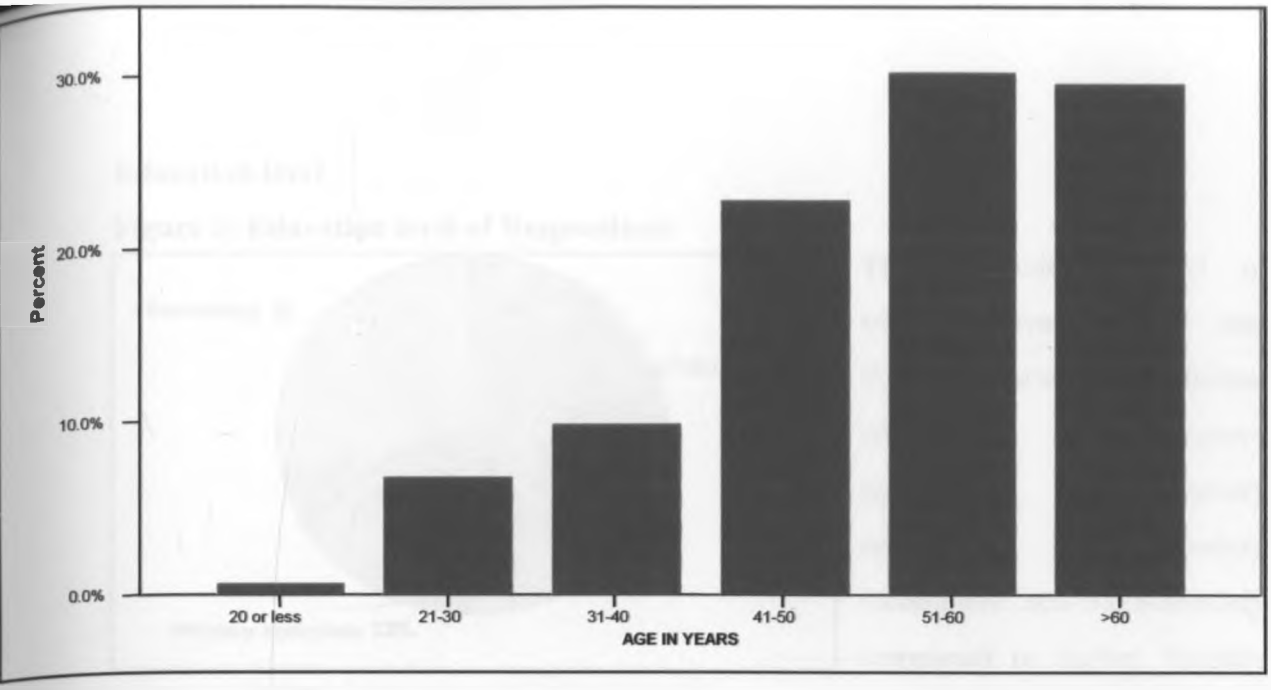


Figure 2: Age Distribution of the Respondents

Residence

The respondents were asked where they usually reside and the responses were recorded as district of residence for those from outside Nairobi and estate of residence for those from within Nairobi. Those who said they stay in Nairobi or the surrounding sub-urban settlements like Ngong, Rongai and Kikuyu were grouped under Nairobi. The results show that the participants were drawn from all the provinces in the country except Northeastern province. Table 1 displays the distribution of the study respondents by residence. Majority of them 240 (75.2%) were from Nairobi and its sub-urban environs with only a quarter 79 (24.8%) coming from upcountry.

Table 1: Respondents Residence

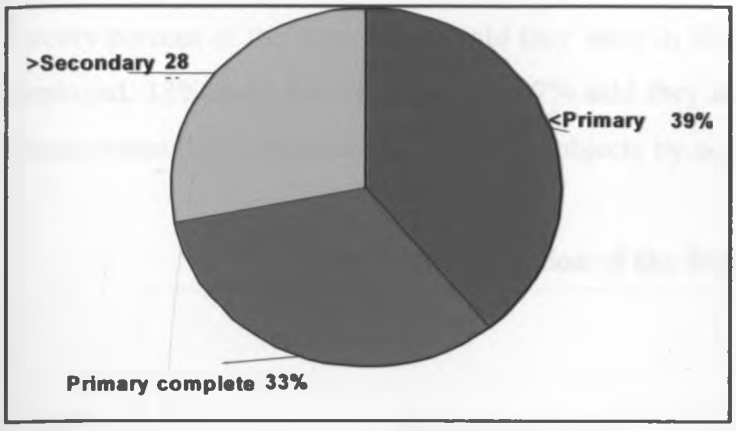
Residence	Number	Percentage
Nairobi	240	75.2
Up country	79	24.8
Total	319	100.0

Marital Status

About three-quarters 249 (76%) of the respondents were married, 41(12%) were single or separated and 39 (12%) were windowed. ef

Education level

Figure 3: Education level of Respondents



The respondents' level of education was divided into three categories 1) No formal education or primary incomplete, 2) Primary completed or secondary incomplete and 3) Secondary completed or higher. Slightly over one-third of the participants (39%) had either no formal education or had not completed primary school level, 33% had completed primary school but not finished secondary education while 28% had completed secondary school or higher level of education (Figure 3).

Income

The monthly income of the respondents was divided into three categories i.e. Ksh 0-7,000, Ksh 7,001-20,000 and above Ksh 20,000. Overall, 58% of the participants earned Ksh 0-7,000 per month, a fifth (20%) earned Ksh 7,001-20,000, while only 4% earned above Ksh 20,000 (figure 4).

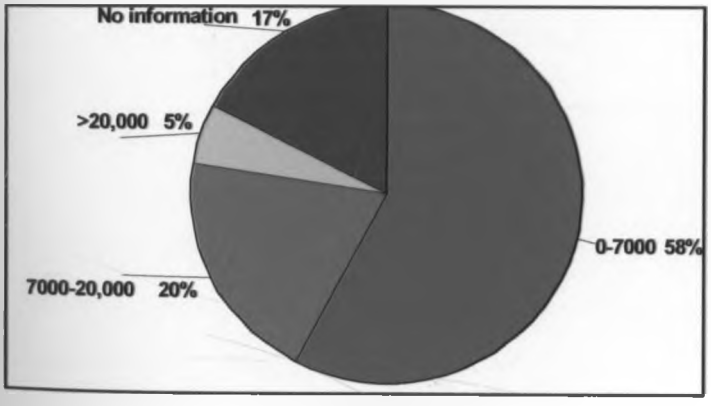


Figure 4: Income of the Respondents

Occupation

Twenty percent of the respondents said they were in formal employment, 29% were self-employed, 13% were homemakers and 37% said they were not working. Figure 5 below demonstrates the distribution of the study subjects by occupation.

Figure 5: Occupation of the Respondents

5.3 Respondents' Diabetes Control

5.3.1 High Blood Pressure

Systolic Blood Pressure

Slightly over half 173 (53%) of the respondents had a systolic blood pressure of 140mmhg or more while slightly more than a quarter 88 (27%) had a systolic blood pressure of 160mmgh or more. Figure 6 shows the systolic blood pressure distribution of the respondents.

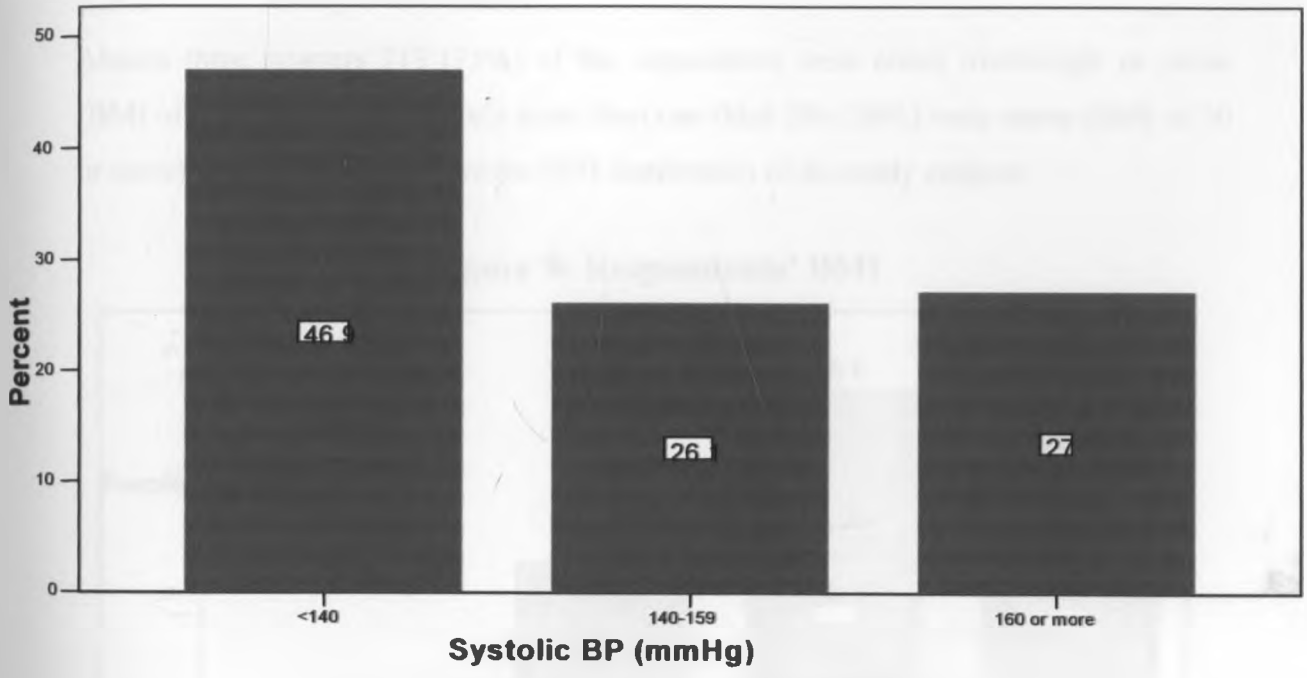


Figure 6: Respondents' Systolic Blood Pressure

Diastolic Blood Pressure

About two thirds 208 (63%) of the respondents had a diastolic blood pressure of 80 mmHg or more while approximately one in ten (12%) had a diastolic pressure of 100 mmHg or more. Figure 7 shows the diastolic blood pressure distribution of the study respondents.

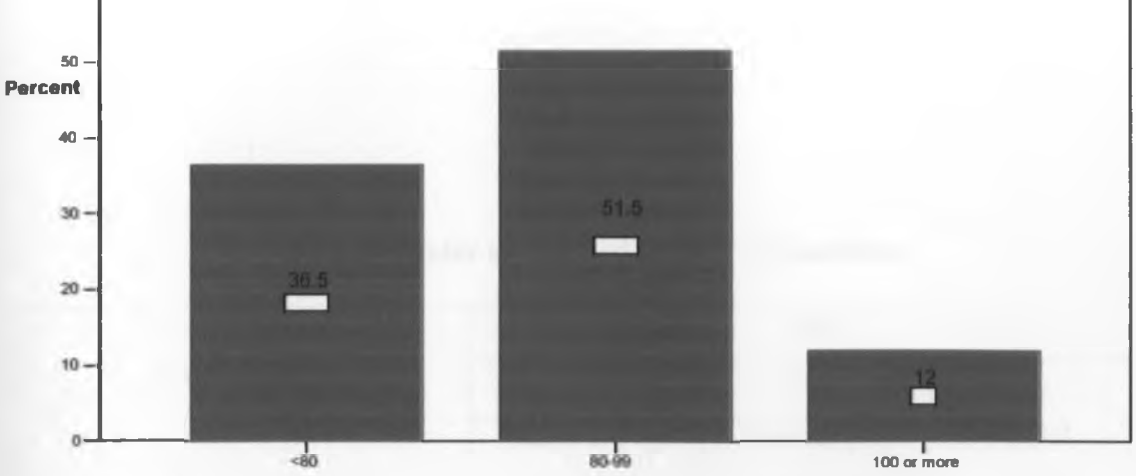
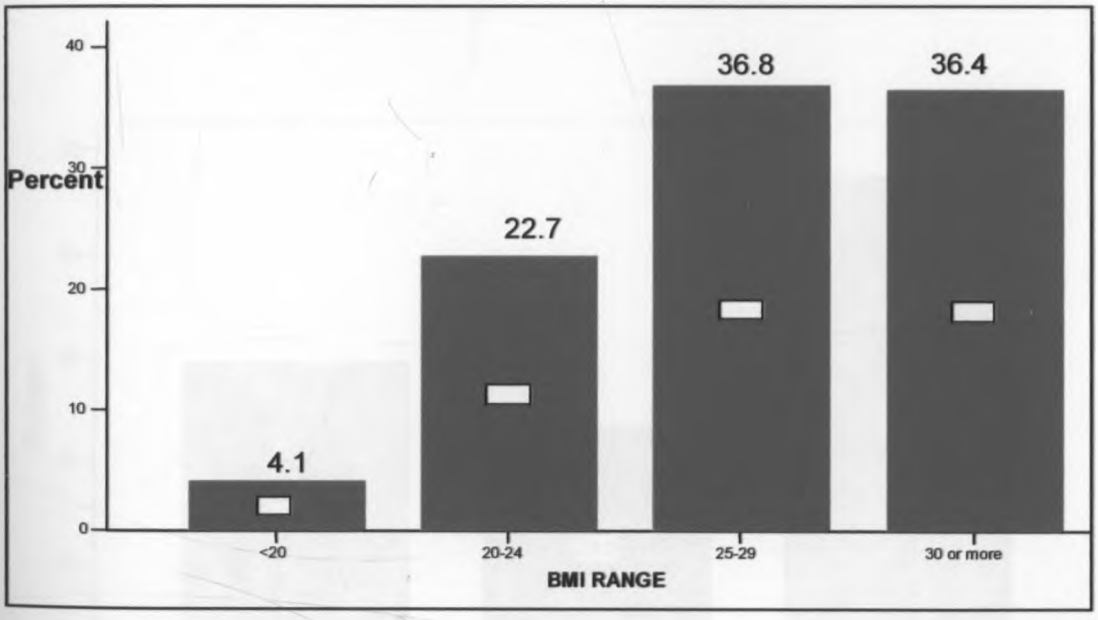


Figure 7: Respondents' Diastolic Blood Pressure

5.3.2 Body Mass Index

Almost three quarters 213 (73%) of the respondents were either overweight or obese (BMI of 25 or more) and slightly more than one third 106 (36%) were obese (BMI of 30 or more). Figure 8 above shows the BMI distribution of the study subjects.

Figure 8: Respondents' BMI



More women respondents than men were overweight and the difference was statistically significant (p=0.015) at 95% confidence level (χ^2=5.9). 65.5% of the overweight participants were women compared to 51.5% of those with normal BMI. Table 2 below shows the comparison of body mass index for males and females.

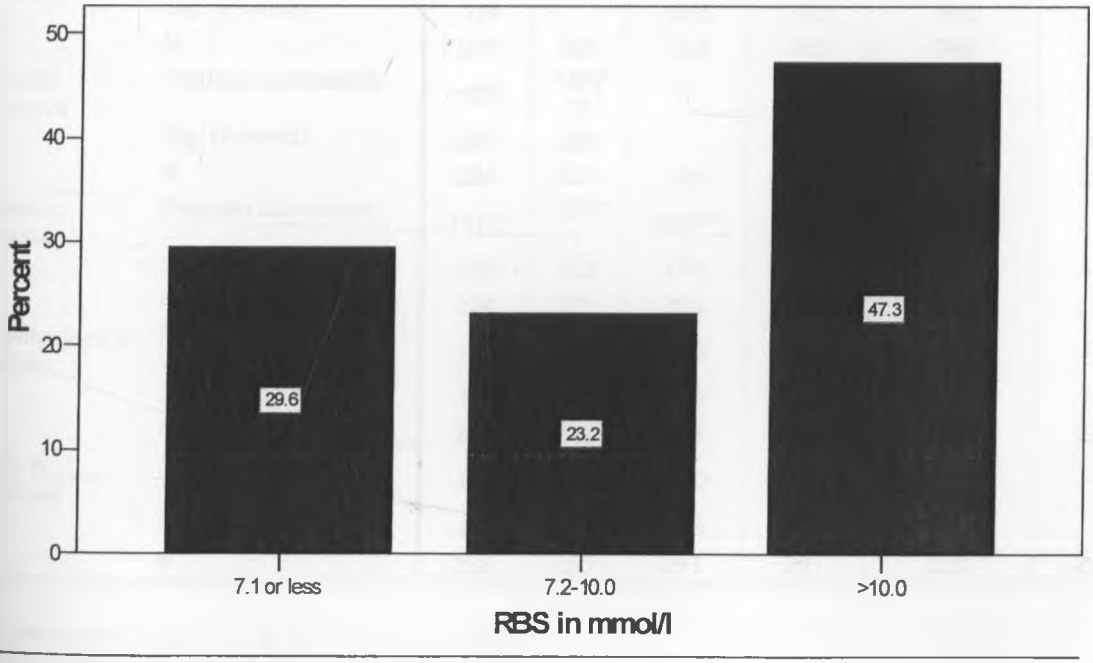
Table 2: Gender segregated BMI of Respondents

Variables		BMI		
		<25	25 +	
		Number (%)	Number (%)	Total
Gender	Male	51 (48.6)	77 (34.5)	128
	Female	54 (51.4)	146 (65.5)	200
	Total	105	223	328

P- value = 0.015

5.3.3 Random Blood Sugar

Forty seven percent (155), 23% (76) and 30% (97) of the respondents had a random blood sugar of > 10 mmol/l, 7.2-10.0 mmol/l and < 7.2 respectively. Figure 9 shows the



5.3.4 Bivariate Correlation Analysis of Random Blood Sugar

Bivariate correlation analysis was done to determine how blood pressure, body mass index, fruits and vegetable consumption and moderate physical activity related with random blood sugar. Among these factors, only diastolic blood pressure had a significant relationship with random blood sugar. Diastolic blood pressure correlated positively and significantly with random blood sugar (r=0.177, p=0.035) at 95% confidence level. It was therefore controlled for when determining the relationship between the lifestyle factors and random blood sugar. Table 3 below shows the results of Bivariate Analysis of random blood sugar.

Table 3: Bivariate Correlation Analysis of Random Blood Sugar

Variable	Correlation coefficient	Blood sugar	BMI	Systolic pressure	Diastolic pressure	Activity days in a week	Daily fv servings
Blood sugar	Pearson Correlation	1	-.083	.059	.117(*)	-.093	-.064
	Sig. (2-tailed)		.134	.292	.035	.145	.278
	N	328	324	324	324	248	292
BMI	Pearson Correlation	-.083	1	.148(**)	.125(*)	-.016	.062
	Sig. (2-tailed)	.134		.008	.025	.808	.294
	N	324	326	323	323	248	290
Systolic pressure	Pearson Correlation	.059	.148(**)	1	.606(**)	.023	-.002
	Sig. (2-tailed)	.292	.008		.000	.713	.968
	N	324	323	326	326	248	291
Diastolic pressure	Pearson Correlation	.117(*)	.125(*)	.606(**)	1	.035	-.057
	Sig. (2-tailed)	.035	.025	.000		.580	.331
	N	324	323	326	326	248	291
Activity days in a week	Pearson Correlation	-.093	-.016	.023	.035	1	.106
	Sig. (2-tailed)	.145	.808	.713	.580		.114
	N	248	248	248	248	250	225
Daily fv servings	Pearson Correlation	-.064	.062	-.002	-.057	.106	1
	Sig. (2-tailed)	.278	.294	.968	.331	.114	
	N	292	290	291	291	225	294

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
Fv- fruits and vegetable

5.4 Lifestyle Risk Factors

5.4.1 Prevalence of Fruits and Vegetable Consumption

The patients were asked how many days in a typical week they consume fruits and vegetables and on average how many servings they consume per day. For raw leafy vegetables like salad and spinach one cup was considered equivalent to one serving while for chopped or cooked ones, one half of a cup was considered to be equivalent to one serving. For fruits, one medium size piece (like apple or banana) was considered as one serving while for chopped, cooked or canned fruits one half of a cup was considered as equivalent to one serving. Eighty nine percent (89%) of the respondents said they consume fruits or vegetables every day. Twenty eight percent (28%), 57% and 15% of the respondents consume 0-2, 3-4 and 5 or more servings of fruits and vegetables per day respectively. The average servings per day were 3.5 (sd 1.3) with a median of 3. The maximum servings per day were 8 with a minimum of one serving per day. Only 15% of the participants consume the 5 or more servings per day recommended by WHO (50) meaning 85% of the study subjects consume less than the recommended level of fruits and vegetables per day. Table 4 shows the frequency distribution of daily fruits and vegetable servings among the respondents.

Table 4: Daily Servings of Fruits and Vegetables

No. Of daily servings	Frequency	Percentage (%)
0-2	92	28
3-4	189	57
5 or more	49	15
Total	330	100

5.4.2 Fruits and Vegetable Consumption and Diabetes Control

Fifty-one percent of the 56 participants who reported 2 or fewer servings per day of fruits and vegetables had a random blood sugar of more than 10 millimoles per liter. On the other hand, only 38% of the 49 respondents who reported consuming 5 or more servings of fruits and vegetables had a random blood sugar of more than 10 millimoles per liter.

The difference was statistically significant (p=0.029) at 95% confidence level (χ^2=10.8). Fruits and vegetable consumption did not however have a statistically significant relationship with the body mass index or blood pressure of the respondents. Table 5 displays the relationship of daily fruits and vegetable servings and selected diabetes control factors.

Table 5: Daily Fruits and Vegetable servings Vs BP, BMI & RBS

Variables		Daily servings n (%)			P value
		2 or less	3-4	> 4	
RBS (mmol/l)	7 or less	33 (36.7)	50 (26.5)	14 (29.2)	0.029
	7-10	11 (12.2)	49 (25.9)	16 (33.3)	
	>10	46 (51.1)	90 (47.6)	18 (37.5)	
BMI	<25	36 (39.6)	54 (28.7)	15 (31.3)	0.190
	25 or more	55 (60.4)	134 (71.3)	33 (68.8)	
Systolic BP (mmHg)	<140	46 (51.1)	89 (47.6)	18 (37.5)	0.305
	140 or more	44 (48.9)	98 (52.4)	30 (62.5)	
Diastolic BP (mmHg)	80 or less	40 (44.4)	58 (31.0)	21 (43.8)	0.115
	81-99	43 (47.8)	104 (55.6)	20 (41.7)	
	100 or more	7 (7.8)	25 (13.4)	7 (14.6)	

A partial correlation analysis of the relationship between number of fruits and vegetables servings per day and random blood sugar while controlling for diastolic blood pressure was carried out. Daily servings of fruits and vegetables had a negative relationship with random blood sugar. More daily servings were associated with lower random blood sugar levels. This relationship was however not statistically significant (r = -.053, p= 0.369) at 95% confidence level.

5.4.3 Fruits and Vegetables Consumption and Socio-economic and Demographic Characteristics

Chi squared test of significant relationship was done by cross tabulation of daily servings of fruits and vegetables and the various socio-demographic characteristics of the patients.

The results show that ninety one percent of those formally or self employed, compared to seventy nine percent of homemakers or unemployed (collapsed into not working group) consume less than five servings of fruits and vegetables per day. This was statistically significant (p=0.002) at 95% confidence level (χ^2= 9.7). None of the other socio-demographic factors had a significant relationship with fruits and vegetable consumption. Table 6 below illustrates the relationship of the selected socio-demographic factors and fruits and vegetable consumption.

Table 6: Fruits and Vegetable Consumption and patient Factors

Variables		Daily servings				P-value*
		<5		5 or more		
		Number	%	Number	%	
Age (yrs)	40 or less	49	87.5	7	12.5	0.592
	>40	227	84.7	41	15.3	
Sex	Male	112	86.2	18	13.8	0.680
	Female	169	84.5	31	15.5	
Education level	Primary or less	199	84	38	16	0.334
	>Primary	82	88.2	11	11.8	
Work status	Yes	148	91.4	14	8.6	0.002
	No	133	79.2	35	20.8	
Income (Ksh)	7,000 or less	155	83.8	30	16.2	0.580
	>7,000	117	86	19	14	
Marital status	Married	211	84.7	38	15.3	0.923
	Single/separated	35	85.4	6	14.6	
	Windowed	34	87.2	5	12.8	
Residence	Nairobi	204	85	36	15	0.580
	Outside Nairobi	67	84.8	12	15.2	

* P value at 95% confidence level

5.4.4 Multiple Regression Analysis of Fruits and Vegetable Consumption

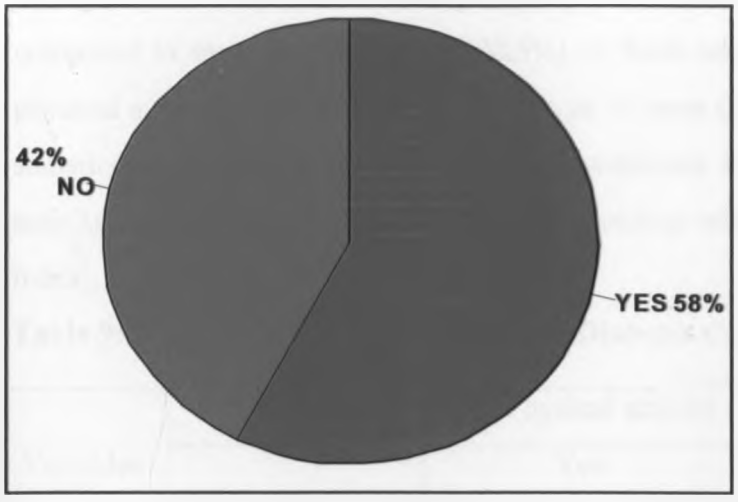
Multiple regression analysis was performed to further evaluate the relationship between fruit and vegetable consumption and the socio-demographic characteristics of the respondents. Again only working status had a significant relationship with fruits and vegetable consumption. Those working were associated with less daily servings of fruits and vegetables (Beta 0.157, p=0.014) at 95% confidence level. Table 7 below demonstrates the results of multiple regression fruits and vegetable consumption and different socio-economic and demographic characteristics of the study respondents.

Table 7: Multiple Regression of Fruits and Vegetable consumption and socio-economic and demographic factors

Variable	B	Beta	t	Confidence interval	P – value
Residence	0.116	0.042	0.673	-0.223 - 0.454	0.502
Age	0.319	0.098	1.581	-0.078 - 0.716	0.115
Education level	0.169	0.063	0.964	-0.176 - 0.513	0.336
Working status	-0.381	-0.157	-2.472	-0.684 - -0.078	0 .014
Income level	0.005	0.002	0.032	-0.307 - 0.318	0 .974
Gender	-0.201	-0.081	-1.220	-0.525 - 0.123	0 .223
Marital status	0.140	0.050	0.768	-0.219 - 0.498	0 .443

5.4.5 Prevalence of Physical Inactivity

Figure 10: Respondents Physical Activity Status



Forty two percent (42%) of the patients said they don't do any activity that makes them breath faster than normal or make their heart to beat faster than normal. Figure 10 shows the exercise status of the study respondents. Of those involved in exercise, 72% do not do it daily while only 53% do it for 5 or more days in a week. The average days of exercise were 4 (sd 2.8) (median 5). More than half of the patients (58%) are idle or seated for 8 or more hours per day and about a third (31%) are idle the whole day (12 hours). Table 8 below shows the frequency distribution of number of days in a week the respondents are involved in moderate level physical activity.

Table 8: Moderate Physical Activity Days per Week

Activity days/week	N	%
0-2	83	33
3-4	34	14
5+	133	53

5.4.6 Physical Activity and Diabetes Control

Table 9 demonstrates the relationships of moderate physical activity and the selected biological risk factors. Fifty nine percent (59%) of those involved in moderate activities compared to seventy one percent (70.5%) of those who were not involved in moderate physical activities had a random blood sugar of more than 8 mmol/l. This difference was statistically significant (p=0.03) at 95% confidence level (χ^2=4.7). Moderate physical activity had no statistically significant relationship with blood pressure and body mass index.

Table 9: Moderate Physical Activity and Diabetes Control

Variables		Physical activity				P - value
		Yes		No		
		Number	%	Number	%	
RBS (mmol/l)	8 or less	77	(41)	41	(29.5)	0.03
	>8	110	(59)	98	(70.5)	
BMI	<25	56	(29.8)	49	(35.5)	0.275
	25 or more	132	(70.2)	89	(64.5)	
SBP (mmHg)	135 or less	90	(48.1)	60	(43.8)	0.440
	>135	97	(51.9)	77	(56.2)	
DBP (mmHg)	80 or less	108	(57.8)	86	(62.8)	0.362
	>80	79	(42.2)	51	(37.2)	

A partial correlation analysis of the relationship between number of moderate physical activity days per week and random blood sugar while controlling for diastolic blood pressure was carried out (Pearson's correlation coefficient). The number of physical activity days per week had a negative but not statistically significant correlation with random blood sugar (r = -0.092, P= 0.150) at 95% confidence level. The respondents who exercised more days per week tended to have lower random blood sugar.

5.4.7 Physical Activity and selected Socio-demographic Factors

Table 10 demonstrates the relationship between the selected socio-demographic characteristics and moderate physical activity. Seventy six percent (76%) of the respondents who were either single or separated (compared to 55% of those married and 59% of the windowed) said they were involved in moderate physical activity. This difference was statistically significant (p=0.042) at 95% confidence level (χ^2=6.4). There was no statistically significant relationship between the other socio-economic and demographic characteristics and moderate physical activity.

Table 10: Physical Activity and Socio-economic & Demographic Factors

Variables		Physical activity				P value
		Yes		No		
		Number	%	Number	%	
Age (yrs)	40 or less	32	58.2	23	41.8	0.904
	>40	153	57.3	114	42.7	
Sex	Male	72	55.4	58	44.6	0.506
	Female	117	59.1	81	40.9	
Education	Primary or less	135	57.4	100	42.6	0.919
	>Primary	54	58.1	39	41.9	
Work status	Yes	97	60.6	63	39.4	0.283
	No	92	54.8	76	45.2	
Income	7,000 or less	111	60.3	73	39.7	0.168
	>7,000	71	52.6	64	47.4	
Marital status	Married	135	54.7	112	45.3	0.042
	Single/separated	31	75.6	10	24.4	
	Windowed	23	59	16	41	
Residence	Nairobi	140	58.8	98	41.2	0.281
	Outside Nairobi	41	51.9	38	48.1	

5.4.8 Multiple Regression Analysis of Moderate Physical Activity and Socio-economic and Demographic Factors

Multiple regression analysis was performed to further evaluate the relationship between moderate physical activity and socio-demographic characteristics of the study respondents. None of the selected socio-demographic factors had a significant relationship with moderate physical activity days per week. Table 11 below shows the results of multiple regressions of moderate physical activity and patients' socio-demographic characteristics.

Table 11: Multiple Regression of Physical activity and Socio-demographic Factors

Variable	B	Beta	t	Confidence interval	P – value
Residence	0.731	0.112	1.671	-0.131 - 1.593	0.096
Age	0.658	0.089	1.306	-0.335 - 1.650	0.193
Education level	0.345	0.057	0.799	-0.507 - 1.197	0.425
Working status	0.199	0.036	0.516	-0.562 - 0.960	0.607
Income level	0.167	0.029	0.413	-0.629 - 0.962	0.680
Gender	-0.478	-0.084	-1.176	-1.279 - 0.323	0.241
Marital status	-0.323	-0.051	-.719	-1.209 - 0.563	0.473

5.4.9 Smoking

Only 3% of the patients said they are current smokers. All the smokers were men. Significantly more than two thirds (67%) of the smokers do so daily and almost half (43%) of them smoke more than 10 sticks per day. The prevalence of smoking was too low for most statistical analysis procedures.

5.4.10 Alcohol consumption

Overall, 6.4% of the patients were currently taking alcohol (14% of the men and 1.5% of the women), (Table 12).

Table 12: Alcohol Consumption

Consume alcohol	Number	%
Yes	21	6.4
No	308	93.6
Total	329	100.0

Of those currently taking alcohol, 33.3% reported that they take five or more drinks (bottles) per day while 67% had ever taken five or more drinks in a day in the preceding 12 months. Eighty six percent of the current alcohol users were male and 14% female.

CHAPTER 6 DISCUSSION

6.1 The Study Population

The study involved diabetic patients attending Kenyatta National Hospital diabetic clinic. Three quarters of the patients were from Nairobi and its environs while a quarter were from up country. It thus means quite a significant number of patients travel a long distance for their diabetes care. This could also be a reflection of the National and referral status of Kenyatta National Hospital. There were more women than men in the study group. This may be a reflection of the epidemiology of diabetes as some studies have shown that the prevalence of diabetes is higher among women than men (94).

Majority of the patients (83%) were 40 years and above and a particularly important finding is that slightly over half (53%) of the patients were in the age group 40-60 years, the productive stage of their lives. This finding confirms WHO's concern that by 2030, while most people with diabetes in developed countries will be aged 65 years or more, in developing countries the majority will be in the 45-64 year age bracket and affected in their most productive years (4).

Majority of the participants (76%) were married which is an important social factor in the management of diabetes. A large body of research suggests that support from others can facilitate recovery from a physical illness and enhance the ability to cope with and adapt to the consequences of chronic illness (95). In one prospective study by Schwartz et al of type 2 diabetic adults; it was found that a decrease in social support predicted a worsening of blood glucose control over time (96). Further, a subset of social support studies has focused on the family as a major source of support, finding that stronger family support relates to such varied outcomes as better psychological adjustment (97) and enhanced compliance with medical regimens (98). Other studies of families of individuals with diabetes have confirmed the importance of family support. Studies of children and adolescents with type 1 diabetes (99), as well as studies of adults with type 2 diabetes (100), have found that better illness adaptation and treatment adherence relate to high family cohesion and low family conflict. Cross-sectional studies have shown a relationship between social support and glycemic control (101). Support from one's

spouse has been found to be the most important source of support during illness episodes (102), although disruptions in the marital relationship often occur when one partner has a chronic illness. Evidence cited in a recent review (103) of the diabetes literature argues for the importance of considering the family as the setting of disease management.

6.2 Control of Biological Risk Factors

Biological risk factors (high blood pressure, high random blood sugar and overweight) were quite prevalent among the respondents. The American diabetes association (ADA) sets a goal of keeping blood pressure for diabetes patients less than 130 mmHg (systolic) and less than 80 mmHg (diastolic) to prevent CVS complications (39) while WHO sets an optimal target of <135/85 mmHg (110). More than a half of patients had high blood pressure (53% systolic of 140 or more, 64% diastolic 80 or more). A normal body mass index (BMI) is considered to be between 18.5-24 while between 25-29 is overweight and 30 or more is obese. Over weight and obesity levels were too high (69% and 36% respectively). Lifestyle factors like exercise and diet have been shown to be important in weight and blood pressure control. The high prevalence of these biological risk factors (which can lead to diabetes complications) could be explained by the poor compliance to lifestyle changes. According to WHO a post-prandial blood sugar of more than 10 mmol/l indicates poor control (104). Almost a half (47%) of the patients in this study had a random blood sugar of more than 10 millimoles per liter.

6.3 Prevalence of Lifestyle Risk Factors

6.3.1 Fruits and Vegetables Consumption

Though majority of the participants (89%) said they eat fruits and vegetables daily, 85% did not take the WHO recommended five or more servings per day (50). This may be an indication of availability but lack of knowledge and/or practice. Previous studies on adherence to prescribed dietary recommendations have been inconsistent. In type 1 diabetes studies by Carvajal et al. (108) in Cuba, and Wing et al (109) in the United States, 70–75% of study participants reported not adhering to dietary recommendations, but in a study in Finland by Toljamo et al. (110) adherence to dietary recommendations was high, 70% of participants reported always or often having a regular main meal, while

only 8% reported always having irregular mealtimes. Obviously having a regular meal is quite different from having a particular number of servings of a given food component. In a study conducted in India on type 2 diabetes patients, dietary prescriptions were followed regularly by only 37% of patients (81), while in a similar study in the United States about a half (52%) followed a meal plan (82). Only 60% of individuals with diabetes in the National Health Interview Survey report that they "follow a diabetic diet" (111). A study that analyzed data from 1,480 adults older than 17 years with a self-reported diagnosis of type 2 diabetes in the Third National Health and Nutrition Examination Survey (NHANES III), 62% of respondents ate fewer than five servings of fruits and vegetables per day (112).

In this study, daily consumption of fruits and vegetable had significant relationship with the level of random blood sugar. More daily servings were associated with lower levels of random blood sugar ($p=0.029$). However this relationship lost its significance after bivariate correlation analysis ($r=0.053$, $p=0.369$). Other studies have shown that high consumption of fruits and vegetables is associated with better glycemic control. For example, diabetes prevalence has been noted to be relatively low among individuals following plant based and vegetarian diets, and clinical trials using such diets have shown improvements in glycemic control and cardiovascular health (113). In a 12-week pilot trial of a low-fat vegetarian diet in individuals with type 2 diabetes, conducted without increased exercise, fasting serum glucose concentration dropped by 28% compared with 12% in the control group following a diet based on American Diabetes Association (ADA) guidelines ($P = 0.05$) (114). In another study, individuals with type 2 diabetes ($n = 99$) were randomly assigned to a low-fat vegetarian diet or a diet following the American Diabetes Association (ADA) guidelines. Participants were evaluated at baseline and at 22 weeks. 43% of the vegetarian group and 26% of the ADA group participants reduced diabetes medications. Including all participants, HbA1c decreased 0.96 percentage points in the vegetarian group and 0.56 points in the ADA group ($P =0.089$). Excluding those who changed medications, A1C fell 1.23 points in the vegetarian group compared with 0.38 points in the ADA group ($P = 0.01$). After adjustment for baseline factors, urinary albumin reductions were greater in the vegetarian group (15.9 mg/24h) than in the ADA group (10.9 mg/24 h) ($P = 0.013$). Both a low-fat

vegetarian diet and a diet based on ADA guidelines improved glycemic and lipid control in type 2 diabetic patients. These improvements were greater with a low-fat vegetarian diet (115). The loss of significance in the association of fruits and vegetable consumption and random blood sugar in multiple regression could be could be because RBS has been shown to be a poor monitoring tool of glycemic control in comparison HbA1c.

This study found that gender and working status had a significant influence on the consumption of fruits and vegetables. Men consumed less fruits and vegetables than women ($p=0.007$) while the employed or self-employed consumed less fruits and vegetable servings ($p=0.025$). It would appear that those working might feel that they don't have enough time for a good meal and opt for a quick fix solution. Since this study also found that men were more likely to be working than women then this may be the basis of their less consumption of fruits and vegetables. These findings show the importance of promoting a healthy eating culture among diabetic patients and may be even the general population.

6.3.2 Physical Inactivity

The FAO/WHO joint expert committee recommends accumulation of moderate activity for 30 minutes on most or preferably all days of the week as an effective CVD prevention measure (34). Almost one half (42%) of the patients said they are not involved in any physical activity. Further, of those who said they exercise, only 28% do it daily and only 53% exercise five or more days per week. 58% of the patients are idle or seated for 8 or more hours per day. A study conducted in Finland on Type 1 diabetes patients indicated that two-thirds of study participants took regular daily exercise (35%) or almost daily exercise (30%), while 10% took no exercise at all (110). Conversely in a study in Canada of a sample of patients with type 2 diabetes randomly selected from provincial health records, few respondents participated in informal (37%) or organized (7.7%) physical activity programmes (85). Another survey in the United States found that only 26% of respondents followed a physical activity plan (86). A study looking at diet and exercise practices from a nationally representative sample of U.S. adults with type 2 diabetes analyzed data from 1,480 adults older than 17 years with a self-reported diagnosis of

Type 2 diabetes in the Third National Health and Nutrition Examination Survey (NHANES III) found that, 31% reported no regular physical activity and another 38% reported less than recommended levels of physical activity (112).

In this study, physical exercise was significantly associated with lower random blood sugar (p=0.03) but this significance was lost after bivariate correlation analysis. Other studies have demonstrated the importance of physical exercise in glycemic control. A meta-analysis of 14 controlled trials (11 randomized) revealed that exercise interventions resulted in a small but clinically and statistically significant reduction in glycosylated hemoglobin (0.66%) compared with no exercise intervention (116). This study found that marital status had a significant association with exercise. Those married were less likely to be involved in physical exercise than the single and separated (p=0.042) though this relationship lost its significance after multiple regression. A study by Glasgow et al found that men in a sample of patients with Type 1 diabetes were more physically active than the women, though they also consumed more calories, ate more inappropriate foods and had lower levels of adherence as assessed using a composite measure of diet (28).

6.3.3 Alcohol Consumption

Only 6.4% of the participants were current consumers of alcohol. However a significant number of those who consume alcohol (33%) consume 5 or more bottles per day and 67% had ever taken five or more bottles per day in the last one year. This would be significant since binge drinking has a negative impact on diabetes management. The Kenyan beer brands range in alcohol content from 4.2% - 6.5%. Taking the small bottle of tusker 330mls (with the lowest alcohol content of 4.2%), one bottle translates to about 14 grammes and 5 bottles would be equivalent to 70g. The U.S. Department of Health and Human Services considers chronic excessive intake of alcohol to be 30-60 g/day and recommends not more than two drinks/day for men and not more than one drink per day for women (63,64). The prevalence of alcohol consumption in this study was considered to be too low for a statistical analysis.

6.3.4 Cigarette Smoking

The prevalence of smoking among the participants was 3%. Though this is low for most statistical analyses, it is important to note that majority of those who smoke (67%) do so daily and almost a half (43%) smoke 10 sticks or more per day. All the current smokers were men and higher education was associated with higher likelihood of smoking (p=0.03). This could be because of the exposure to cigarette advertisements in the course of attaining ones education. One population based cross-sectional study of type 1 diabetes patients in Wisconsin found that 15.3% of them were current smokers (117). Another study that examined the association of smoking and self-reported diabetes mellitus involving 3006 persons who were 18 years or older with diabetes and 52,750 without diabetes, found that twenty-six percent (SE: 1.8) of the diabetic population were current smokers, 25.9% (SE 1.4) were former smokers, and 48.1% (SE: 2) had never smoked and these percentages were similar to the non smoking population (118). This study was done during a period when several municipalities in Kenya including the Nairobi city council were in a roll banning smoking in public places. It's however hard to know whether this might have affected the results.

CHAPTER 7 CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The objective of this study was to determine the prevalence of lifestyle risk factors, their relationship with diabetes control and also how various socio economic and demographic characteristics of the patients affect their adherence to recommended lifestyle practices. Despite the limitations of the study, it presents useful information to bring to the fore the importance of emphasizing lifestyle practices in the control of diabetes as well as other non-communicable diseases.

1) The study found out that the prevalence of lifestyle risk factors especially lack of exercise and low consumption of fruits and vegetables is extremely high. More than eight in 10 of the participants consume less than the WHO recommended 5 or more servings of fruits and vegetables per day while 42% do not engage in any physical activity. Of those involved in physical activity 47% do it for less than 5 days in a week. This could be one of the underlying reasons for high prevalence of the biological risk factors.
2) A significant number of patients (25%) travel from up country to Nairobi for their diabetes care. Since distance to a care center is known to affect quality of care this needs to be addressed.
3) Majority of the diabetes patients are young (40-60 years), the age that they are supposed to be economically productive.
4) The prevalence of biological risk factors i.e. hypertension, obesity and high levels of blood sugar is high among patients attending KNH diabetes clinic.
5) Though the prevalence of alcohol consumption and cigarette smoking is not very high among the patients, one would be worried about the population that practices this and how they do it. A significant number (43%) smoke 10 or more sticks per day. At the same time, 33% of those who consume alcohol use 5 or more bottles per day while 67% had ever taken 5 or more bottles per day in the last 12 months.
6) Males, those employed and those with higher education exhibited increased lifestyle risks in respect to diabetes management.

7. 2 Recommendations

1. The ministry of health (Department of Non-communicable Diseases Control) needs to facilitate the development of national guidelines on diabetes management clearly outlining the role of lifestyles management. There should also be clearly set targets for diabetes control markers to be fully discussed by the health care provider and individualized for each patient.
2. Special attention needs to be paid to the at risk diabetic sub populations like smokers and those who consume alcohol. Diabetes caregivers need to take detailed social history of the patients and help those who smoke and take alcohol to overcome these behaviours in a non-judgmental attitude. It's important that they also collaborate with relevant rehabilitation centers for maximum benefit.
3. The Ministry of Health (Division of health promotion and communication) in collaboration with stakeholders like the Diabetes Association of Kenya need to promote healthy lifestyles among diabetic patients and the general population.
4. There is need for a Nationally representative survey to assess the prevalence of these non-communicable diseases lifestyle risk factors in the general population with a view of instituting preventive measures. This can be included in the National Demographic and Health Survey (KDHS) or the National Population and Housing Census.
5. Experience in the western countries has shown that work place policies are effective in changing peoples' lifestyle. For example encouraging people to use the stairs instead of the elevator.

Areas of Further Research

From the results of this study it is evident that more data is needed to guide policy development in the area of diabetes management. The following areas are therefore recommended for further research.

1. Quality of diabetes care in Kenya.
2. A Knowledge, Attitude and Practices (KAP) study of diabetes disease.

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APPENDICES

Appendix 1: Consent Explanation Form

Dear Participant,

I DR STEPHEN NGUI MUTWIWA a student in the MPH Programme in the University of Nairobi am carrying out a survey on the lifestyles of diabetic patients. The successful completion of this survey will enable me to acquire my master's degree.

Diabetes as a disease affects many people all over the world. Most of the times it's a lifelong disease and patients have to learn how to take care of themselves to avoid complications associated with the disease. Some of the things require that patients change their way of life in terms of diet, exercise, alcohol consumption and tobacco smoking. Others include faithfully taking drugs as advised by the doctor and always talking to your doctor before taking other none prescribed medications.

It is however known that some of these requirements may not be easy to achieve for various reasons. Doctors would really want to understand any difficulties you face as a person living with diabetes in your family, work and in the community. This way doctors can understand your situation and find the best ways to help you. One of the ways of doing this is by talking to the people with the disease like you and analyzing their responses.

Today doctors will be talking to you about your disease and your experiences with it as part of a study on the lifestyles of diabetic patients. You have been selected to be part of this study and this is why we would like to talk to you. This survey is being conducted by doctors from the university of Nairobi and will be carried out by professional interviewers. It will help one of the doctors in his masters' Programme. It will also help healthcare workers better understand people with diabetes like you and therefore manage the disease in a better way.

During this interview you will be asked questions about your personal and family life. Some questions will touch on issues of the foods you eat, exercise and drug ingestion. Your weight, height and blood pressure will also be measured. A qualified medical staff will collect a blood sample from you to enable us check the level of your blood sugar. This will just be a drop from a prick on your finger. You will experience very slight pain. The doctors doing the research will pay for your blood test and will also offer advice to you according to your results. The results of this study will be communicated to you in the follow up clinics.

The information you provide is totally confidential and will not be disclosed to anyone. It will only be used for research purposes. Your name, address, and other personal information will be removed from the instrument, and only a code will be used to connect

your name and your answers without identifying you. The survey team may contact you again only if it is necessary to complete the information on the survey.

Your participation is voluntary and you can withdraw from the survey anytime after having agreed to participate. If you have any questions about this survey you may ask me or contact the university of Nairobi or Dr Stephen Mutw'iwa on 0722499543.

Consent form

I ..... hereby provide informed consent to take part in this study of diabetics' lifestyles. I have understood the nature of the study and its purpose. The risks and benefits of participating in this study have fully been explained to me.

Name of participant: ----------Sign: ----------

Interviewer/investigator: ---------- Sign: ----------

Date .....

RUHUSA YA KUHUSIKA

Kwa Mhusuka,

Mimi Dakitari STEPHEN NGUI MUTWIWA, mwanafunzi wa shaada ya pili katika afya ya uma kutoka chuo kikuu cha Nairobi ninafanya utafiti kuhusu maisha ya wagonjwa wa sukari. Utafiti huu utanisaidia katika kupata shaada yangu.

Ugonjwa wa sukari unahadhiri watu wengi ndunia kote. Mara nyingi huu huwa ni ungojwa wa maisha na inabidi mhadhiriwa aelewe jinsi ya kujitunza ili hasipate mahadhara kutokana na ungonjwa wa sukari. Wakati Mwingi inabidi mgojwa abadili maisha yake kama vile kwa chakula, mazoezi na madawa anayokunywa. Mara nyingi kubadili maisha kunakua na ugumu kulingana na ali yako ya maisha. Madaktari hutaka kuelewa na vikwazo tufauti ambazo wangojwa ukubana nazo katika harakati za kuishi na ugojwa wa sukari kupitia kuongea na wangojwa wenyewe na kutafiti majibu yao. Kwa njia hio madaktari wanaewaelewa wagojwa wao saidi.

Leo madaktari kutoka chuo kikuu cha Nairobi wanataka kuongea nawe kuhusu ungonjwa wako wa sukari na mambo unayo kabiliana nayo katika hali ya kujitunza na huu ugojwa. Huu ni utafiti ambao unafanywa na madakitari kutoka chuo cha Nairobi na utasaidia mmoja wao kupata shaada yake ya pili katika chuo hicho kikuu. Pia utasaidia madaktari wanaotibu kuwaelewa wagonjwa wa sukari saidi na hivyo wagonjwa wenyewe kusaidika.

Umechaguliwa kuwa mmoja wa wahusika katika huu utafiti wa kimasomo na ndio sababu tungetaka kukuliza maswala fulani. Watakao kuuliza maswali wamepewa mafunzo yapasayo. Utaulizwa maswali kuusu maisha yako binafsi na pia jamii yako. Utapimwa uzito na urefu wako na pia presha ya ndamu yako. Dakitari atakutoa ndamu kidogo kama tone moja tu kwa kidole kupima vile sukari yako unaendelea. Manufaa kwako ni kwamba madakitari watakulipia kile kipimo cha sukari na pia watakutibu na kukushauri kulingana na matokeo ya vipimo vyote. Baadaye utanufaika na utafiti huu kwani utaimarisha umaarufu wa madaktari wanaokutunza. Walakini utasikia uchugu kidogo sana wakati wakutoa ilo tone la ndamu.

Majibu utakayotoa hapa yatawekwa kisiri na hayatatabulishwa kwa yeyote ila tu kutumika kwa utafiti huu. Jina, simu na anwani zako zitatolewa kwa hayo majibu na badala yake nambari fulani kutumika kukuwakilisha. Madakitari watawasiliana nawe tena tu kama itabidi kufanya hivyo.

Kuhusika katika maswali haya ni kwa hihari yako mwenyewe na unakubaliwa kukataa wakati wowote. Kama una swali lolote kuhusu huu utafiti unaweza kuniuliza au kuwasiliana na chuo kikuu cha Nairobi ama kumpigia simu DR STEPHEN NGUI nambari ya simu 0722499543.

Fomu Ya Ruhusa Kuhusika

Unaweza kuhusika katika maswali haya kwa kutia sahihi yako hapa.
Mimi ..... nakubali kuhusika katika utafiti huu wa maisha ya wangojwa wa sukari. Nimeelezwa hali na lengo la utafiti huu na adhara yake.

Jina ---------- sahihi ----------

Shahidi ---------- sahihi ----------

Appendix 2: Consent Form

I ..... hereby provide informed consent to take part in this study of diabetics' lifestyles. I have understood the nature of the study and its purpose. The risks and benefits of participating in this study have fully been explained to me.

Name of participant: ----------Sign: ----------

Interviewer/investigator: ---------- Sign: ----------

Date .....

Unaweza kuhusika katika maswali haya kwa kutia sahihi yako hapa.
Mimi ..... nakubali kuhusika katika utafiti huu wa maisha ya wangojwa wa sukari. Nimeelezwa hali na lengo la utafiti huu na adhara yake.

Jina ---------- sahihi ----------

Shahidi ---------- sahihi ----------

Appendix 3: Study Questionnaire

Name of interviewer _____ Date _____

Participant ID ⌊_⌋⌊_⌋⌊_⌋⌊_⌋ DEMOGRAPHIC INFORMATION

NO.	QUESTION	RESPONSE	
1.	Names (majina)		
2.	Marital status	Married Single/separated Windowed	1 2 3
3.	Residence- District or estate (Makao)		
4.	Blood pressure -three readings (Presha ya ndamu-pima mara tatu)	Systolic Diastolic	
5.	Height (urefu)	In centimeters	
6.	Weight (usito) (If too large for scale 666.6)	In Kilograms	
7.	Random blood sugar (sukari)	In mmol/l	
8.	Sex (record as observed Male/Female)	Male Female	1 2
9.	How old are you? (umri wako ni miaka ngapi?)	Years (miaka)	⌊_⌋⌊_⌋
10.	What is the highest level of education you have completed? (Ulisoma mpaka kiwango gani?)	Nil to uncompleted primary Primary completed or secondary uncompleted (nilimaliza shule ya msingi tu) Secondary completed or above (nilimaliza sekondari ama zaidi)	1 2 3
11.	Which of the following best describes your main work status over the last 12 months? (Ni gani kati ya hizi inaelaza hali yako ya kikazi kwa hii miezi 12 imepita?)	-Employed (kuajiriwa) -Self employed (kujiajiri) -Home maker (mama wa nyumbani) -Not working (bila kazi) -Student (mwanafunzi)	1 2 3 4 5

12.	What is your estimated monthly income considering all wage earners in your house? (Kama hujui kiasi unaweza kukisia au kukadiria mapato ya kipesa katika nyumba yako yote kwa kila mwezi nikikusomea baadhi ya mapato?)	0 - 7,000 7,000 – 20,000 20,000 – 100,000 >100,000 Refused (amekataa)	1 2 3 4 8

13.	Smoking History (Historia Ya Uvutaji) Do you currently smoke any tobacco products, such as cigarettes or cigars? (kwa sasa unavuta sigara ya haina yoyote?)	Yes (Ndio) 1 No (La) 2 (Go to Q 16)
14.	If Yes, Do you currently smoke tobacco products daily? (ikiwa ni ndio, unavuta bidhaa za tumbaku kila siku?)	Yes (Ndio) 1 No (La) 2 go to Q 16
15.	On average, how many pieces do you smoke each day? (kwa wastan unavuta sigara gapi kwa kila siku?) Don't remember (sikumbuki) 777	No.----------
16.	Alcohol consumption (Unywaji Wa Pombe) Have you consumed alcohol (such as beer, wine, spirits, or traditional brew) within the past 12 months? (umetumia kinywaji cha kulevya kama pombe, divai, pombe kali au ya kienyeji kwa mda wa miezi kumi na miwili iliyopita?)	Yes (Ndio) 1 No (La) 2 If No, go to 22
17.	When you drink alcohol, on average how many drinks do you have during one day? (unapokunywa pombe, kwa kawaida unakunywa vinywaji ngapi kwa siku moja?)	Number (namba) ⌊_⌋⌊_⌋ Don't know (sijui) 777
18.	Have you consumed alcohol (such as beer, wine, spirits or traditional brew within the past 30 days? (Umetumia kileo au pombe aina yoyote kwa siku hizi 30 zimepita?)	Yes (Ndio) 1 No (La) 2
19.	In the past 12 months, what was the largest number of drinks you had on a single occasion, counting all types Of standard drinks together? (katika hii miezi 12 imepita, ni kiwango gani cha juu saidi cha hesabu ya vinywaj uliwaikunya wakati mmoja?)	Largest number ⌊_⌋⌊_⌋ (kiwango cha juu saidi) For women go to Q 21
20.	For men only (wanaume pekee): In the past 12 months, have you had 5 or more drinks on a single day? (kwa miezi 12 iliyopita umekunywa vinywaji vitano au zaidi kwa siku moja?)	Yes 1 No 2
21.	For women only (wanawake pekee): In the past 12 months, have you had 4 or more drinks on a single day? (kwa miezi 12 iliyopita umekunywa vinywaji vinne au zaidi kwa siku moja?)	Yes 1 No 2

22.	In a typical week, on how many days do you eat fruit? (Unakula matunda siku ngapi kawaida kwa wiki?) (USE SHOWCARD)	Number of days ⌊_⌊ If Zero days, go to Q24 Don't Know 77
23.	How many servings of fruit do you eat on one of those days? (Zile siku ambazo unakula matunda, unakula kiasi gani kwa siku?)(USE SHOWCARD)	Number of servings ⌊_⌊ Don't Know (sijui) 77
24.	In a typical week, on how many days do you eat vegetables? (Unakula mboga siku ngapi kawaida kwa wiki?)(USE SHOWCARD)	Number of days ⌊_⌊ If Zero days, go to Q26 Don't Know (sijui) 77
25.	How many servings of vegetables do you eat on one of those days? (Zile siku ambazo unakula mboga, unakula kiasi gani kwa siku?) (USE SHOWCARD)	Number of servings ⌊_⌊ Don't Know (sijui) 77
26.	Does your daily work, leisure or sports involve activities that make you breath faster or your heart to beat faster?	Yes (Ndio) 1 No (La) 2 If No, go to Q30
27.	How many days in a week are you involved in such activities that make you breath faster? (Kwa wiki ya kawida, ni siku ngapi unazofanya kazi iyo yakufanya moyo kwenda kasi sana kama kazi yako ya kawaida?)	Number of days ⌊_⌊
28.	On such days, how much time do you spend doing such activities? (Hio kazi ya kufanya moyo kwenda kwa kasi sana huwa waifanya kwa mda gani kwa siku moja kazini?)	Hours: ⌊_⌊ : minutes ⌊_⌊
29.	How much time do you usually spend sitting or reclining on a typical day? (ni mda kiasi gani unaotumia ukiketi ama kupumzi kwa siku halisia?)	Hours: ⌊_⌊ : minutes ⌊_⌊