CONTRIBUTORS OF NON-ADHERENCE TO TYPE II DIABETES TREATMENT AMONG PATIENTS AT THOGOTO HOSPITAL IN KIAMBU COUNTY, KENYA

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DECLARATION

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

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DEDICATION

This thesis is dedicated to my daughters Ashley and Medza; you are the reason why I work hard in everything that I set out to do. I also dedicate it to my parents Mr. and Mrs. Ongugo, your encouragement and all the sacrifices you have made for me to be where I am today means a lot to me. Without your support I would not have accomplished all that I have done. Lastly, I dedicate this work to all persons living with Diabetes and their health and primary caregivers- may this work contribute to solutions on the challenging responsibility of ensuring optimal adherence to Diabetes treatment.

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ABBREVIATIONS AND ACRONYMS

CDs	- Communicable Diseases
DCCT	- Diabetes Control and Complications Trials
HBM	- Health Belief Model
HIV	- Human Immunodeficiency Virus
AIDS	- Acquired Immune Deficiency Syndrome
IDF	- International Diabetes Foundation
KHS	- Kenya Health Survey
LDCs	- Least Developed Countries
MOH	- Ministry of Health
NCDs	- Non- Communicable Diseases
SPSS	- Statistical Packages for Social Sciences
TB	- Tuberculosis
UKPDS	- United Kingdom Prospective Diabetes Study
WHO	- World Health Organization

DEFINITION OF TERMS

Attitude	- This is used in the study to indicate a patient's dispensation and feelings towards a disease.
Adherence	- In the study it is used to define the 'active', collaborative and voluntary commitment of the patient in a treatment regimen specified by the doctor to towards the patient's healing.
Health care facility	- This is used in the study to indicate hospitals and clinics an individual can get medical help and attention.
Health care provider	- In the study it is defined as an individual who provides treatment of diseases to the patients.
Non – adherence	- This is used in the study to mean that the patient is not following the treatment regimen which has been prescribed by the doctor or medical practitioner.
Occupation	- Is defined in the study as a regular activity performed for payment, which takes up one's time

Perception	**-** Can be defined as the feelings and dispensation an individual has on something or the surrounding environment.
Personal traits	**-** Is a quality or characteristic that distinguishes the character, action and attitude of a person.
Stigma	- Is the extreme objection to (or discontent with) an individual or group on socially characteristic grounds that are seen, and serve to distinguish them, from other members of a society

ABSTRACT

People are diagnosed as having diabetes when their blood glucose level is higher than normal. There are various treatment regimens for diabetes and these include the appropriate maintenance of diet, commitment to regular physical activity or exercise, regular monitoring of blood glucose, and taking of prescribed medications which the patient needs to adhere to. Treatment adherence complications however are rampant amongst people living with diabetes, consequently rendering the control of glucose difficult to achieve. This low level of adherence often leads to risks amongst the patients. These risks can be reduced by proper adherence. However, studies show that adherence to diabetes treatment is very low worldwide. This study sought to identify factors associated with non-adherence to diabetes treatment among patients with Type 2 diabetes. The study's primary objective was to investigate factors that contribute to non-adherence of treatment regimens for Type 2 diabetes patients. The specific objectives included to determine the status of the non-adherence to diabetes treatment among Kiambu County patients, to determine the socio-economic factors that contribute to non-adherence tendencies among the patients, to establish individual factors that promote non- adherence tendencies among diabetic individuals, and to suggest methods of improving adherence to diabetes treatment regimens among diabetes patients. This study was guided by the Andersen model of Healthcare utilization and the Health Belief Model (HBM). The study was conducted in Thogoto hospital, Kiambu County using the survey research design. Data was collected through questionnaires and key informant interviews with medical personnel at the hospital. Systematic random sampling was used to identify the study participants. Data from the questionnaires was analyzed using SPSS v.21. Chi square was used to assess whether there was a relationship between the dependent and the independent variables. In the study, factors associated with non-adherence were considered to be statistically significant at the level of $P \leq 0.05$. Quantitative data was presented using pie charts, graphs and frequency tables and qualitative data was presented in narrative form. The results indicated that a majority of the patients were on oral medication. Adherence among patients was fairly good with majority of the patients showing adherence to the treatment routine by following the recommended treatment regimens. The results further revealed that there were significant associations between variables like gender, income and increasing age to treatment adherence. The study recommendations were there is need to put in place strategies to aid patients understand their treatment regimen; the government should equip all hospitals at county level with staff for monitoring adherence and offering patient education. Where necessary, there should be mobile diabetic clinics to ensure that all patients can access treatment. There is need for greater sensitization on the seriousness of diabetes and the need to contain and control it in Kenya. Lastly, the government needs to invest in subsidized pharmaceuticals products to ease patient burden of the drugs prescribed by the doctors.

CHAPTER ONE: INTRODUCTION

1.1 Background Information

Diabetes is an infamous illness that attacks in cases where the patient registers higher glucose levels in the body than normal. It is not biased as it affects both the young and old and can only be diagnosed when its symptoms are visible. The reason behind this is its symptoms are hardly visible and most individuals do not check their bodies for glucose levels, which is a key method used to detect abnormalities on the individual's sugar levels. (Petryna, 2007).

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by persistent hyperglycemia (Goyal & Jialal, 2018). Diabetes mellitus (Type 1 and 2) is a significant and growing health problem worldwide (Rwegerera, 2014). Diabetes Mellitus, is an illness that occurs when there is an insulin deficiency in the body or when there is a lack of effectiveness of insulin action, or both in the body. This disease is long-term, and it distresses a major population of people from different social classes throughout the world (Association, 2014).

Diabetes mellitus contributes to approximately 3.4 million deaths in the world every year, and an increase in its prevalence by 2030 it is projected to be by two-thirds (Kumar, Bhowmik, Srivastava, Paswan, & Dutta, 2012). Besides, according to a report by Joseph and Golden from their works, the main cause of mortality among those patients suffering from diabetes mellitus is heart related (Joseph & Golden, 2014). Globally cardiovascular disease is recorded as a major cause of mortality among diabetes patients. Furthermore, (Santulli, 2013)

explains that there are about 50 % of people with diabetes who are developing crippling complications that are significantly increasing the financial load on a country's health care system. An upsurge in the prevalence of diabetes in more than 10 years poses a huge test to health care because it calls for quick response, which cannot be attained in most African developing economies.

Recently the International Diabetes Federation (IDF) estimated that 463 million people had diabetes in 2019. IDF projects that without urgent and sufficient actions, 578 million people will have diabetes in 2030 and the number will increase by 51% (700 million) in 2045 (Saeedi et al., 2019). According to World Health Organization reports, an estimated 1.6 million deaths were directly caused by diabetes in 2016 (WHO, 2020). In Kenya, non-communicable diseases (NCD's), of which diabetes is among the leading, are important sources of morbidity and mortality (El-busaidy et al., 2014). Current population based studies in both rural and urban Kenya have reported a diabetes prevalence of 3.5–5%, with higher proportions among those in the urban areas (Mohamed et al., 2018).

Type 2 diabetes – previously referred to as non-insulin dependent or maturity onset diabetes – this type results from failure of the pancreas to produce adequate insulin or failure of body cell to utilize insulin or both (Jialal,2020). It accounts for about 85–90% of all cases of diabetes. Type 2 diabetes can lead to complications in many parts of the body and can increase the overall risk of dying prematurely. Possible complications include heart attack, stroke, kidney failure, leg amputation, vision loss and nerve damage (WHO, 2016).

Type 2 diabetes requires long-term follow up, with uninterrupted access to medication and specialist care (Jones, 2013). Additionally, comprehensive care for a type 2 diabetes patient includes regular blood glucose monitoring, exercise, dietary modification, the use of anti-diabetic drugs, which are necessary for disease control and regular screening for damage to the eyes, kidneys and feet, to facilitate early treatment (Khalooei & Benrazavy, 2019)Maintaining good glycemic control measured by glycated hemoglobin (HbA1c) is believed to allow patients to maintain insulin production and reduce insulin resistance (Horii, Momo, Yasu, Kabeya, & Atsuda, 2019)The American Diabetes Association (ADA) recommends those diagnosed with type 2 diabetes receive diabetes self-management education and support, including training to improve diabetes knowledge and self-care behaviors as well as clinical care to support glycemic control (Williams, Walker, Smalls, Hill, & Egede, 2016)

At least 45% of patients with type 2 diabetes mellitus (T2DM) fail to achieve adequate glycemic control and one of the major contributing factors is poor treatment adherence (Polonsky & Henry, 2016)Achieving glycemic control and preventing early complications are the ultimate targets of diabetes management which depends on patient's adherence to regimens (Elsous, Radwan, Al-Sharif, & Abu Mustafa, 2017) Poor medication adherence makes achieving good glycemic control difficult, which is believed to affect the onset of diabetic microangiopathy (retinopathy, nephropathy, and neuropathy) and increase the risk of diabetic complications (Marín-Peñalver, Martín-Timón, Sevillano-Collantes, & del Cañizo-Gómez, 2016) Furthermore, non-adherence is

associated with higher rates of hospital admissions, suboptimal health outcomes, increased morbidity and mortality, and increased health care costs (Neiman et al., 2017)In Brazil, a study on treatment adherence and its associated factors in patients with type 2 diabetes noted that the presence of peripheral neuropathy was associated with worse physical activity adherence (Marinho et al., 2018)

African rural societies still register low incidence rate of diabetes: however, this is not true for particular high-risk populations. Nigeria for example has approximately 7 percent of its total populace as diabetic, according to Sobngwi, Maurvais et al. (2007). Some studies done by different researchers have linked the occurrences of non-adherence to different diabetes treatment aspects. One such study was done by Kolyango, Omino, et al., 2008 in their study that surveyed diabetes non-adherence tendencies to diabetes treatment among patients at Mulago Hospital in Uganda. Similar studies are yet to be conducted in Kenya.

Kenya as well as other Sub-Saharan Africa countries are struggling with an increased issue of long-term non-infectious diseases and infectious diseases. Preventive measures during the initial and subsidiary treatment levels of great significance to these countries. This is needed to prevent the high financial implications experienced in the secondary levels of diabetes care. These suitable levels of treatment are vital in the prevention of diabetes related problems, as well as in ensuring timely diagnosis, consequently costs arising from diabetes complications.

Both KHS (2007) and Jolize (2005) explain that diabetes incidences in Kenya have been reported to range somewhere between 6% and 10 %. This means that approximately 3.5 to 4 million Kenyans are ailing from the sickness (MOH, 2008). Noteworthy, the prevalence of Diabetes among adults and the youth is equal across both genders, and is fast increasing. Even more depressing is the fact that the general public is not well informed about the etiology and treatment of the disease. The term 'treatment adherence' or regimen adherence often signifies a patient's ability to come up with an idea and follow the same plan of attitudinal change that in the end will serve to enable him or her to boost their health as well as self-manage any disease by taking the necessary precautions and advice given by the doctors.

Adherence according to Delamater (2007) refers to the intended commitment and concerted participation of the patient in a common behavioral course to yield the intended healing outcome through following the treatment regimen recommended by the doctor. The implied factor within the conceptualization of treatment adherence is voluntarily undertaken by and mutually in the treatment plan, target setting, and application of the treatment regimen that is recommended. Patients normally adopt the treatment suggestions and further choose to either observe the internal procedures or ignore them.

Treatment adherence is a complex behavior influenced by factors along the continuum of care, relating to the patient, providers, and health systems (Neiman et al., 2017)Multiple factors have been associated with non-adherence

among patients with T2DM in Kenya. For example; Ngari et al in Meru noted that level of income, affordability of services, health insurance cover of the patients, and monthly cost of DM management significantly influenced non-adherence (Ngari, Mbisi, & Njogu, 2020). In Nairobi, dissatisfaction with family members support, challenge in drug access and dissatisfaction with attending clinicians were factors found associated with poor medication adherence (Waari, Mutai, & Gikunju, 2018). Similarly, Mwaloma's study noted that the majority of the patients with low adherence levels were not sufficiently equipped with knowledge with attending clinicians to comprehensively manage their disease (MWALOMA, 2016)

Treatment regimen adherence problems seem to be rampant amongst individuals with diabetes, making the control of glucose levels in the blood difficult to attain. For diabetic management objectives to be achieved, and especially by developing nations, every circumstance and factor that make the disease susceptible or heighten the patients' non-adherence tendency to recommended regimens ought to be an important concern to health caregivers.

According to WHO (2012), Kenya is greatly burdened by diseases which may influence the economy and alter its life expectancy rate to 55 years. The dominant issue usually comes from infectious illnesses like HIV/AIDS, Tuberculosis and Malaria which account for more than 62% of total deaths in the country. In spite of the successful management of communicable diseases, the county's health status has significantly deteriorated partly because of the increase in non-infectious illnesses that contribute to 28% of the total number

of deaths. In the year 2010; diabetes accounted for about 2% of the total deaths in the country. The World Health Organization (WHO) estimated the diabetes prevalence in Kenya at approximately 3.5%, with a probable increase in the prevalence to 5% by the year 2025 (WHO, 2011). An estimated two-thirds of the total diabetic cases may, however, be undiagnosed. According to Mohammed et.al, 2013 in the South Sudan medical journal, there is a necessity to evaluate the heightening problem of diabetes and develop a cost-friendly approach for the control and prevention of diabetes.

Kenya's current health landscape is challenged by the prevalence of non-communicable diseases, especially diabetes, consequently piling to the already standing challenges of infectious illnesses. Currently there is the issue of lack of funding to implement effective strategies for diabetes detection, prevention and management. The low awareness levels especially among the patients and their family members and the snowballing prevalence of risk factors associated with diabetes are the most significant barriers to the fight against diabetes, and this is evident from the increasing numbers of patients that present themselves with diabetic related complications all over Kenya (MOH, 2010).

Kenya has the opportunity and the ability of mitigating the overall burden of diabetes, but to achieve this, healthcare funding should be largely concentrated on public healthcare as well as key healthcare intervention strategies. This, in return, demands for the complete transformation of societal behaviors to encourage healthy living. A rigorous monitoring and management of people with diabetes is vital for correct diagnosis and availability of medical aid.

Diabetic patients should be continuously monitored and have easy access to professional care and necessary medication (Beran & Yudkin, 2006)Most healthcare personnel do not possess the optimum training and knowledge needed to effectively care for diabetic patients thus exposing them to inadequate management in healthcare facilities. Most healthcare institutions do not carry out screening for blood sugar level as a daily medical checkup routine (MOH, 2010). The poor management of diabetic patients in Kenya is mainly due to the inadequacy and elevated costs of insulin, coupled with the poor follow-up of patients. Despite the national government having subsidies to make the price of insulin affordable for everyone, there is always a shortage of insulin supply due to a high demand. Besides, there is also the issue of communication breakdown between the national medical store and the local reservoirs, consequently affecting restocking (Nelson et al., 2008).

The current level of public knowledge and awareness about diabetes in Kenya is significantly low, perhaps below 30% (Bett, 2019). Knowledge differs according to education levels and regions (Bett, 2019). Most patients do not adhere to behavioral changes associated with diabetes. Although there is a higher amount of public knowledge which comes from the good practice habits for the prevention of diabetes prevention, almost 50% of the population with the needed knowledge does not practically apply it (Bett, 2019).

Diabetes as a disease requires long-term medical checkups, easy access to specialized care and correct medication. However, most healthcare personnel

do not possess the optimum training and knowledge needed to effectively care for diabetic patients thus exposing them to appalling management in healthcare facilities. Majority of the healthcare institutions also lack facilities for routine screening of hyperglycemia.

Noteworthy, insulin is costly and this coupled with its limited supply and poor patient follow-up to clinical appointments in Kenya contribute to the poor management of this disease. Despite the efforts of the national government to subsidize insulin and make it affordable to everyone, the supply is normally inadequate due to the high demand. Besides, restocking is normally challenged by the lack of clear communication between the national medical depositories and the local storages (Nelson et al., 2008).

(Peters, Laffel, & Group, 2011) initiative dubbed "Leadership for Education and Access to Diabetes Care" targets to make insulin available at affordable rates to countries that are least developed. However, there are cases where the prices of insulin are raised so that the supplier can reap high profits, consequently leading most patients to procure the product from alternative private suppliers at excessively higher amounts that are up to 60% more. Interestingly, most people suffering from diabetes have poor control of their blood glucose and this contributes to almost 25% of the total hospital admissions cases all over Kenya being diabetes-related.

The number of diabetes cases in Kenya is currently on the rise, as well as mortality brought by diabetes complications (Kimando, Otieno, Ogola, &

Mutai, 2017). However, it has not been established whether the increased cases are as a result of poor adherence to diabetes treatment regimens or delayed diagnosis. Besides, not many studies focusing on adherence tendencies of diabetes have been conducted, especially in Kenya. Instead, related studies have mainly focused on other illnesses like cancer, tuberculosis and HIV/AIDS. For instance, a study conducted by (Talam, Gatongi, Kimaiyo, & Rotich, 2008) focused on the adherence tendencies of patients to HIV/AIDS medication, popularly known as antiretroviral drugs among Kenyan's diagnosed with the epidemic.

A lot of local studies conducted on diabetes have majored on the social and economic burdens of the disease, as well as insulin supply and disease management and treatment among healthcare workers. Much attention should be directed to the social factors that influence on the treatment adherence levels among patients.

Adherence to treatment can be improved by analyzing the different associated determinants. The question adopted in the present systematic review study was; what are the determinants or the factors that contribute to non-adherence to treatment among patients with T2DM in Kenya?

1.2 Statement of the Problem

The non-adherence of patients to prescribed treatments, especially in chronic condition is usually perceived as an important impediment to the recommended delivery of treatment. Notably, majority of patients diagnosed to be suffering

from chronic illness fail to stick to the recommended treatment regimens, consequently leading to fatal eventualities which have adverse effects on the patient's life. These effects could be bad health, increase mortality rates, indisposition, and the social and economic burden that it places on the society. A major issue that impedes on effective medical care is the lack of adherence to the recommended treatment regimens among diabetic patients by healthcare workers. This non-adherence to medical treatment and behavioral health treatment is often a major challenge since it decreases the effectiveness of successful treatment regimens, especially in the management of Diabetes Mellitus in Kenya where the healthcare personnel recommend a number of self-care exercises for patients to maintain.

Both locally and globally, the incidences and death rate from diabetes are on a crescendo. This increase indicates a crisis both in patient adherence and prevention and cure. Despite Kenya having several diabetic clinics spread in different counties, as well as outreach campaigns for diabetes, a major gap still exists in patients' adherence level to prescribed treatment regimens. Although, a good number of researchers have majorly concentrated on the prevention and management of diabetes, patient knowhow on self-care, and treatment, there is very minimal research conducted on the non-adherence tendencies to the treatment models of diabetes in Kenya. Besides, related studies have mainly focused on other illnesses like cancer, tuberculosis and HIV/AIDS. However, most local studies conducted on diabetic patients have focused on its social and economic burden as well as how non-adherence to prescribed regimes can be improved.

Therefore, the scarcity of documentation on diabetes treatment adherence provides the basis of this study which investigated the social causes of non-adherence tendencies to the treatment regimens of Type 2 diabetes aimed at curing diabetes in Kenya's Kiambu County.

1.3 Objectives of the study

The underlying objective of the present study was to establish the social factors that influence non-adherence to treatment regimens specified for diabetes among individuals diagnosed with the type 2 diabetes.

1.3.1 Specific objectives

Besides, it was built on these specific objectives:

i) To determine the non-adherence status to recommended diabetes treatment regimens among patients in Kiambu County

ii) To determine the socio-economic factors that promote non-adherence tendencies to the recommended treatment regimens among diabetic persons in Kiambu County

iii) To determine the personal traits and cultural factors that promote non-adherence tendencies to diabetes recommended treatment regimen among the patients

iv) To recommend methods of promoting adherence to specified treatment regimens among diabetic patients in Kenya

1.3.2 Research Questions

The study was guided by the following research questions:

i) What is the current status of non-adherence to recommended treatment regimens among the diabetic patients in Kiambu County?

ii) What are some of the socio-economic factors that promote non-adherence tendencies amongst the diabetes patients at Thogoto hospital?

iii) What are some of the individual and cultural factors that promote non-adherence tendencies amongst the diabetic patients in Kiambu County?

iv) What are some of the suggestions that can be given by the patients to promote adherence amongst the diabetic patients in Kenya?

1.4 Justification of the study

Most patients are aware of the potential risks involved when one fails to religiously follow the prescribed diabetes treatment models. However, despite having this knowledge, patients', adherence levels to treatment and medication remain suboptimal (Tunceli et al., 2015). (Tunceli et al., 2015) posits that it is important to develop long-term interventions to treatment adherence especially for long-term illnesses like diabetes.

While a study conducted in Uganda’s Mulago hospital by Makerere University in 2008 showed several factors relating to the non-adherence tendencies to diabetes medication and treatment regimen, very few studies on the same have

been conducted in Kenya or a Kenyan hospital. Scattered literature about diabetes in Kenya can however be traced in different secondary data, most of which concentrate on the economic impacts of the disease, challenges to follow a prescribed dietary regimen and its impact amongst diabetic individuals, and sensitizing Kenyans to acknowledge diabetes as a chronic illness.

As touched on earlier, diabetes cases in Kenya are on the rise and in return more and more patients are relapsing on their prescribed treatment. The result of this has been increased numbers in hospital admission cases, high treatment cost and lack of proper treatment. The rippling impact of non-adherence to treatment regimens in most cases impedes on the patients' overall life quality due to bad health, increases morbidity rates, mortality rates, and the society's economic cost.

The study mainly focused on researching the factors that encourage non-adherence tendencies to prescribed treatment and intervention methods to encourage adherence practices among patients to promote successful diabetes treatment.

The study may also contribute to the SGDs goal number 3 which is to ensure healthy lives and promote well-being for all at all ages. This will be achieved through building the body of evidence on how adherence can be improved to reduce the fatality that occurs with the disease and how the health sector can help in curbing fatalities from the disease.

1.5 Study Variables

The study was based on three main variables:

- **Dependent:** non-adherence to prescribed diabetes medication and treatment regimens.
- **Independent:** social factors including age, marriage status, sex, literacy level, profession, and treatment method, as well as socio-cultural factors including religion, old medication and treatment methods, healthcare workers and providers and facilities.
- **Intervening factors** consist of healthcare access, affordable care, conducive relationship between doctors and their patients, social support channels, uncomplicated treatment routines and clear communication of treatment prescription.

1.6 Significance of the Study

Inadequate medication adherence is a major factor leading to poor and suboptimal glycemic control among patients with Diabetes Mellitus, which catalyzes the magnitude of this problem and leads to the development of diabetic-related complications. This scenario potentiates the progression of the disease, hospitalization, pre-mature disability, and mortality (Waari et al., 2018).

In chronic diseases, a failure to take medications as prescribed, or the use of less than 80% of the prescribed treatment is termed as non-adherence. Low adherence to prescribed anti-diabetes medicines are responsible for 30% to 50% of treatment failures. This aberrant behavior compromises the effectiveness of treatment, which, in turn, leads to reduced treatment benefits from the perspective of quality of life and can have a negative financial burden on both the individual patients and the society at large (Balkrishnan et al., 2003).

Therefore, the current study will provide more insight and knowledge on why diabetes is categorized as a chronic condition; there is very little evidence on how diabetic individuals understand the type of treatment that is being prescribed to them and the significance of adhering to the given regimen. In order to get the best treatment and have full control of the disease, it is vital for patients to obey the prescribed regimen. The current study is further vital for leaders and policymakers in the healthcare industry since it will aid in the development of favorable policies that are vital to the treatment, control and management of diabetes.

1.7 Scope of the study

The study looked into some of the factors that contributed to the non – adherence to recommended diabetes treatment among Type 2 diabetic patients. The main respondents to the study were those patients who had come to the hospital to seek for treatment or those who had come to the hospital for checkup and to attend the diet clinic classes. It looked mainly at those patients

who were suffering from Type 2 diabetes and were available for questioning at the time of the study.

1.8 Limitations of the study

The study faces certain confines that might hinder its effectiveness and outcome. One of the main limitations was lack of inadequate and reliable data explaining non-adherence tendencies for diabetes treatment among patients in Kenya. In order to alleviate this shortcoming, a great amount of data will be sourced from relevant literary works from Southeast Asia, Europe and the United States: these are regions with clearly outlined guidelines and very conventional health care systems reputable for great control and management of diabetes mellitus. Data collection was mainly restrained by uncooperativeness from patients who refused to complete the questionnaire. As a result, the researcher failed to meet the intended sample size. Furthermore, the location of study where the researchers gathered information presented a limitation since the study would draw its conclusions from that particular location as opposed to the entire county of Kiambu.

1.9 Delimitation of the study

The delimitation of this work is that the study was only conducted in a medical outpatient facility. This is a limitation considering that non-adherence is a broad phenomenon that may be affecting patients in other sections of Thogoto hospital. The study focused on patients reporting at the hospital which was an indication that they were more inclined to adherence. This may have hindered

total reflection of the situation in the hospital and among all diabetic patients in the community of study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter examines the existing literary works on diabetes mellitus as a disease and on the patients' adherence to treatment regimens recommended for diabetic patients. This section aided the researcher in building the most important literature on diabetes and provides more insight into the research topic.

2.2 Diabetes Mellitus

Diabetes mellitus (DM) is a chronic, non-communicable disease (NCD) which has emerged as one of the leading global health problem associated with the pancreas in the production of insulin leading to hyperglycemia (Organization, 2014). Type 2 diabetes also known as diabetes mellitus is associated with a combination of resistance to insulin action and inadequate compensatory insulin secretory response (Association, 2019).

Type 2 diabetes affects both the old and the youths and is highly associated with morbidity, mortality, and a high health cost to individual patients, their families, and countries (Nwaokoro et al., 2014). It was found to affect 382 million (7.7%) in 2013 and the infection rate was estimated to 483 million (8.3%) by the year 2030. In developed countries, more than half of the people with type 2 diabetes mellitus are older than 65 years and only 8% are less than 44 years of age. In developing countries, 75% of diabetic patients are 45 years old and above and 25% of adults with diabetes mellitus are under 44 years

(Organization, 2014). In recent studies, low-income countries of Sub-Saharan Africa including Uganda have the fastest growing rates of diabetes mellitus whereby the diabetes population has drastically increased from an estimated 98,000 patients in 2000 to about 1.5 million in 2010 from a population of 30 million people (Nyanzi, Wamala, & Atuhaire, 2014).

One of the most unique things about diabetes is the fact that it requires patients' responsibility for their treatment and care. The number of people with diabetes rose from 108 million in 1980 to 422 million in 2014. Prevalence has been rising more rapidly in low and middle-income countries than in high-income countries. In 2019, diabetes was the ninth leading cause of death with an estimated 1.5 million deaths directly caused by diabetes. A healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use are ways to prevent or delay the onset of type 2 diabetes. Diabetes can be treated and its consequences avoided or delayed with diet, physical activity, medication and regular screening and treatment for complications (Denicolò, Perco, Thöni, & Mayer, 2021).

2.3 Risk Factors for Developing Diabetes Mellitus

Certain health problems are closely associated with the development of type 2 diabetes. These health problems are neither absolute nor independent causes of the disease; that is, not all people with these problems develop type 2 diabetes. Nonetheless, they are major risk factors because they help to initiate or to worsen type 2 diabetes in people with the predisposition for it. Major risk

factors for type 2 diabetes include obesity, physical inactivity, unhealthy diet, hyperglycemia, stress, and chronic inflammation (Tangvarasittichai, 2015).

Type 2 diabetes takes time to manifest and is very hard to diagnose owing to its mild symptoms (Ramachandran, 2014); as a matter of fact, more than half of the people suffering from type 2 diabetes do not show the symptoms related to the disease but have at least one diabetes related complication by the time they are being diagnosed (Humpert et al., 2005).

2.4 Management of Diabetes Mellitus

Managing any disease is important and especially in the case of long-term diseases. The key elements in managing Type 2 diabetes include constant exercises, healthy feeding behaviors, and sticking to the prescriptions given by the doctor (Das et al., 2018). The first stages of treating diabetes mellitus usually concentrate on nutritional therapy in combination with vigorous physical exercises followed medication prescriptions.

Insulin is prescribed to the patient when diet and physical exercises fail to achieve the intended targets in the management of the disease (Nathan, 2002). Support for lifestyle measures especially from the family members should be maintained throughout the disease management plan this makes it easier to manage the disease and control any complications that would arise from the same (Maina, 2016).

2.4.1 Lifestyle Modification

Lifestyle modifications are useful in managing diabetes mellitus and any other chronic disease. According to (Weber et al., 2010) these modification programs are meant to address the total lifestyle of an individual to reduce excessive weight by doubling up on physical exercise and boosting the nutritional value of the food that the patients is into. (Binu, Shanija, & Sahayo, 2011) asserts that some of the top environmental issues that increase the risk of heart failures among individuals diagnosed with type 2 diabetes include an inactive routine and harmful diet options that cause overweight related conditions such as obesity.

According to (Sigal, Kenny, Wasserman, Castaneda-Sceppa, & White, 2006) the main cornerstone for effectively managing diabetes is constant physical exercises, healthy nutritional practice and prescribed medication. (Weber et al., 2010) posit that individuals who have been diagnosed with Type 2 diabetes and are following lifestyle interventions such as eating healthy and intense exercise can greatly control their energy, cholesterol and lipoprotein levels, manage their insulin sensitivity and weight, register low Body Maas Index (BMI), decreased glycosylated Hemoglobin (HbAIC), have a grip on their blood pressure and glucose levels.

2.4.1.1 Physical Activity

Regular physical exercise has proved to be effective not only in improving glycaemia by lowering insulin resistance and promoting insulin secretion, but also in reducing the risk of cardiovascular disease and obesity in patients with T2DM (Alexopoulos, Blair, & Peters, 2019). While physical fitness and

exercising are vital in managing diabetes mellitus, regular exercising has the potential to decrease hyperglycemia in patients diagnosed with any form of diabetes. Besides, physical exercise enhances a patient's insulin sensitivity by mitigating the volume of free fatty acid exposed to the liver, consequently reducing chance of being obese. Exercise helps in slowing down the output of hepatic glucose, and increases the amount of glucose absorbed into the skeletal muscles, as well as increase the insulin sensitivity of the muscles (Binu et al., 2011). Exercising also ensures that the right amount of HbAIC is produced by the body.

According to (Plotnikoff et al., 2006), the right amount of HbAIC greatly reduces the risk of patients experiencing further complications.

Experts recommend that individuals suffering from Type 2 Diabetes should include a moderate intense aerobic session into their physical workout program and perform it at least thrice weekly for 50 minutes' session (Colberg et al., 2010). The authors further recommend 2 days of resistance training and at least a day of flexibility training.

2.4.1.2 Diet

Effective dietary management plan is also an important intervention for preventing diabetes related complications among patients (Omondi, Walingo, Mbagaya, & Othuon, 2011). Noteworthy, currently there is no universal meal plan for doctors to recommend to their patients, this according to (Everett et al., 2013) is because dietary therapy depends on the treatment goals of individual patients. Healthy diet mainly helps in controlling body mass, providing balance

nutritional needs and adjusting the blood lipids. (Winskill, 2016) recommends that fat consumption during nutritional therapy should contain a maximum of 35% of the sum energy received in the body, while saturated fat should not surpass 10% of the sum energy. The author further recommends that the daily cholesterol consumption of diabetic patients should not exceed 300mg on a daily basis. The best source of proteins in a diabetes diet plan should be from both plants and animal feeds, with an intake range of 10% to 20% of the sum energy. However, for children and pregnant women, a higher intake is recommendable. Furthermore, carbohydrates should provide up to 60% of the meal's energy, while fiber intake should be limited to 40 gm daily.

Additionally, extra sugar should provide less than 10% of the total energy consumed. (Aas, Johansson, Bjerkan, Lorentsen, & Mostad, 2013) explains that patients should further avoid the consumption of alcoholic beverages and excess salt, while nutritive sweeteners should completely be restricted. Clinical diet therapy is vital in the management and control of diabetes and the reduction and prevention of related complications. Diabetes' nutritional therapy needs to concentrate on the reduction and control of fat and caloric intake within the body, and improved exercising. Besides, the nutritional therapy for diabetes mellitus needs to stress on a tolerable reduction of calories and fat, heightened bodily exercise, as well as the modification of hypertension and hyperlipidemia. An increased consumption of foods with solvable fiber can also boost the control of glycaemia in people suffering from diabetes mellitus.

2.5 Adherence and non-adherence of Diabetes treatment among patients

Adherence has been defined as "the extent to which a person's behavior – taking medication, following a diet, and/or executing lifestyle changes – corresponds with agreed recommendations from a health care provider (Ganiyu, Mabuza, Malete, Govender, & Ogunbanjo, 2013). While non-adherence has been defined as taking < 80% of the prescribed treatment (Dehdari & Dehdari, 2019). Treatment adherence is a complex behavior influenced by factors along the continuum of care, relating to the patient, providers, and health systems (Neiman et al., 2017). Multiple factors have been associated with non-adherence among patients with T2DM in Kenya. For example; (Ngari et al., 2020) in Meru noted that level of income, affordability of services, health insurance cover of the patients, and monthly cost of DM management significantly influenced non-adherence (Ngari et al., 2020). In Nairobi, dissatisfaction with family members support, challenge in drug access and dissatisfaction with attending clinicians were factors found associated with poor medication adherence (Waari et al., 2018). Similarly, Mwaloma's study noted that the majority of the patients with low adherence levels were not sufficiently equipped with knowledge with attending clinicians to comprehensively manage their disease (MWALOMA, 2016).

Non-adherence to prescribed treatment regimen in patients with DM is quite high. It is a serious concern that poses a great challenge to the successful delivery of healthcare (Afriyie, 2019). For instance, in Kenyan studies, low levels of non-adherence to both pharmacological and non-pharmacological treatment among T2DM patients has been noted (Mugo, 2018). An

investigation among T2DM patients on follow-up at Moi Teaching and Referral Hospital (Kenya) showed that the majority of the patients (72%) had poor compliance to drug treatment (Koech, 2020). While Muhabuura's and Mugo's studies demonstrated lower rates of non-adherence to diet and exercise recommendations amongst people diagnosed with T2DM in Nairobi and Nakuru, Kenya (Muhabuura, 2014).

2.6 Regimen-related factors to adherence

The complexity / difficulty of regimen; for majority of the chronic illnesses, previous studies have indicated that the adherence to treatment regimens declines as the complexity increases. For example, (Chesney, Morin, & Sherr, 2000) explains that adherence to antiretroviral drugs for HIV/AIDS treatment is a highly complicated procedure involving both the medication and changes in lifestyle to adopt to necessary practices needed to enable the prevailing preconditions to administer the treatment regimen effectively. In some instances, the prescribed regimen might involve a number of doses for pills medication, deserting some types of meals and restrictions on different lifestyle practices that might help in the effective management of the disease.

Majority of the healthcare professionals believe that the medication issue largely affects treatment adherence. However, the effect that the medication issue has on adherence is closely linked to the stage of the illness, whether it is

at the initial stages or the advanced stages. Symptomatic individuals are more likely to experience complications from their non-adherence tendencies as compared to patients with asymptomatic cases (Gao et al., 2009). Dosing schedules of the prescribed medication and feeding practices seem to have a greater influence on adherence as compared to medication burden. Paterson and colleagues (McKibbin et al., 2006) went ahead to report that the daily double doses were linked to higher treatment adherence as compared to daily triple doses. Nevertheless, studies conducted by various teams have been effective in proving the correlation between medical dosage and adherence. Treatment schedules that involve constant monitoring and a drastic transformation of an individual's lifestyle, especially changes that have side effects might not just lead to frustrations among the patients and treatment fatigue but also ultimately to non-compliance to the same (Genuth et al., 2001). Regimens that required fewer modifications on the patients' lifestyle, for example, minimal nutritional limitations and lesser medicine on a daily basis were more likely to positively influence the medication adherence tendencies of the patient.

Treatment routines for any disease must therefore be abridged through regimens that involve the reduction of daily pills dosage, lessening the number of prescribed therapy, and minimization of a patient's interaction with drugs, especially those with serious side-effects.

Side-effects: Side-effects especially to the drugs prescribed have been consistently linked to reduced observance of treatment regimens. (Genuth et al., 2001) further explains that a patient who reacts bad to medication more than

twice is more expected to discontinue his or her prescription leading to future complications. Noteworthy, the degree that side-effects of a given treatment regimen affect the willingness of the patient to follow the same prescribed treatment is largely dependent on the issues surrounding the particular individual. Literature from studies that have looked at side-effects of various medications on patients have clearly indicated that the best kind of adherence is when a patient is submitted to a treatment regimen that eliminate symptoms (Chesney et al., 2000).

Patients usually tend to rapidly terminate therapy or request changes in medication if they begin experiencing any kinds of side-effects (Mocroft et al., 2001). Whether real or perceived by the patient, the side-effects of a given treatment regimen are largely accountable for majority of changes imposed on a treatment model as compared to the failure of the same treatment ((Mocroft et al., 2001). One huge study conducted on approximately 860 participants diagnosed with HIV/AIDS in Italy (Friis-Møller et al., 2010) stated that approximately one-quarter of patients who were treatment-naïve terminated their prescribed regimen within a period not exceeding one year owing to the high toxicity found in the prescribed medication and various side-effects ((Friis-Møller et al., 2010). Another study in France by Duran and team indicated that patients who experienced side-effects from their treatment within the first few months were likely to terminate treatment. This was the strongest predictor of non-adherence as compared to the amount of prescribed daily dosses and socio-demographic factors. The signs and symptoms related to

treatment side effects which cause the greatest distress among patients include treatable conditions such as nausea, stomachache, diarrhea, and body exhaustion (Davidson, Castellanos, Kain, & Duran, 2005).

2.6.1 Patient-related factors to adherence

The conduct of a patient towards the disease diagnosis and the prescribed medication is a crucial linkage between the recommended treatment method and the ultimate results of the treatment. However, even the most efficacious routine is bound to fail when patients do not follow the prescribed medication or even worse, terminate the treatment regimen recommended. Finally, if everything remains constant, the factors that greatly influence adherence to treatment regimen are mainly patient-related (Chesney et al., 2000).

Psychosocial issues: Stresses of life can drastically disrupt the intake of proper medication, especially in the dosing of prescribed medication, and more so if such stresses are often experienced at a larger degree by patients of low socio-economic state. Though in most of the research conducted on patients' demographic features have not been successful in establishing any relationship between the different characteristics and observance to treatment regimes, some recently conducted research have defined different variables that may correlate. The patient's literacy level also influences treatment adherence: the lower the education levels the lower his or her adherence. There are also other studies which have shown a correlation between adherence and ethnicity and gender.

A study by (Honeyman et al., 2000) for instance, found lower adherence levels among black people and women. Most of the women who showed low adherence levels cited stress related issues during childcare as one of the reasons for their lack of adherence. Alcohol abuse and the misuse of venous drugs and the depressive symptoms associated with them have been reported to contribute to the low adherence levels among patients.

While there are studies that have shown no relationship between the patient's history of drugs and substance abuse and treatment adherence habits, the prolonged abuse of drugs and related substance is considered the strongest interpreters of abandoning treatment regimen (Chesney et al., 2000). Nonetheless, even the active drugs and substance users can attain a recommendable treatment adherence if doctors listen to and address their concerns regarding their prescribed treatment, such as their anticipation and ways to manage the side-effects that could be experienced by the patient (Association, 2003).

Psychological issues have also been indicated as variables affecting adherence. Depression, stress, and management of stress by individuals, are examples of important indicators of adherence to treatment regimens. Noteworthy, negativity and hopelessness traits portrayed by an individual can further demotivate individuals from self-care and negatively impact on his or her adherence ability especially when it comes to complicated instructions.

Patient-belief system: The knowledge and beliefs that patients hold regarding the disease that they are suffering from and its medication is a potential determinant of their adherence. (Chesney et al., 2000) asserts that knowing the connection between treatment adherence and the viral load of the disease on the patient and disease progression at every stage is important because it ensures a positive adherence behavior.

Forgetfulness and confusion are also considered as major stumbling blocks for attaining positive adherence tendencies to diabetes treatment routines. Patients have reported that difficulty in understanding prescription instructions is a factor that affects adherence of most patients. The requirements of different types of diets and regulations for water and food consumption or the progressive sequences of medication can be puzzling especially to the elderly patients. According to (Katz et al., 2000) misunderstandings may arise as a result of the complexity of the treatment regimen or insufficient guidance from the physician.

Forgetfulness is the most cited cause for poor adherence tendencies to most treatment regimens, and it mainly is rampant in pill medication; for instance, in a study by Chesney and team, the authors testified that 66% of the interviewed respondents reported a high number of non-adherence due to the fact that the patients forgot to take their pills as prescribed. Ostrop and colleagues went further to demonstrate that while forgetfulness was the main reason behind non-adherence, the midday dose in the three-times per day prescription was the most overlooked dose among most patients. Although there are no other studies

that have confirmed these findings, three-times per day prescriptions are commonly overlooked as compared to twice and once daily dosage prescriptions.

Patient-provider relationship: For there to be a significant level of adherence among patients, there has to be a conducive environment and more friendly relationship between the physicians and the patients. Such environment could aid in overcoming major blockades against prescription adherence. However, several known factors can encourage the development of a positive relationship between health care providers and their patients. These factors include the communication clarity and quality, compassion, the service providers' competence, the ease of the medication, and allowing patient participation in decision making on treatment being administered (Chesney et al., 2000). However, patients get disappointed with health care workers whenever there are cases of misinterpretations on the prescribed medications and diet plans; this leads to the treatment becoming complex, the victim labelled as a "bad patient" or mismanagement of the side-effects. The consequences of such frustrations may encourage poor and non-adherence to recommended treatment regimens.

2.7 Importance of Adherence

Adherence is described as the active voluntary contribution of individuals in managing their illness by observing the set treatment plan and sharing responsibilities between the person and the health worker. In relation to prolonged therapy, adherence measures the level which the patient's conduct,

obeying a diet, and conforming to lifestyle vicissitudes agrees with the approved treatment commendations as posed by a health care professional (Sabaté & Sabaté, 2003).

The adherence to any treatment regimen is the measure of a patient's observance level to prescribed medication or therapy (Osterberg & Blaschke, 2005). On the other hand, non-adherence is the failure to take medication as prescribed, sticking to the recommended treatment regimens and in turn affecting both the patients and the whole health care system (Maina, 2016).

Generally, the glucose levels in people diagnosed with diabetes mellitus is effectively controlled by oral hypoglycemic agents consequently decreasing the patient's risk of developing micro vascular and macro vascular problems (Goh et al., 2014). (Maina, 2016) explains that these factors heighten the adherence levels to oral hypoglycemic agents which is vital in achieving adequate glycemic control that helps in the reduction of deprived health results, reduction on the cost of care, and mitigating potential snags associated with type 2 diabetes patients.

2.7.1 Consequences of Non – Adherence to Diabetes Treatment

A major issue disrupting the delivery of care for diabetes, and especially diabetes mellitus, is the high non-adherence tendencies to medication (Eyre et al., 2004). A study by (Lau & Nau, 2004) indicated that diabetic patients with poor adherence tendencies to oral hypoglycemic agents within a one-year period were at greater risk of being admitted in less than 12 months. Other negative effects caused by non-adherence to treatment regimen as cited by

(Maina, 2016) include medication wastage especially among patients who do not take them in the case of pills, the disease becoming worse, treatment failure, reduction of functional abilities within a certain period, deprived life quality, increase in treatment cost, and increased mortality.

2.8 Social Perceptions Associated with Diabetes and its Treatment

In their study (Yuniarti, Dewi, Ningrum, Widiastuti, & Asril, 2012) define illness perception as the manner in which a person responds to an illness. The authors further explain that this perception stems from the conception and beliefs that a person has towards his or her illness are based on both internal and external factors. One theory that best explores illness perception is the self-regulatory model theory. The main dimensions for this theory include self-identity and self-control, as well as the causes, duration and consequences of the illness. In a study by (Dube, Van den Broucke, Housiaux, Dhoore, & Rendall-Mkosi, 2015) the authors explain that illness perception among diabetic patients influences their self-management traits, which in return impacts on their glycemic control. Different studies including those by (Cryer, Irene, & Karl, 2007), (Lattanzio et al., 2014) and (Yuniarti et al., 2012) explain that the general perception of the causes of diabetes are unhealthy feeding habits, physical dormancy and genetics.

A Kenyan study by (Lattanzio et al., 2014) showed that locals perceived diabetes and alike illnesses as a result of punishment from God, other deities, and witchcraft. In augmenting this finding, (Cryer et al., 2007) and (Jijomon, Sharon, Xavier, & Nayak, 2013) discovered that some locals believed that

diabetes was caused by overweight related complications like obesity, and genetics- meaning that people inherit diabetes from others. Concerning treatment, most Kenyans perceived that medication, constant body exercise, and healthy feeding habits could cure or reduce the consequences of diabetes. Liani and her colleagues further reported that most of the older people strongly perceived that herbal medication, prayers and home therapies like feeding on raw chicken livers and consuming more water can cure or mitigate those consequences of diabetes.

2.9 Issues affecting diabetes Adherence

A significant amount of research on diabetes indicate that individuals diagnosed with the illness find it more problematic to adhere to the recommended treatment regimens compared to patients diagnosed with related chronical conditions (Kalyango, Owino, & Nambuya, 2008). Other studies focusing on adherence to treatment plans have shown that the socio-economic state of individuals and an individual's disease-related issues, as well as a person's demographics including health status, gender, race, age and social support may also affect the adherence behaviors of patients.

In their study, (Hjelm & Mufunda, 2010) suggest that low levels of adherence to recommended treatment regimens can be caused by the attitude that the person has on general health and different illnesses, religious and cultural views, and medication practices. The authors further make the point that the causes for low adherence levels may differ depending on the different

individuals. For some, adherence to medical treatment means a rational choice made by patients to attain the wanted health targets, and preserve their identity.

In a study by (Brown & Bussell, 2011), the researchers have explained that the main stumbling blocks to adherence revolve around the general issues that patients can control: the oversight on taking prescribed medicine, intentionally omitting doses, and failure to seek complete information from doctors and other healthcare workers on unclear treatment issues. Besides, patients' emotional state also hinders complete adherence to prescribed treatment regimens. A diabetic person who is depressed is more likely to abandon the treatment regimens recommended by the doctor. Therefore, constantly paying attention to them is also an essential way of boosting adherence levels.

Different studies conducted by researchers (Linda Haas et al., 2012; Uchenna, Ijeoma, Pauline, & Sylvester, 2010), (Adisa, Alutundu, & Fakeye, 2009) and (Kalyango et al., 2008) have also indicated that socio-demographics like gender, marital status and age as great contributors to low-adherence levels. Besides, these authors have constantly cited gender as a significant factor on the non-adherence and adherence levels among patients. A different study on adherence to diabetes treatment that was carried out in Uganda's Mulago hospital by (Kalyango et al., 2008) reported that more females did not understand the prescribed regimen compared to their male counterparts. However, other factors like marriage status, employment status and age have not been adequately related to low adherence levels of diabetes treatment

regimens. Literacy levels have also been associated with better adherence tendencies in a few cases.

Another important study to this literature was done by (Uchenna et al., 2010) in Nigeria's state of Enugu. Here the author wanted to determine the casual features that affect adherence levels of diabetes treatment regimens in the region. Uchenna and the colleagues revealed that the level of education impacted on non-adherence levels in diabetes treatment regimen. These results were mirrored in a similar survey conducted in Pittsburgh, Pennsylvania where the researchers discovered that the more an increase in literacy was directly proportional to an increase in adherence levels especially in diet recommendations (Bakker, Eringa, Sipkema, & van Hinsbergh, 2009). (Ng et al., 1999) also augmented the findings by Bakker and his colleagues in a study conducted in Mexico where he found identical results on the relationship between literacy and adherence levels. Furthermore, a different research by (Sarkar et al., 2010) conducted in the state of California, produced results indicating a correlation between non-adherence and lower levels of learning especially in the case of blood glucose monitoring at least once daily in patients diagnosed with diabetes mellitus.

Social support, from both the community and family members, is also a significant factor that influences better patients' adherence level to diabetes treatment regimens and especially to nutritional regimens and the administration of insulin among women diagnosed with gestational diabetes; this is according to (Association, 2003). (Uchenna et al., 2010) posit that

diabetes is seen as a disease that involves the whole family, reason being it affects everyone in the family who resides or takes care of a diabetic patient and the effectiveness of their response to the changes surrounding them and how the diabetic manages and feels about the illness. The authors further explain that lack of support from friends and family members can cause distress to the patient.

The manner in which a patient perceives a given treatment regimen influences self-care especially when it comes to managing diabetes and particularly diabetes mellitus. Beliefs about the consequences associated with non-adherence, the ability of the patient to control the illness, and the supposed success of an intervention model can determine the adherence of the patient to any treatment recommendation (Farmer et al., 2005). A study conducted by (Serour, Alqhenaei, Al-Saqabi, Mustafa, & Ben-Nakhi, 2007) found out that more than half of the patients examined strongly believed that high adherence levels to nutritional regimen and physical activity pattern among diabetic patients positively influenced their general wellbeing. Patients' beliefs, influences, and management of their condition also influenced the way they adhered to specified lifestyle measures put in place for the management of disease. For example, one's adherence may be compromised if the patient does not believe that modification in their lifestyle, better feeding habits and regular physical exercise, could affect their glycemic control. According to an experiment done by (Thomas, Alder, & Leese, 2004), the authors discovered that almost 70% of diabetic patients believed that they can enhance their

control on the disease trough frequent and strenuous physical exercise, but most of them still found it challenging to initiate and keep up with the same exercises.

Noteworthy, features of the health service greatly impact adherence behavior of diabetes treatment among patients. Some of these features include but is not limited to the doctor and patient bond, medicine costs, ease of access to healthcare facilities, the cost involved for the patient to get there (transport), availability of medication, long delays in between appointments by the patients, operating hours of the health center, long waiting periods for the patients, oblivious knowhow on diabetes management and insensitive and unfriendly hospital workers (Mandewo, Dodge, Chideme-Munodawafa, & Mandewo, 2014).

Effective diabetes education especially on the types of diets recommended contributes to improved patient adherence because it provides behavioral change strategies among the patients that focus mostly on factors like exclusive lifestyles, family, work related issues and likes and dislikes (Bays, Mandarino, & DeFronzo, 2004). More specifically, these education programs that address any controversial beliefs shared by diabetic patients and treatment behavior have been found to enhance the adherence to treatment regimens and overall health outcome (Cassar, Belch, & Brittenden, 2003).

The expense involved in acquiring diabetes related health services also has a significant influence in the adherence levels among diabetic individuals. In an experiment that sought to establish the potential hurdles concerned with the

control and management of diseases concluded that health care expenses were the main blockades to medication adherence (Ho, Bryson, & Rumsfeld, 2009). This was followed by a diet plan, regular body exercise, and blood glucose test. (Montague, 2002) and (Uchenna et al., 2010) also reported similar outcomes where the financial variables, particularly indirect and direct costs related to a given medication regimen, be it medicine or particular food and limited access to treatment impeded on the ability of the patient to adhere to specified regimens, particularly in counties that are still developing. In a different research that was steered by (Kalyango et al., 2008), the authors pointed out that patients who could not afford medication were less likely to adhere to prescribed regimen.

The high cost of medication, and especially for insulin is a big hindrance to the optimal diabetes care in Africa's Sub-Saharan region. According to a global report by (Whiting, Guariguata, Weil, & Shaw, 2011), more than 80% of the diabetic population in Africa's Sub-Sharan region could afford insulin and its related accessories due to their costly nature. Furthermore, insulin and their syringes were available to about 12% of Africa's diabetic population. Besides, less than a quarter of the affected population constantly checked their blood glucose levels. This was because self- monitoring of blood glucose was rarely done and the main reason for its deterrence was its unavailability and high cost of the testing kits across the continent (Whiting et al., 2011).

Accessibility and especially to the health centre is another factor which may hinder the adherence to diabetes treatment regimens in the affected population.

Other factors influencing treatment adherence include reliable and frequent access to medication and health care facilities. (Heap, Murray, Miller, Jalili, & Moyer-Mileur, 2004) and (Zgibor & Songer, 2001) note that it is paramount for diabetic patients to have access to affordable and quality health care in order to prevent further complications and boost the success levels for diabetes treatment.

A good number of researches on the issues that impact on the access and use of health services have reported that in most developing nations, diabetic patients are hindered from accessing suitable health service due to the scarcity of health institutions and travelling expenses needed to get to the desired facility. This consequently leads to extremely low adherence levels among patients. Relative to this, (Karter et al., 2004) survey reported that patients living in California's rural territories could not afford to transport themselves to preferred health facilities due to cost of transport and proximity. The consequence of this is high non-adherence levels.

Furthermore, access to information related to diabetes and its management can also make a difference between adherence and non-adherence behaviors to treatment. In a study that targeted to enhance the understanding of the correlation between diabetes management and knowledge on diabetes medication, (Goering & Matthias, 2010) discovered that diabetic patients relied on health professionals, diabetes sensitizing programs, the internet and family and friends for information about the disease. Besides, the authors

acknowledged that highly adhering patients used multiple sources to gather information compared to the non-adhering group.

Drawing from this literature analysis, a lot of factors relate to the adherence and non-adherence levels of different treatment regimens of diabetes, and the trend varies across different regions. Treatment methods, the external environment, element of the health service, social and cultural support and general knowhow of the etiology of diabetes were some of the notable factors that influence the level of adherence among the diagnosed population.

Various studies have suggested different interventions to increase adherence levels including putting much emphasis on the seriousness of treatment adherence, developing simpler or alternative treatment practices, and clear and effective communication on the treatment instructions. Furthermore, patients have suggested the need to customize the treatment plans to suit individual needs, enquire how the patients feel about their adherence behaviors to recommended treatment regimens, and if it is important to come up with ways of sustaining adherence levels. The need to include the community and close people to the patient, as well as analyzing key indicators like skipped hospital visits, forgetfulness or ignoring prescribed medication have also been suggested by researchers like (Osterberg & Blaschke, 2005) as fundamental areas that should be tweaked to produce better adherence practices.

2.10 Theoretical Framework

The two theoretical underpinnings utilized by the study are (1) health belief model and (2) Andersen's model of healthcare. The health belief model is renowned for being among the most popular social cognition models since time. Its developer, Irwin M. Rosenstock categorized this model as psychological health model when he formulated it in 1966. The author developed the model to aid in the study and promotion of peoples' interest to health services (Lo, Chair, & Lee, 2015). Following the dynamic changes on the perception and understanding of the health community, and especially towards health seeking traits among individuals, the model was subsequently relooked in the late 1980s towards treatment seeking traits. This model was initially intended to envisage people's behavior towards treatment of chronical cases. However, in the past few years, it has been widely adapted to envisage other health related behaviors like what makes an individual seek medical attention. This model suggests that your belief in a personal threat when faced by an illness together with your belief in the effectiveness of the proposed behavior to seek medical attention will determine the probability of the trait.

The conceptual model by Andersen demonstrates factors that influence the use of health services by patients for medical attention. The model suggests that the use of different health services by consumers depend on the need factor, predisposing factor and the enabling factor. First, the need factor signifies the patient's actual and perceived needs for medical services. Secondly, the predisposing factor includes individual traits like health beliefs, sex, age and race among others. Finally, the enabling factor on the other hand could be

support from the family and the general community and access to medical cover among others. The Andersen model of healthcare is the brainchild of a popular medical professor called Ronald M. Andersen. Since its inception, the model was later redeveloped in 1990 by another researcher by the name Newman.

2.10.1 The Health Belief Model

The subject model is arguably the best-known social cognition models. The model states that behavior change requires three steps (Bloom Cerkoney & Hart, 1980); the assessment of an individual's readiness for behavior change, how ready is the individual to make the change, the weighing of the pros and cons of behavioral change following individual's complete understanding of the components of the behavior modification and finally, the external and internal prompts meant to serve and cue the person to effect behavioral change. In the field of health services, people tend to compare what the health care provider is suggesting against individual assessments of the possible adherence outcome to the same recommendations. Different researchers including (Becker & Janz, 1985) and (McGregor, 2016) have shown that the health belief model suggests that internal or external motivation is vital for creating change, but must be backed up by the procedures required to effect the change.

Becker and his colleagues believe that there is constructive interconnection between the adherence behavior and health beliefs of individuals. It has often been insinuated by different studies that health beliefs have a predestined relationship with adherence. Becker et al. also suggest that by addressing

patients' perceptions about their illness and treatment regimens, doctors may likely be able to predict their patients' level of adherence. Hence, for an improvement in adherence, the authors advise on the implementation plans to change the prevailing self-destructive health perceptions and beliefs by changing their attitude towards a given disease and its corresponding treatment regimen.

According to (Raskin & ROSENSTOCK, 1986) an individual's adherence behavior is shaped by six main traits: First, the patient should be motivated or triggered, that is, he or she should know his health status and have interest in helping his condition. Second is the vulnerability level that the patient relates with the disease. Third, the patient should realize the seriousness of the illness and recognize that the consequences of the illness on their general health will depend on their actions. Next is the alleged benefit from the treatment regimen. Patients should believe that their health condition will improve only by adhering to the prescribed professional intervention. Fifth is the perceived hurdle arising from seeking medical intervention. Patients must realize that they stand to benefit more from changing their behavior accordingly as opposed to maintaining their old habits. Finally, it is paramount that patients realize the importance of learning about their illness and prescribed treatment regimen. Information about the illness and its treatment include medication details, benefits of obeying the prescribed treatment and behaviors that promote adherence.

In the current context, the researcher used this model to analyze patient behavior, and the factors that influence their decision to seek treatment and adhere to the recommended medical interventions.

2.10.2 The Andersen Model of Healthcare Utilization

This model focuses on stage of the health system when the needs of the patient meet the professional system. Andersen's (1968) theoretical model focused on three main factors to seek medical attention: 1) The need factor for seeking treatment especially to the patients, whether individual or, social (Wolinsky, 1988); 2) predisposing characteristics which represented the tendency to utilize health care services. According to Andersen, an individual was more or less likely to use health services based on demographics, position within the social structure, and beliefs of the health service benefits. The authors explained that people who shared the opinion that the health service would cure or mitigate the consequences of their condition were likely to use the services; 3) factors that enable and support the access to treatment such as friends and family, and different community services. On one hand, resources from friends and family mainly include the financial status. Community resources, on the other hand, included access of treatment facilities and the level of assistance provided

In the 1970s, the model was later expanded to include the health care system like the health policy, resources, and organization, as well as the changes in these factors over time. Resources in this case comprised of the distribution of

both labor and capital, including education levels of health care personnel and availability of healthcare equipment. Organization on the other hand referred to the technique employed by heath service providers to manage available resources. This consequently impacts the general structure and access of services. Noteworthy, the redeveloped model points out that the approach that an organization utilizes for effective resource distribution and to control its labor volume is an important determinant on whether or not consumers will be attracted by the services offered. Besides, the relooked model asserted that client satisfaction was proportional to utilization of the health care services. Additionally, the model recognized that the presence of different health facilities and services, and their purpose would influence the kind of services used by the patients. Therefore, the relooked model according to Andersen (1995) and (Andersen & Newman, 2005) vocalizes the point that regardless of whether a particular health care service is used or not, and regardless of its frequency of use, there will be a broad array of third-party elements based on the health care facility and population traits.

During the 1980s -1990s, the model was revised again to form three components with a linear relationship: 1) primary determinants; 2) health behaviors and 3) health outcomes. The primary determinants were described as the direct cause of health behaviors and these determinants included characteristics of the population (i.e., demographics), the health care system (i.e., resources and organization), and the external environment (i.e., political, physical, and economic influences of utilization). In addition, the model

explained that health behaviors determined health outcomes whether they would be positive or negative. Health behaviors included personal health practices like diet and exercise and the use of health services. Lastly, the model indicated that health outcomes, including patient's health form, consumer satisfaction and assessed health condition, were directly influenced by the health behaviors (Andersen & Newman, 2005))

Andersen's model is effective in explaining the adherence trends for treatment regimens among diabetic people through its capability to identify factors that patients critically consider prior to settling on a health care service provider.

2.11 Conceptual framework

The first parts of the current literature analysis suggest that non-adherence traits to diabetes treatment regimens reflect the behavioral patterns of the patient that is attributed to by different factors like the patient's behavior and perception. Some common personal perceptions witnessed among patients include misleading religious practices with the potential to discourage patients from seeking treatment, overreliance traditional forms of medication and treatment, and outdated cultural practices. Besides, such traits are normally surrounded by procedures and systems that are either completely unsupportive or create a suitable environment for fitting response. Factors that may hinder treatment may revolve around family and the entire community system. ***Error! Reference source not found.*** below describes an explanation framework on how different factors are correlated and contribute to adherence levels of diabetes treatment regimen.

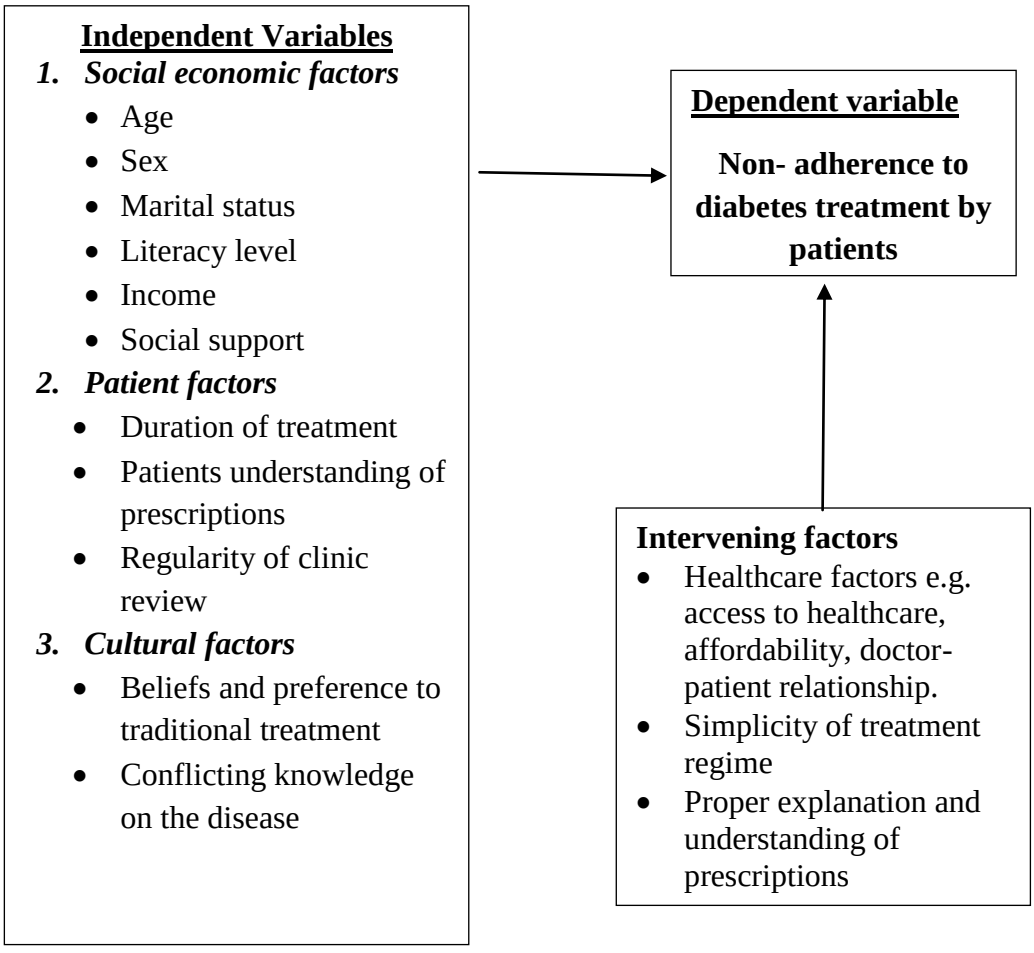

Figure 1: Conceptual framework – how different social factors affect diabetes treatment adherence levels

Source: Author

The above conceptual framework indicates that the potential factors that hindered patients' adherence traits to the recommended treatment regimen including marriage status, literacy level, age and gender, adherence to traditional medication, lack of diabetes related knowledge, lack of social and cultural support, negative view on treatment, simplified treatment schedule, and low medication adherence were somehow related. Age also influences adherence tendencies of diabetes treatment regimens. Compared to young people, elderly patients find it difficult to adhere to treatment compliance levels. This is attributed to the fact that with age comes different problems including the gradual loss of memory and vital body senses. Apart from these problems, they might also experience difficulties in following the recommended treatment regimens owing to their cognitive impairments and different physical matters including issues concerned with taking pill medication, ease of opening medicine packages, effective handling of the pills, differentiating the different pills, or recognizing the different labels placed on the different types of pills.

The marital status of the patient was also another factor that may influence adherence levels of the patient, particularly on the diet regimen. The family members of the patient are known to be supportive especially when it comes to diet restriction whenever illness strikes. Therefore, the support and help manifested in a nuclear family setup leads to positive adherence traits among married patients as compared to the unmarried ones.

Another important factor when it comes to adherence to a given treatment regimen was the level of education. Many researchers including Apter et al. (1998), Okuno et al. (2001), Ghods and Nasrollahzadeh (2003) and Yavuz et al. (2004) have reported that more learned individuals are more compliant to treatment compared to the least learned ones. Characteristically, it is common for more learned individuals to possess better knowledge of an illness and its treatment regimens, hence the higher adherence levels. Patients hold different attitudes towards treatment, and this can draw the line between adherence and non-adherence to treatment. Some patients find themselves helpless of their condition, and are the least likely cohort to adhere to treatment regimens compared to those who hold a positive attitude towards their condition. In illustration, patients who feel helpless about their huge body mass can hardly afford to work out and attain the recommended weight.

A solid support mechanism gotten from friends and family positively influences the adherence levels of diabetic patients towards recommended treatment and the management of the disease. High marital support in diabetes related cases makes one more compliant and attentive towards the recommended treatment regimen as compared to when one takes the treatment journey alone. Besides, this form of social support also serves as a way of reducing stress, which is negative in the treatment and management of diabetes.

Health service factors such as affordability, accessibility and a healthy relationship between doctors and patients are great determinants of compliance levels for diabetes treatment. Every patient hopes to be attended to by

professional, friendly, fair, enduring, emotional, supportive and understanding physician to enable them build a positive attitude towards their condition, which in return boosts their compliance to administered treatment methods. According to Bartlett et al. (1984) and Apter et al. (1998) the lack of clear communication practices by service providers impedes on a patient's ability to comply with any prescribed treatment.

It is vital that the current study establishes the presumed functions of the aforementioned factors in influencing adherence levels to diabetes treatment among the affected population. Local researches have largely focused on the economic and social burden of diabetes and its spread, but are yet to explore these factors exhaustively and determine their contribution to treatment adherence among Kenyans. Finally, policy makers, government, patients and medical practitioners stand to benefit the most from the wide range of information on compliance to treatment regimens and the conclusions that will be reached in this study

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Overview of methodology

Under this section, the researcher explains the applied methodology by exploring the area of study, the design of the study, the study and targeted populous, methods of sampling, research tools, modes of data collection, quality of data collected, management of data, data entry and analysis, and ethical underpinnings.

3.2 Study design

The study utilized the descriptive survey design. Surveys are popular for their effectiveness especially when analyzing the traits of a vast population. The use of surveys according to (Davis, 2012) is the only research design that has the potential to span across a wide population while at the same time ensuring accuracy of the collected samples to draw strong conclusions. The researcher also settled on this method since it uses questionnaire as its main tool. Well-designed questionnaires according to (Davis, 2012)are highly effective in gathering accurate and satisfactory data from a selected sample, thus suffices as the ideal tool for extracting patients' information on adherence patterns for diabetes treatment regimens.

3.3 Study Area

The selected area of study was in Kenya's Kiambu County at Thogoto Hospital- formerly known as Kikuyu Hospital. The selection of Thogoto

hospital was based on the fact that the institution specializes on diabetes treatment and is reputed to be a community friendly institution and among the busiest hospital in the county. Thogoto Hospital houses a modern diabetic clinic that was launched in 1993. The clinic receives patients with diabetes and deals with blood glucose testing, treatment, and management of the disease. An average of 1,200 clients visits the clinic on a monthly basis. It has a capacity of 5 internal specialists and this includes one clinical officer, two nurses, one chiropodist who works part-time and one nutritionist.

The Kiambu based clinic has two different stations for effective treatment of diabetes. The first station is called triage or consultation stations and mostly handles diagnosis and testing procedures. Here, details about the patient's weight, blood pressure and sugar levels are recorded and if the results warrant further attention, the patient is placed under appropriate care and medication.

The second station at the clinic is called education station and it aims to educate and inform patients and their relatives on the necessary precautions they need to take to have a strong grip on their illness.

3.4 Study population

The selected population for the study comprised of individuals diagnosed with diabetes and was under treatment at Thogoto Hospital. The participants were both adult females and males undergoing treatment at that time.

3.4.1 Inclusion criteria

The selected participants were patients suffering from Type 2 diabetes. The researcher used this selection criterion because Type 2 diabetes was the most rampant form of the disease in the country. Besides, the inclusion criteria strictly included adult patients who had attended the clinic for at least six months and were available and willing to volunteer for the study by giving their consent to be included in the same.

3.4.2 Exclusion criteria

The exclusion criteria left out patients who did not have Type 2 diabetes, were not on a treatment regimen at the time of the study, and if on a treatment regimen, had been on it for less than 6 months. Patients who had not given their consent to participate in the study were excluded from participation.

3.5 Sample size

According to Thogoto Hospital's patient register, the health facility had approximately 1,500 diabetic individuals who visited the premises for either treatment or for checkup. The researcher used Kothari's (2004) formula to determine the sample size. According to this formula, the assumption is that the sample is representative of the total population; in the case of a small sample error, the research sample will be measured according to funds allocated for the study, there will be a better control of the methodological bias, and the outcome generated from the research will be generalized.

$$n = \frac{z^2 pq}{e^2}$$

Here z represents a standard variant of 1.96 that corresponds to 95% confidence interval

p = an estimated proportion of treatment for diabetic people who did not adhere

q = 1 - p

e = acceptable error margin (precision of measurement)

p= 0.25

q= 0.75

e= 0.05

$$n= \frac{1.96^2 x 0.25 x 0.75}{(0.05)^2}$$

$$=288.12 \approx 300$$

3.6 Sampling

With the help of assistant researchers and frontline medical workers in the treatment of diabetes including dieticians and clinicians, the researcher sampled participants using the sample size. The patients' clinical information such as age, gender and diagnosis of diagnosis were employed to recruit qualified participants for the study. Random sampling technique was used to select participants in the study. This was done by randomly selecting every third patient as they entered and waited to see the doctor. The researcher selected every third patient who consented to participating in the study until the required sample was attained. The same sampling technique was also employed to select participants during the clinic's diet day. The researcher used purposive sampling to select few key informants based within the clinic including two

doctors, two nurses, one nutritionist, and one management representative directly involved with diabetic patients. The key informants were those mainly attached to the diabetic clinic as they were better placed to give adequate and correct information on the diabetic situation at the hospital.

3.7 Data collection

The researcher utilized different forms of data collection models, with the intention to enable result triangulation. For primary data, the researcher mainly used selected participants and the key informants mentioned previously. For secondary data, the researcher used various internet resources from medical journals that triangulated with the questions and anticipated answers from the questionnaire.

The researcher screened the selected participants for language fluency in English or Kiswahili by asking them the language they were familiar with to eliminate cases of language barrier between patients and data collectors who were not conversant with the local dialect. However, patients who spoke only the local dialect but had interpreters were included in the study The selected participants were expected to give their consent before being included in the study. However, the researcher ensured that vital study information, such as its significance and objectives were exhaustively explained to the participants beforehand.

The researcher obtained quantitative data through semi-structured questionnaires that were in English as show in Appendices B. Participants were

administered the questionnaire while waiting to see the doctor. This approach saved time that would otherwise be wasted while waiting in ques. After getting consent from the patients, the research assistants asked individual participants questions as stated in the questionnaire and keyed the answers on the questionnaires as appropriate. Since not all participants understood English, the research assistants had to administer the questions for better understanding. Besides, participants were not allowed to take the questionnaires home and return them on the next day since not all of them frequented the hospital. Key data collected by the questionnaire included patient demographics, assessment of social factors associated with adherence and non-adherence tendencies, health status, and participants' personal opinion.

In gathering qualitative data, the author used pre-examined key informants interview guide as shown in Appendix C. The key medical practitioners were questioned about their social belief on diabetes and patients' adherence behavior to diabetes treatment regiments. Appointments were made to interview the key informants.

3.7.1 Pre-Testing the questionnaire.

The author pre-examined the questionnaire through diabetic patients within the area neighboring Thogoto Hospital. The pretesting was conducted at a dispensary that was close to the area where the hospital is situated. Through pre-testing, the researcher was able to evaluate the flow, sensitivity and clarity of the questionnaire.

The test-reset method was used when examining the questionnaire's reliability, to determine the patterns used to answer similar questions in the past. Questionnaire validity was determined through the construct method which was determined by evaluating whether the questionnaire represented the main elements being measured by the researcher.

3.8 Data Analysis

Version 21 of the SPSS software was used to analyze the quantitative data. The researcher computed descriptive statistics to analyze participants' traits, opinion and commonness of non-adherence tendencies to diabetes treatment. The researcher used Chi-square to carry out bivariate analysis which assessed the correlation among dependent and independent variables. When testing for independent association, the researcher included factors where $P < 0.05$. Besides, the researcher computed the non-adherence frequency as a fraction of non-adherent participants. The prevalence of non-adherence was calculated as the ratio of participants who are non-adherent. Non-adherence related factors to diabetes treatment regimens were viewed as statistically significant at $P < 0.05$. The gathered information once analyzed was further tabulated using figures and tables, while some data were analyzed using narrations. Noteworthy, the researcher mostly used narrations on data gathered from the key informants that were integrated in the study as well as a few data collected from patients.

3.9 Ethical consideration

The researcher obtained a letter of clearance to collect data from the Graduate School. The researcher then sought permission to conduct the study from Kenyatta University's Ethical Review Committee and from NACOSTI (National Commission for Science, Technology and Innovation). The researcher further obtained an informed consent from every participant but only after exhaustively explaining the significance of the research and the questionnaire contents. Besides, in line with the global ethical consideration of research, the researcher explained to the participant on the use of their information as well as assuring them anonymity, privacy and confidentiality. The researcher ensured this was possible by conducting the interviews in private and confidence of individual participant, as opposed to group administration. Besides, raw data was stored under key and lock in boxes and in a password protected computer.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings derived from the study which are discussed in line with objectives of the study as outlined under section 1.3. The researcher administered questionnaires to the participants during the days designated for diabetes clinic that is on Mondays and Wednesdays of every week. The response rate from the administered questionnaires was 94%. This means that 285 questionnaires were completed successfully from the possible 300.

4.2 Socio demographic characteristics of respondents

In this study, the researcher presented several socio-demographic traits of the participants, spanning from marriage status, literacy level, occupation and economic status, age and gender. The highlighted traits promoted understanding of the study population. Later in the study, the researcher will establish and analyze the role of these economic and socio-demographic factors on diabetes treatment adherence tendencies.

4.2.1 Gender of the respondent

Contemporary studies including one by Courtenay (2000) have pointed out the significance of gender in determining individual traits in health and especially concerning adherence to treatment regimens. Most medical adherence studies (Silva et al, 2016; Thompson et. al., 2016) have revealed women to be more adherent to treatment regimens in terms of meeting doctor appointments and complying to the prescribes treatment as compared to their male counterparts.

Noteworthy, from table 4.1 below out of the 285 participants who successfully completed the questionnaires only 45% of them were male as compared to 55% females. From this revelation it is clear that diabetes is not gender sensitive: however, according to the present study, females appear as the majority. Several researchers including Balbay et al. (2005), Choi-Kwon (2005), Fodor et al. (2005), Kiortsis et al. (2000), Lindberg et al. (2001) and Lermaharit et al. (2005) among others have mirrored the current findings in their studies by reporting that that females are bigger on hospital visits compared to their male counterparts regardless of the illness. Despite the similarity of these results to other studies, there are also some studies by (Caspard, Chan, & Walker, 2005) and (Hertz, Unger, & Lustik, 2005) that have reported contrary outcomes. Montague (2001) suggests the importance of noting that such findings may be indicating that diabetes is more prevalent among females than males.

Table 4. 1:Gender of respondent

Gender	***Frequency (n)***	***Percentage (%)***
Male	136	44.6
Female	149	55.4
Total	**285**	**100**

4.2.2 Age of the respondent

Considering that people are more likely to suffer from diabetes as they get older, age as a factor cannot be overlooked in diabetes-related researches (Endocrine web, 2015). ***Table 4. 2*** shows the age sets which were included in

the study. The ages of the participants featured in the current study broadly varied, with the elderly people aged above 69 registering the second highest number of participants at 23% second to the 49 to 58 years cohort who registered the highest numbers at 28%. The third category aged between 59 and 68 were 21%, followed by 16% of participants aged between 39 and 48, 7% aged between 29 to 38 and finally 5% being aged between 18-28. A number of researchers (Wild et al., 2004; Wai et al., 2005) corroborate these findings by showing the correlation between age and the onset of diabetes.

Table 4. 2: Age of the respondents

Characteristic (Age group)	***Frequency (n)***	***Percentage (%)***	***Cumulative (%)***
18-28	15	5	5
29-38	20	7	12
39-48	45	16	28
49-58	80	28	56
59-68	60	21	77
69 and above	65	23	100
Total	**285**	**100**	

4.2.3 Marital status of the respondent

For as long as mankind history has existed, the institution of marriage has always occupied a central role in most households. Howe (2011) however notes

that findings to corroborate the correlation between marriage status and mortality or health have not shown consistency.

The current study according to ***table 4.3*** below, shows that 56% of the participants were married. The singles participants presented 18% of the participants while 16% were widowed. 10% consisted of separated and divorced individuals. The marital status of patients is usually linked to individual's health-seeking attitudes. Studies done by Cooper et al. (2005) reported that the patient's marriage status was central in influencing positive adherence attitudes to treatment regimens. The current study will test the role of marital status in influencing positive adherence trends in the later sections.

Table 4. 3: Marital status of respondents

Characteristic (Marital status)	***Frequency (n)***	***Percentage (%)***
Married	160	56
Single (never married)	55	18
Widowed	41	16
Separated	15	5
Divorced	14	5
Total	**285**	**100**

4.2.4 Education level of the respondent

Treatment adherence studies highly consider a patient's literacy level. While the education level cannot stand on its own and needs a combination of factors

in order to promote positive adherence practices, it is a vital element for type 2 diabetes patients. According to Kirkman et al. (2002) most areas in the treatment regimen of diabetes requires at least some form of formal education to foster better understanding and management of the illness. Those areas include understanding basic nutritional principles, special skills and knowhow on insulin administration to the body and the monitoring of sugar levels in the blood among other necessary strictures.

The current study indicated that there was a higher adherent level among patients who had attained a certificate level of education as compared to the illiterate group. Similar studies from India (Mukherjee et al., 2013), (Farsaei et al., 2011), Brazil by (Gimenes, Zanetti, & Haas, 2009)and from Malaysia by (Omar and San, 2014) concur with these findings. These studies concluded that patients who have completed elementary school were more adherent to treatment regimens compared those without reading or writing capabilities. These findings can be justified by the fact that literacy enables patients to understand their prescriptions. Low or no education could be a contributor to increases in non-adherence since diabetes treatment regimens become complicated with time and demand patients to practice certain cognitive skills to promote understanding of glucose control and drug therapy.

Other researchers including (Kaona, Tuba, Siziya, & Sikaona, 2004),(Spikmans et al., 2003) , Stilley et al. (2004) and Wai et al. (2005) have, however, disputed these claims by showing inconsistent and mixed results on the correlation

between literacy level and compliance to diabetes treatment. ***Table 4.4*** shows literacy level of respondents in the current study.

Table 4. 4: Education level of respondents

Characteristic (Education level)	***Frequency (n)***	***Percentage (%)***
Tertiary	105	37
Secondary	95	35
Primary	54	18
None	31	10
Total	**285**	**100**

4.2.5 Income level

The financial or income status has been found to be a vital factor in diabetes treatment adherence studies. According to (Eaddy, Cook, O'Day, Burch, & Cantrell, 2012) medication and consultation expenses paid straight from the patent's pocket have largely been mentioned to hinder patients' adherence to given treatment regiments. In particular, Piette (2004) expounds that when the cost of consultation or medication is high, patients are likely to be deterred from adhering to the prescribed treatment.

Table 4.5 captures the income level of the participants in this study. Most of the respondents indicated that their income was Ksh. 50,000. This information indicated that most of the patients were financially stable and were able to maintain most of the treatment regimens recommended to them. The data captured here, however, only reflects 224 participants from the total 285 because 61 participants could not disclose their income sighting privacy despite being taken through the research objectives prior to the interview.

Table 4. 5: Income level of respondents

Characteristic (Income level Ksh.)	***Frequency (n)***	***Percentage (%)***
<10,000	50	22
10,000 – 20,000	36	16
20,000 – 30,000	18	8
30,000 – 40,000	20	9
40,000- 50,000	20	9
50,000 and above	80	36
Total	**224***	**100**

**61 respondents did not indicate their income*

4.3 Status of patients' adherence to treatment

One of the researcher's main objectives for the current study was to find out the patients' adherence status to diabetes treatment, and to accomplish this, the researcher simply looked at the kind of treatment each participant was

undergoing, for what span of time and whether they were following the regimen.

(Chakrabarti, 2014) definition of adherence was used in this study and according to the author, adherence is the degree that an individual's behavior towards taking medicine, obeying diets or change of lifestyle concurs with the recommended prescriptions. The WHO's description of medical adherence close to Chakrabarti's definition, according to WHO (2005), adherence is "the extent that an individual's conduct correlates with the recommendations set forth by a qualified health worker." The WHO further advises that poor adherence levels to recommended medication and treatment routines can lead to grave health consequences or even cause death to the patient.

In the current study, adherence particularly referred to the acquiescence level of a patient to either diabetes medication (insulin or prescriptive drug) or different non-medication treatment routines like diet and lifestyle changes. For the researcher to understand participants' adherence level to prescribed treatment in Thogoto Hospital, the participants were questioned on the number of times they actually took their medicines as per the health worker's prescription. The results are reflected in ***table 4.6*** below:

Table 4. 6: Status of Adherence to treatment

	Frequenc y / %	**Frequency / %**	**Frequenc y / %**	**Frequen cy / %**

Type of therapy	**Total sample**	**Frequently**	**Rarely**	**Never**
Insulin	90 (28%)	40 (45%)	23 (25%)	27 (30%)
Prescribed drugs	140 (44%)	76 (54%)	36 (26%)	28 (20%)
Combined non- medication therapy (regular sugar testing, dieting and exercise)	90 (28%)	46 (52%)	14 (15%)	30 (33%)
Total	**320****	**162**	**73**	**85**

****Multiple responses applicable**

From the table above, prescribed drugs were the most common kind of treatment among the patients (140 patients = 44%), with insulin and combined non-medication tying at 28% or 90 patients. The table also shows that only 40 patients (45%) frequently adhered to their insulin prescription, while 54% and 52% frequently followed their prescription of prescribed drugs and combined non-medication respectively. From these results, it can be deduced that the patients had fairly high adherence levels, which was anticipated considering that they were at the hospital during the interview.

4.4 Role of socio demographic factors in influencing adherence to diabetes treatment

On the second research objective, the researcher wanted to establish the function played by the aspects of socio-demographic in influencing or determining adherence levels to the treatment of diabetes. To achieve this, the

study analyzed individual demographic aspects and how they impact the participants' adherence levels.

Different studies including one by (Murphy & Coster, 1997) have hailed adherence as a fundamental component of controlling the complications of diabetes and curing or eradicating the illness. (Murphy & Coster, 1997) describes patients' adherence as "the extent that an individual's conduct correlates with the recommendations set forth by a qualified health worker. Different socio-demographics aspects of the patient including marriage, education, financial status, gender, social support and age are vital in swaying patients' adherence levels to diabetes treatment and the management of the disease.

The study delved deeper to establish how the aforementioned socio-demographic aspects manipulate patients; attitudes towards adhering to recommended treatment. As portrayed in ***table 4.6***, the researcher measured adherence to treatment levels using the participants' frequency of complying to prescribed types of therapy. From the table, it can be deduced that the patients had fairly high adherence levels with (45%) frequently adhering to their insulin prescription, while 54% and 52% frequently followed their prescription of prescribed drugs and combined non-medication respectively.

The researcher employed the help of the Chi-square test to portray variables correlated with treatment adherence levels. The variables as highlighted in ***table 4.7*** were gender (p = 0.032), age (p = 0.022), and income range (p =

0.028) respectively, measured against a significant at 95 level of confidence (α=0.05).

Table 4. 7: Socio-demographic factors influencing adherence to treatment

Variables in the equation	B	S.E.	Wald	df	Level of Sig.
Gender (1)	1.6531	1.42	6.807	1	0.037**
Age	0.09	0.0257	9.266	1	0.026**
Marital status	-0.076	0.32	0.057	1	0.811
Education level	0.212	0.528	0.162	1	0.688
Income	0.079	0.042	4.375	1	0.024**
Residence	0.219	0.801	0.075	1	0.785
Constant	-1.025	2.376	0.186	1	0.666
** significant at 95 level of confidence (α=0.05)					

4.4.1 Age and adherence to treatment

Considering that people are more likely to contract diabetes as they get older, age as a factor cannot be overlooked in diabetes-related researches. A lot of study has supported the correlation between age and adherence, (Wai et al., 2005; Wild et al., 2004) while only a few have disputed these findings. Some of these studies are like those ones that have been conducted by.

However, findings from the current study showed a clear link between the two variables. The leading age unit that frequently visited the clinic ranged between 49 and 58 years old representing 28% of the total participants. While

researching on the healthcare costs related with type 2 diabetes, Krueger et al. (2015) reported that treatment non-adherence was rampant with adolescents. The authors attributed these findings to the challenges faced by adolescents in acknowledging a new illness, lack of knowledge on most illnesses, the burden of treatment methods and fear of complications. Yet, (Abebaw, Messele, Hailu, & Zewdu, 2016) reported that elderly patients who had ailed for longer periods had advanced knowledge of the disease and understood the need for glycemic management to prevent foreseen complications, as well as the importance of the support derive from a family unit in managing the disease.

Noteworthy, different studies have shown inconsistency in treatment adherence results among older patients. In their review of literature, most researchers including (Hertz et al., 2005) ; Kim et al., 2002; Senior et al., 2004;; Sirey et al., 2001;) posit that older people show higher adherence as opposed to the younger patients. Yet, findings from a few studies including (Khan et al., 2012; Nozaki et al., 2009) have shown that the age of the patient had nothing to do with the compliance levels of the patients toward diabetes treatment models.

4.4.2 Gender and adherence to treatment

Taking into consideration ***table 4.7*** from the current study, the significance of gender in determining individual traits in adherence to treatment regimens is evident. Data from the tables indicating the socio demographic data on gender (table 4.1) portrayed that the number of women visiting the clinic were more than that of men. Given this statistic, and considering that the interviews were

conducted within a diabetes clinic, it is arguable that females have better health-seeking conducts than males. According to a study done in Thailand by Lertmaharit et al. (2005) the authors discovered higher diabetes prevalence in females than males. Besides, the study reported a higher prevalence rate among females ($p = 0.03$) in the urban territories compared to the males.

However, the impact of gender on treatment adherence is inconsistent with recent studies including (Kalyango et al., 2008) showing very high adherence rates among the males as compared to females. Besides, despite gender being portrayed as a significant factor in diabetes treatment adherence, a study by Pond et al. (1996) further revealed that treatment adherence and diabetes management was improved among males as compare to poor results portrayed by females. Noteworthy, the variance in control and adherence traits between male and females maybe attributed to the fact that women are burdened with the duty to consecutively cope with their family's care and their individual care.

A study conducted by (Khan, Sharma, Filkins, & Pichichero, 2012) further augmented the findings from this study. In the study, Khan and his team explored different factors that positively influenced adherence levels to diabetes treatment and discovered that men were poor adherers to treatment compared to females who registered very positive adherence levels. Similarly, according to a German group study that sought to examine how difference in gender influence adherence to diabetes medication and poor glycemic control among individuals diagnosed with type 2 diabetes exhibited substantial gender-

specific variances when it comes to adherence and poor control of blood glucose.

4.4.3 Income and adherence to treatment

The treatment of diabetes is an expensive affair especially when paying from out-of-pocket. Researchers like (Nagelkerk, Reick, & Meengs, 2006) have reported that high cost involved with diabetes treatment and management, coupled with the inability to afford the required medication has a significant impact on patients' adherence conduct to diabetes treatment. The authors further assessed the relationship between individuals' income and adherence and reported significant proof of correlation between these two variables.

Data collected from this study showed that 36% of the participants earned Ksh50,000 and above, while 16% earned between Ksh10,000 and Ksh20,000 and 22% earned below Ksh10,000 as portrayed in Table 5. The data captured here, however, only reflected 224 participants from the total 285 because 61 participants could not disclose their income sighting privacy despite being taken through the research objectives prior to the interview. The participant from the clinic fell in the two sets: a clear pointer that salary increase promoted positive adherence conducts towards diabetes treatment, (wald = 4.375, df=1, P-value = 0.024). In essence these findings augment the results portrayed in studies that vocalized lower earnings lead to poor adherence behaviours, including one by (Rolnick, Pawloski, Hedblom, Asche, & Bruzek, 2013). The high cost involved with diabetes treatment and management, coupled with the

inability to afford the required medication can also be significant factor impeding on patients' adherence conduct to diabetes treatment.

A cross-sectional analysis of baseline data from 77 patients in a randomized, controlled diabetes intervention study conducted by (Odegard & Gray, 2008) in the United States of America showed that 34% of patients indicated that paying for medications was one of the main reasons for poor adherence behaviors. A similar study that was conducted by French researchers (Tiv et al., 2012) in France used the multivariate regression analysis approach to examine factors that influence treatment adherence through patient-reported questionnaires revealed a significant correlation between the money earned by the patients and their treatment adherence traits. The researchers construed that among other factors, financial difficulties faced by the patients negatively impacted on their medication adherence alone but not the non-medicinal therapies like diet control, physical exercise.

4.4.4 Marital status and adherence to treatment

A lot of studies have associated patients' marriage status with their health seeking conducts. Despite being a relevant factor in the topic of medical adherence, the current study did not find any correlation between the participants' marital status and their adherence behaviors to diabetes treatment regimens. Besides, although the researcher was unable to prove how the patients' marital status affected their treatment adherence levels, earlier studies by Cooper et al. (2005), De Geest et al. (1995), Frazier et al. (1994) and Turner

et al. (1995) have showed that married patients actually portrayed positive adherence behaviours as opposed to the single ones. A major aspect contributing to this trend is the fact that married people receive much support from the nuclear family members including children and spouses. However, some recent studies especially those conducted by Ghods and Nasrollahzadeh (2003), (Kaona et al., 2004), (Spikmans et al., 2003) , Wild et al. (2004) and Yavuz et al. (2004) found no relationship between marital status and treatment adherence. This disparity might be because the more recent researchers focused on researching how marriage influence certain illness conditions, which do not correspond with the ones assessed in older studies.

4.4.5 Types of the treatment regimen

The study further collected data in relation to the kind of treatment undertaken by each participant and the duration of time that they had been on a specific type of treatment. The data was vital in determining the adherence and non-adherence levels for particular treatment regimens from each participant as highlighted in ***table 4.8***

Table 4. 8: Types of medication/treatment

Type of treatment regimen	Frequency	Percentage
Conventional medication (Insulin,	210	64%

oral medication)		
Regular sugar testing	70	21%
Exercise and diet control	30	9%
Alternative traditional medicine	20	6%
Total	***330**	**100%**

*Multiple responses applicable

From the results, conventional medication, which included oral medicine and insulin, were the dominant treatment regimens used by most of the interviewed participants. This trend can be attributed to the fact that the sample population for this particular study had type 2 diabetes. However, drawing from a study by Senior et al. (2004) patients vocalized their preference on insulin injection to oral medicines owing to the perception that injections worked instantly since it is directly absorbed into the blood as compared to oral drugs.

Besides, a number of participants communicated about their preference of using traditional medication concurrently with the prescribed conventional medication. Prompted to mention the details about the traditional medicines used, they mostly mentioned *Moringa* seeds and leaves, avocado seeds, okra pods, soursop leaves, lemongrass and black plum bark. The participant also mentioned a variety of vegetables including a variety of spices like cinnamon, ginger and garlic and a bunch of locally available green leafy vegetables and they reported that these traditional medicines had the potential of curing diabetes especially if taken frequently and in large quantities. Some participants also cited that they prepared a variety of herbs including rosemary flowers, aloe

vera, and bitter lemon, which they believed were effective in managing the disease. The herbs were in most cases drunk raw or mixed with different beverages prepared in the house including hot milk, hot water, hot porridge and hot tea. Noteworthy, the participants reported that they did not follow a specific time frame when using these traditional medications, and that the use depended on the participants' health status at that moment.

The participants reported that most of these traditional medicines were available locally from the markets, their own or their neighbors' garden and herbalists, thus making it easy to access. When prompted, the participants reported that the local herbalists obtained their herbs locally and prepared the concoctions using their experience.

Drawing from the data collected from a section of participants receiving nutritional education, the most popular herbs for diabetes treatment were *Moringa* seeds and leaves, avocado seeds, indigenous leafy vegetables like spider plant, amaranth and nightshade, and lemongrass. Quoted below are comments from participants on their use of traditional herbs and medicine:

> *"After being diagnosed with diabetes, I immediately started using rosemary flowers and moringa seeds to control my illness. They have proved extremely effective in dropping my sugar levels."* (Patient A1)

> *"I normally get my herbs from an herbalist around my home, and other times from bushes and gardens near me. For vegetable, fruits and*

spices, I can easily procure them from a local market. Dried aloe vera is also available in the market." (Patient A2)

Most participants who used herbs and traditional medicines attributed it to the high costs associated with diabetes medication, ease of accessing traditional medications, referrals from family and friends who had used the same and thought they were efficient. Other participants believed that the combination of conventional and traditional treatment methods worked better in controlling diabetes as opposed to using one type of medication. Besides, participants who were using traditional forms of cure believed that traditional methods were effective in managing complications that arose from diabetes including low immune system and kidney issues, as well as relief from constipation issues and hypertension.

4.4.6 Education Level and adherence to treatment

Treatment adherence studies highly consider a patient's literacy level. According to (Kalyango et al., 2008) this is especially vital to the study of diabetes treatment adherence since it determines the patient's level of understanding to treatment regimens prescribed by a health worker. Similar to marital status, the current study failed to find any tangible evidence to back up the correlation between these two variables.

However, a number of studies do not consent to these findings. For instance, according to studies by (Rwegerera, 2014) and (Gimenes et al., 2009) the researchers revealed that there was a correlation between the two variables, in

the context that patients earning high salaries portrayed higher rates of adherence Similarly, Okuno et al. (2001), Ghods and Nasrollahzadeh (2003) and Yavuz et al. (2004) also settled that high earnings promote higher adherence levels.

Surprisingly, just like the current study, past studies by (Kaona et al., 2004), (Spikmans et al., 2003), (Stilley, Sereika, Muldoon, Ryan, & Dunbar-Jacob, 2004) and Wai et al. (2005).have also reached a similar conclusion where income did not have any impact on adherence traits. It therefore suffices to deduce that level of education works differently in various content of shaping treatment and adherence to diabetes treatment.

4.4.7 Social support and adherence to treatment

Extensive research on behavioral and social sciences has been done to exclusively determine the correlation between the patients' treatment adherence conducts and the social support that they access. However, researchers are yet to grasp the exact mechanism that explicitly explains how social support fosters positive health consequences. A study by (DiMatteo, 2004) and other researchers have however revealed that social support contributes to positive attitudes capable of benefiting an individual's health by mitigating stressful events, promoting self-efficacy, converting a person's affective states, and persuading change in health outcomes by eradicating negative perceptions and behaviors.

Findings from the current study revealed that the participants enjoyed adequate social support from various sources of support systems within the society as portrayed in ***table 4.9*** below:

Table 4. 9: Level of support

Type of social support	**Level of support (%) ***			
	None (1)	**Sometimes (2)**	**Often (3)**	**Regularly (4)**
Support from family	1%	8%	20%	71%
Support from friends	4%	23%	29%	44%
Support from community	37%	26%	18%	19%
Psychological support	11%	20%	18%	52%

**Multiple responses allowed*

From the relayed data, most participants (71%) received regular support from family members, followed by psychological support (52%), friends (44%) and finally the community (19%).

Despite being a fundamental factor in diabetes management, research has also linked social support to a few negative health consequences. Some studies including one by Carter (2004) have revealed that some patients experience criticism, distress or stigma from different social constructs particularly when required to adhere to certain medication or lifestyle change therapies, and feel guilty of asking support from some members of their family. Similar studies including one by (Gallant, MacKinnon, & Sprague, 2007) have revealed that

competing demands among family members and the patient is a major barrier to disease management. The author explains that this might occur, for instance, when family members demand to be served the same food as the diabetic patient who is on prescribed diet. Such competing, according to Gallant, demands limit patients' options in diet control, consumes their energy and time consequently introducing them to stress which is bound to negatively influence their attitude and behavior towards treatment regimens especially when juggling between their illness and manifold family roles.

4.5 Individual /patient history factors in influencing adherence to diabetes treatment

On the third research objective, the researcher sought to establish the kind of influence that an individuals' history had on influencing their adherence behaviors to the treatment regimens of diabetes. To accomplish this, the researcher analyzed factors related to the participants' history and whether these factors influenced the participants' adherence tendencies to diabetes treatment regimens in any way.

The researcher further examined the participants' history in regards to the illness in order to get a clear picture of the historical factors that could have influence their adherence tendencies. The patients' historical factors analyzed here included the location of their residence from the clinic, the time when the participant was diagnosed with diabetes, the duration of treatment, and the prescribed treatment regimen including prescribed medicine, insulin, glycemic control and non-medicinal treatments like physical exercise and diet.

4.5.1 Respondent's distance to the nearest health facility

The location of the patient's residence in terms of the distance travelled to the healthcare facility is a fundamental variable in the study of treatment adherence. The main belief around the relationship between the distance covered to get treatment and treatment adherence is that people who have a long distance to cover or reside in areas with underdeveloped infrastructures such a roads and other transportation means are more likely to register higher non-adherence tendencies towards compliance to treatment regimens as compared to patients residing nearer or can easily access the healthcare facility. According to an Indian study by Turner et al. (2005) on the deterrent effect of distance to travel and adherence to treatment regimens, the researchers discovered that the longer the distance and time required to reach the medical facility, the more patients are deterred to visit the hospital to top up their prescribed dosage, consequently leading to poor adherence levels.

Drawing from the data collected by the current study, the researcher reported that the highest number of participants (65%) had to travel between 5 Kms and 10 Kms to access the diabetes clinic in Thogoto Hospital. The short distance enabled them to adhere to scheduled hospital appointments. Another 19% of the participants resided less 5kms from the clinic: a considerable walking distance walking distance, hence making it impossible for them to miss a single appointment.

Table 4. 10: Distance to the health facility

Distance to the nearest health facility	Frequency	Percentage
< 5kms	45	19.9
5 - 10 kms	147	65.0
10 - 15 kms	17	7.5
15 - 20 kms	17	7.5
Total	**226**	**100.0**

4.5.2 Year of diagnosis

Data collected from the current study indicated that the patients under study were diagnosed in varied years. As recorded in ***Table 4.11*** the highest number of participants (45%) were diagnosed between the year 2010 and 2015.

Table 4. 11: Year of diagnosis

Year of diagnosis (Cluster)	Percentage (%)
1990 - 1995	5%
1995-2000	7%
2000-2005	18%
2005-2010	25%
2010- 2015	45%
Total	**100%**

One notable trend from the presented data is that the number of diabetes patients began to rise steadily from the year 2000. This observation is in

correspondence with WHO's reports that diabetes has been on the rise globally since the early 2000s (WHO, 2014). A significant supposition that can be drawn from these results regarding the high number of patients diagnosed between the year 2010 and 2015 frequenting the clinic could be due to the current lifestyle changes which have been documented in the literature review section of the study. Most people are currently not physically fit and the diet that they are involved in is not a healthy diet.

The current findings were augmented with an earlier study by (Manjusha et al., 2017) in India, where the authors reported a significant correlation between the diagnosis period and adherence to prescribed treatment among the patients. The findings further pointed that patients were more aware and committed to the prescribed treatment plans during the initial years of their diagnosis, before fading out after a few years as the patients adjust to the illness consequently declining their adherence levels.

Contrary to the above findings, a number of studies, including one by Park et al. (2010), have revealed that patients who were recently diagnosed with diabetes were less compliant to medication and self-care practices during their initial treatment phase. Contrarily, the authors also cited that individuals who had been diagnosed long ago had learned more about the disease and developed a sense of security and self-confidence towards the prescribed treatment regimens for diabetes.

4.5.3 Seeking of non- conventional alternative treatment

From the data collected in the current study, the researcher discovered that despite the positive adherence traits among the participants, some of the patients still reported to use of traditional treatment methods as an immediate alternative. According to the participants, traditional treatment usually came in handy when they could not access prescribed treatment. While most of them used both traditional and conventional medication concurrently, others only used it in instances where they could not access prescribed treatment. In quoting one participants, they indicated that:

> *"Whenever I bounce treatment from the clinic, I immediately resolve to the use of herbal medicine. Aloe vera is my favorite: I usually boil it and put it in storage for two days and boil it with honey before taking it. Since its never certain when the biomedical drugs will be available, it is hard to sit and wait while my condition deteriorates."* (Patient A1)"

Besides, 10% of the participants confessed to using herbal medicine often due to the inability to access medical facilities because of high transportation costs and distance constraints.

> *"One of my friends refused to abandon traditional herbs and medication because he could not afford transport to the clinic when he needed to top up his dosage. He planted some of the herbs on his garden, hence the convenience in using them."* (Patient A2)"

Other patients believed that to obtain optimum results, they had to use both the traditional and conventional medication concurrently. According to one participant:

> *"Good news is that I can take my herbal medicines and my biomedical dosage at the same time without the fear of side effects and complications."* (Patient A3)"

Similar reports were noted from the key healthcare informants who participated in this study. Apart from the ease of accessing traditional medications, the key informants augmented patients found herbs and other traditional treatments methods easy to administer without the fear of complications. The traditional treatment regimens did not adhere to any particular prescription. Besides, this treatment method is highly embraced by the community.

> *"Traditional herbs medication can be easily acquired… besides, they do not follow any formal prescription like conventional medicines that we administer at the clinic: patients are free to consume any quantity of the herbs at any given time. Besides, the fact that they can take the herbs concurrently with our medicine, they find the regimen more flexible."* (KI health worker).

The concurrent use of traditional and conventional medication is not prohibited by medical personnel. The participants reported that the doctors allowed them to use herbal medicine provided that they also adhered to their prescribed medication.

> *"A number of patients have reported that they use herbal medicine together with our drugs. When a patient inquiry about the concurrent use of these two regimens we usually allow them in condition that they also continue using the drugs that we have prescribed at the clinic."* (KI health worker).

The key informants further attributed the high use of herbal medicine to the patients' burden of affording conventional medications. Noteworthy, herbal medicine was usually sold cheaply in large quantities, thus lasted longer. Insulin shots, on the other hand, hardly last a week. Therefore, when financial constrained and could not afford prescribed drugs, patients easily substituted treatment with herbal medication.

> *"When the patients are penniless and cannot afford biomedical drugs from the clinic, they immediately recourse to herbal medication. Herbs are sold in large quantities and last longer as compared to the time the insulin lasts*." (KI health worker)"

The researcher noted that despite some participants reporting that they used traditional treatment methods, a majority of the sample size still used conventional medication prescribed at the clinic. Despite having enough medication to cater for all diabetic patients in Thogoto Hospital, the key informants could not overlook the truth that some patients used traditional medication. Some participants experienced distance challenges: this indicated that the formal system of healthcare presented traveling challenges in terms of cost and availability of medicine. A number of researches have marked poor

infrastructure in Africa's sub-Saharan territories as a major challenge in diabetes management including one by (Gning et al., 2007). According to the authors, most patients do not have access to good treatment facilities that deal with diabetes management.

Another burden faced by hospitals is the inadequate supply of drugs for most chronic illnesses, particularly in rural regions. According to (Hall, Thomsen, Henriksen, & Lohse, 2011), African health care systems are developing and are yet to adjust from the burden of communicable illnesses to the increasing numbers of chronic diseases. The challenge of accessing conventional medication due to high costs is further complicated by the fact that traditional medications are affordable and can be accessed easily. A study by (Hall et al., 2011) has further proved that most patients opt for traditional treatment regimens for their affordable prices. Diabetes treatment is expensive and the financial burden that it places of patients and their households should not be underrated.

Table 4. 12: Duration of treatment

Type of treatment	**Duration of treatment**			
	< 12	**6 Months**	**3 Months**	**Can't**

	Months			**remember**
Insulin	5%	5%	8%	14%
Conventional Medication	48%	64%	61%	29%
Regular sugar testing	47%	31%	31%	57%
Total	**100%**	**100%**	**100%**	**100%**

Data portrayed in table ***4.12*** reflects that a majority of the participants were taking their prescribed medication, followed by those under regular blood sugar testing and finally insulin. Under conventional medication, a few patients were undertaking treatment regimens that included physical exercise and diet control. Patients placed on dietary treatment were scheduled to visit the clinic every Wednesday and they would be addressed by a professional dietician on how to better manage their condition.

4.5.3.1 Diet control and physical activities

The survey conducted by the researcher revealed that only a small fraction of the participants performed physical exercises and followed a working diet control plan. Participants who exercised and observed their diet explained that they practiced these treatment regimens to better manage their condition. True to this claim, (Steyn et al., 2004) in their study reported that following a prescribed diet plan was vital in maintaining good health among diabetic people. Diet therapy entails the consumption of nutritious foods while

maintaining a healthy body mass. Steyn and his team further claim that a healthy nutrition is a vital impact in controlling the consequences and treating type 2 diabetes. The authors also assert that an effective diabetes nutritional therapy helps in glycemic control due to the types of food recommended for the therapy. Nutritional therapy is also vital in mitigating chances of complication in the future. Effecting dietary changes is vital in the management of type 2 diabetes. Therefore, by religiously sticking and adhering to the nutritional and physical exercise guidance provided by the physician, close monitoring of glucose levels and complying with medication prescriptions, patients can significantly defeat any risks attached to the disease. Besides, according to the National Institute of Diabetes & Digestive & Kidney Diseases (2019) the intake of insulin requires patients to watch their diet.

(LaMonte, Blair, & Church, 2005) refers that the positive relationship between physical exercising and the treatment types 2 diabetes was first explained by Aristotle after he discovered that constant exercising reduced the symptoms of the illness. Contemporary studies have fully documented the benefits of exercising and especially on diabetes. These studies have suggested that physicians should systematically incorporate exercising in patients' treatment regimen for effective management of the illness. Shedding weight has been found to significantly help in the body's glycemic control among overweight patients.

4.5.4 Regularity of clinical review

Diabetic patients who have been put under insulin treatment are required to visit the clinic once in every three months. Those under pill medication or placed on a diet plan to manage the illness are required to visit the doctor in every four months. According to Diabetes Care, (2012) a patient whose blood sugar is left uncontrolled or experiences complications is required to frequently see his or her doctor.

Data collected from the current study indicated that 80% of the participants attended clinical reviews on a monthly basis, while the other 20% attended checkups either quarterly, bimonthly, biweekly or weekly as illustrated by ***figure 2***.

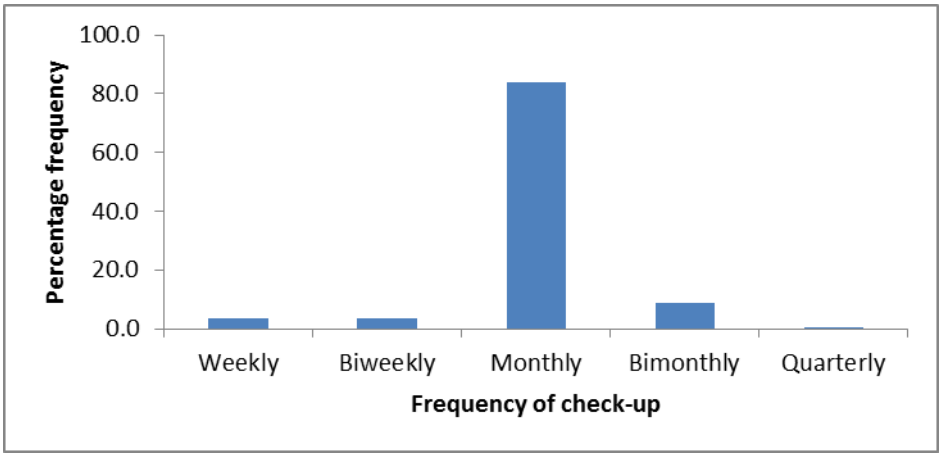

Figure 2: Clinical review

Noteworthy, most patients who attended clinical reviews every month felt that the frequent visits were vital for controlling the disease. Besides, nutritional clinics which were scheduled for every Wednesday of the week were a great contribution to the monthly visits.

4.5.5 Reason for irregularity of clinical review

The participants gave various reasons for their irregular visits to the hospital for reviews. The results as portrayed in ***table 4.13*** showed that out of the participants interviewed (21.8%) failed to meet their appointments due to financial glitches. Work related commitments and family emergency were the other main causes for missed appointments, both rated at 19.3%. Negligence was the least cited reason at 1.7%. The most significant reason as cited by the participants for missing some of the reviews at the hospital was lack of financial support, followed by family emergencies and work related issues.

Table 4. 13: Reasons for missing appointments

Reason for missing appointments	**Frequency**	**Percentage**
Distance	5	4.2
Family Emergency	23	19.3
Lack of financial support	26	21.8
Work related	23	19.3
Transport related	8	6.7
Health Self- assessment	16	13.4
Travelling	8	6.7
Personal schedules	8	6.7
Negligence	2	1.7
Total	**119**	**100.0**

4.5.6 Patient's understanding of prescriptions

An early research by Berger (1999) showed that patients who constantly discussed their diabetes management strategies and treatment goals produced better clinical results in comparison to the passive patients. An effective communication and conducive relationship between patients and their doctors were great contributors of positive behavior among patients (Loring, 2003). According to Loring, patients privileged with such treatment conditions were normally frequently monitored by their doctors: this played a vital role in the patient's self-management of the disease. Furthermore, Piette et al. (2003) asserts that patients who are keen on getting instructions, information and guidance during their clinical review appointments are more pledged to know and follow their treatment options and regimens, admit their situation, and enhance their adherence attitudes and traits.

Following the significance of diabetes control and self-care management in the treatment and reduction of consequences arising from diabetes, the researcher proceeded to enquire how many participants had a good understanding of their treatment plans. As seen in ***table 4.14***, most participant (64%) commented that they were well conversant and understood their prescribed treatment plan, while the remaining few (36%) confessed to not possessing clear knowledge of how their prescribed treatment regimen actually worked.

Table 4. 14: Understanding of treatment prescriptions

Do you understand the prescription of the medication given by the doctor?		**Frequency (n)**	**Percentage (%)**
	Yes	185	64
	No	105	36
	Total	**290**	**100**

4.6 Role of individual/ patient history factors on adherence to diabetic treatment

Under this section, the study explores a number of individual factors related with adherence behaviors to diabetes treatment regimens. Generally, these are the factors that influence the patient's decision to seek treatment after diagnosis and later comply to the prescribed treatment plans. The study classifies these factors as frequency of checkup visits and prescription knowledge. The correlation between these individual factors and adherence to diabetes treatment regimen were determined using a Chi-square as shown in ***table 4.15***.

Table 4. 15: Individual /patients history factors influencing adherence

Variables in the Equation	**B**	**S.E.**	**Wald**	**d.f.**	**Sig.**
Duration of the treatment	0.87	0.81	0.153	1	0.12**
Patients understanding of prescriptions	0.09	0.41	0.044	1	0.04**

Regularity of clinic review	0.03	0.6	0.003	1	0.02**
** significant at 95 level of confidence (α=0.05)					

The above table presents the Chi-square test result that was generated to determine any association between the variables of adherence and patient history. The test wanted to test the individual or patient factors influence the adherence of patients towards prescribed treatment regimens. The findings noted a significant association between patient's treatment and prescription knowledge and adherence to medication. The logic behind this outcome is that individuals can only adhere to something they understand. A significant relationship was also noted between adherence and regularity of clinic visits. However, no association was noted between the patient's period of treatment and their adherence level.

4.6.1 Duration of recommended treatment

In regards to the diagnosis period or length of treatment, Kacerovsky-Bielesz et al. (2009) revealed that people who have been recently diagnosed and are in the preliminary treatment stages are less likely to adhere to prescribed treatment regimens and do not have self-care management. Contrarily, Rosenman et al. (2011) cited that individuals who had been diagnosed longer ago had learned more about the disease and developed a sense of security and self-confidence towards the prescribed treatment regimens for diabetes. Kacerovsky-Bielesz et al. (2009) explains that a few years after diagnosis, the adherence of patients to treatment regimens is weakened due to various reasons including reduced

motivation, lack of hope for positive treatment outcomes, reduced social support, and cultural underpinnings among others.

Considering the outlined facts, it is vital for health experts to increase or channel their focus more towards individuals who have been recently diagnosed with the diabetes and strive to educate them on the chronic nature of diabetes as well as the benefits of adhering to prescribed treatment regimens. Besides, medical experts should investigate patients' beliefs and attitudes that are detrimental to positive adherence tendencies. Besides, motivation levels and potential hinderers to adherence among patients with longer diagnosis periods should be assessed.

Drawing from the data presented in ***table 4.11*** earlier in the study, the greatest number of participants (45%) diagnosed between 2010-2015 reported that they have been under treatment for at least five years. The patients' adherence to recommended treatment regimens relied heavily on the duration of time that the patients had been on treatment. Those who adhered to the prescribed treatment reported that they were well conversant with the risks associated with non-adherence.

> *"I was diagnosed with diabetes six years ago and through all these years, it is now easier for me to obey my treatment plan because I am now more aware and have accepted my condition unlike before. I understand that road to cure starts with self-care management and sticking to treatment."* (Patient A3)"

4.6.2 Patients' understanding of prescriptions

A number of qualitative researches have marked 'patient knowhow of prescribed medication' as a significant determinant to treatment adherence (Borgsteede, et al 2011). Therefore, patient counselling and education using simple language is vital immediately after diagnosis and during follow-up.

Studies have noted approximately half of the people suffering from a chronic condition do not follow their treatment as prescribed mainly due lack of knowledge. Non-adherence to prescribed medication, especially in chronic conditions, have extreme health consequences including deteriorating health and death. Besides, as noted by (Zullig et al., 2017), the implications of non-adherence to diabetes treatment regimens extend beyond the patient to the family and the community.

Results from the current study as indicated in ***table 4.14*** showed that 64% of the participants claimed to understand their medication prescription, thus indicating a positive adherence tendency. From these findings, it is evident that a significant relationship exists between patient understanding of prescribed medication and treatment adherence.

> *"The medical staff here are very friendly. They have explained to us in simple terms the times of medication that we will be given, the frequency of taking the medication and things to avoid while on treatment. This understanding will help me take observe the correct dosage and control my illness."* (Patient A4)"

4.6.3 Regularity of clinic review

A significant way of controlling the aftermath of diabetes is through the number of times the patient attends the scheduled clinical reviews; the higher the number of visits that the patient makes to the doctor the more he or she is likely to comply to the stated treatment regimen and mitigate complications that are prone to diabetes. The data collected in the current study revealed that 80% of the interviewed participants visited the diabetes clinic in Thogoto Hospital for check-ups at least every month. The patients reported that the main reason why they managed to keep up with the monthly visits was because the clinic was accessible and was operated on a daily basis. The other 20% of the patients reported that they visited the clinic for quarterly, bimonthly, biweekly, and weekly clinic reviews.

Despite the finding that 80% of the patients interviewed frequented the hospital, some of them were not compliant to the scheduled checkups and this negatively impacted their adherence to the prescribed therapy.

4.6.4 Cultural beliefs influencing adherence

Personal beliefs about illness include both cognitive and emotional representations. Cognitive beliefs include five core domains: (1) “identity” describes peoples’ beliefs about the label of illness and symptoms, and sets out the targets for change (such as to eliminate symptoms); (2) “timeline” refers to people’s perception of the duration of illness, including symptoms and recovery; (3) “consequences” refers to beliefs about the seriousness of the

disease and the impacts on daily life; (4) “control” refers to perceptions about the amenability of the illness to being cured, prevented or treated; and (5) “causes” refers to people’s perceptions of the possible causes of their condition. Emotional representations are the feelings that arise as a result of illness, such as anxiety and/or depression (Aujla et al., 2016).

The cultural beliefs and values held by patients can significantly influence the way they understand and embrace the treatment regimens for diabetes. For a better understanding of the wider cultural context of individual or a group resides, Tripp-Reimer et al. (2001) suggests that a cultural assessment is necessary: and at the same time the assessment can provide the needed background information to preside over the design of culturally acknowledged healthcare interventions. (Tripp-Reimer, Choi, Kelley, & Enslein, 2001) suggests that in order to deliver culturally competent care, the cultural beliefs, illness beliefs, health behavior and beliefs of both an individual and a group need to be observed.

From the findings observed in the current study, it is clear that the cultural beliefs and values of patients play a major role in influencing treatment adherence levels among patients as the study revealed that the cultural and religious beliefs of the diabetic patients significantly impacted on their adherence as portrayed in ***table 4.16*** below:

Table 4. 16: Cultural factors and adherence

Cultural factors	**Does your cultural/ religious**

	belief contribute to your adherence to treatment?	
	Yes	**No**
Cultural beliefs	78%	22%
Religious beliefs	67%	33%

Cultural views have the ability to either to modify patient's conduct towards disease management. Culturally shared beliefs have the potential to both promote and impede health behavior. Therefore, when the influence of culture is not included in research, explanations for the causes of treatment adherence could be misleading. Research on the influence of cultural factors on diet adherence may elucidate some reasons for the variability in treatment adherence, and highlight the need to integrate cultural and psychological factors when examining health behavior.

For instance, general cultural factors that have been related to health behaviors in the extant literature include collectivism (i.e. duty to one's in-group) and familyism (i.e. putting one's family before oneself) because they contribute to one's confidence to make behavioral changes (Oyserman, Kemmelmeier, & Coon, 2002); Schwartz, 2007). Although general cultural factors influence health behavior, previous research has highlighted the need to identify cultural factors within specific groups (e.g. ethnic minority or socioeconomic groups) from the bottom-up in order to identify important elements of subjective culture

that influence health behavior, and ultimately, contribute to more tailored interventions (Betancourt et al., 2010).

Some socially shared norms may actually act as a significant barrier for diet adherence among T2D patients, such as temptation to eat unhealthy food, eating out, feeling deprived, time constraints, and social events (Marcy, Britton, & Harrison, 2011). Although not the focus of the proposed study, it is also important to note that socially shared norms can be protective if they reinforce health behaviors.

4.7 Health care system factors influencing adherence to diabetes treatment

There are many healthcare system factors that can influence treatment amongst patients. Data collected from the survey revealed that treatment adherence can also be influenced by extraneous aspects of the health care systems. Factors related to health care systems control the patient's decision on whether or not to visit a health care facility for further treatment. The two health care systems factors that were more pronounced during the study were reception from hospital personnel and drugs availability.

4.7.1 Reception from the health staff

The manner in which the hospital workers welcome the patient is vital for patients visiting the facility to seek medical attention. From the survey, most of the participants (85%) talked positively about the reception they received at Thogoto Hospital. Quoting one of these participants:

"I liked how the hospital staff treated me on arrival. The doctor was kind and carefully listened to what I had to say and later gave me appropriate medication. I also overheard a few nurses asking patients on how they were feeling and how they are keeping up with the prescription given to them."

(Patient A5).

However, a small group of the participants (2%) complained about the hospital's reception, while 6.5% of them found it fair and satisfactory. Generally, the good reports by most of the participants about the kind of reception received at the hospital were among the reasons for the high adherence levels portrayed by most participants. The 2% complained about the reception because their objectives were not exhaustively attained as they had intended.

Figure 3: Reception from health staff

Drawing from a study by the African journal of primary healthcare and family medicine (2011) conducted in Ethiopia's Addis Ababa, the significance of quality of care provided by personnel in a health care facility and the presence

of appropriate service providers are major facilitators or barriers of treatment adherence among patients. The study also mentioned that healthcare providers continue to play an important role in creating positive adherence tendencies among diabetic patients on both the administration of insulin and prescribed treatment.

4.7.2 Availability of Medication

A collective of 41% of participants reported during the interview that they adhered to the prescribed treatment. Noteworthy, a majority (67%) of them pointed out that the hospital always had constant supply of medicines prescribed to them by the doctor. This ready availability of the prescribed medication made it easy for them to acquire the much needed medication without much hustle. The availability of medication also gave the patients the morale to go for the recommended checkups because they knew that the medicine needed by them was readily available at the hospital. Undoubtedly, this could be some of the reasons why most participants were found to adhere to the prescribed regimens.

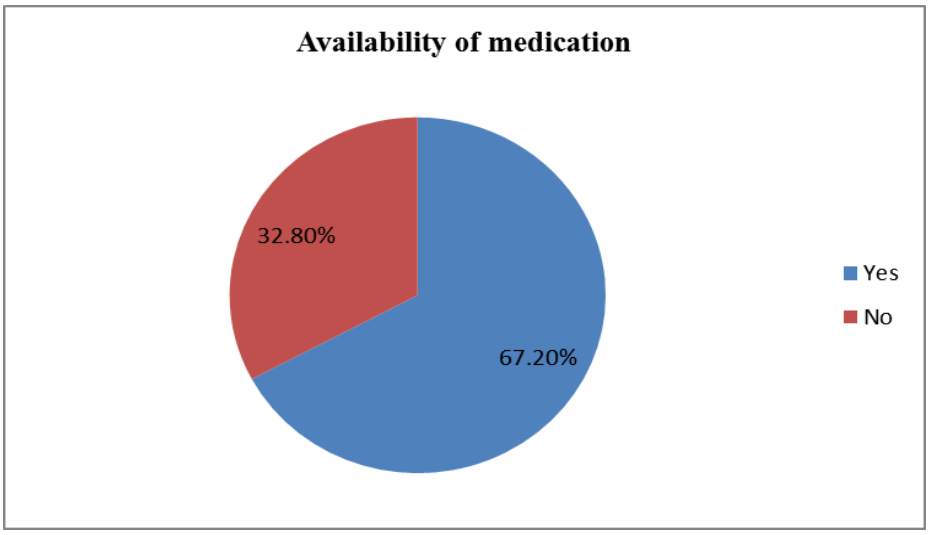

Figure 4: Availability of medication

Among the key factors for the great patient adherence to treatment regimens was the constant availability of drugs at hospital's pharmacy. A number of the participants indicated that they had not encountered any problems especially when it came to availability of drugs at the hospital but they reported concerns on free medicines (or programs that allow them to purchase medications for reduced prices) which were available but in limited numbers, since they were not able to afford buying the prescribed drugs externally from sources that are not free or funded. The implications of this were the decreasing medication doses, going by without the medicines and even having to purchase expired medicines from illegal sources.

Limited research has been conducted on the effects of the healthcare providers and healthcare system-related factors on adherence by patients. Whereas a good patient-provider relationship may influence adherence, there are many other factors that have a negative effect on the same treatment adherence (WHO,

2003). These factors include poorly developed health services with inadequate or non-existent reimbursement by health insurance plans, poor medication distribution systems, lack of knowledge and training for health care providers on managing chronic diseases, overworked health care providers due to shortage of the same, lack of incentives and feedback on performance of the healthcare workers, unavailability of a well-established patient education system, lack of a follow-up plan, brief and unsatisfactory consultation sessions, incapacity to foster self-management and support from the public, poor knowledge on treatment adherence and lack of effective interventions to improve adherence among patients.

4.8 Suggestions for enhancing adherence among diabetes patients

Despite the significance placed on adherence to treatment regimens, (Cramer, 2004) posits less than 50% of patients with a doctor's prescription, comply to their prescription. The researcher proceeded to probe for intervention methods to enhance treatment adherence among the diabetic community.

The alleged blockades to treatment adherence as drawn from the theoretical framework included cost of treatment, lack of knowledge and treatment traits. The study however established that in the case of the patients at the Thogoto hospital, most of them were equipped with the necessary information on type 2 diabetes and how to follow their prescription: knowledge that they earned from attending clinic reviews. Despite having this knowledge, a few patients still doubted the effectiveness of the medication prescribed and proceeded to top up

their prescription with traditional medicine and often ignored the prescriptions. In the words of one respondent;

> *"The medicine that are being produced nowadays are not as effective as traditional herbal medication that we used while growing up. In fact, they are better because they do not have negative side effects"* (Patient A6)"

In their study, (Jeragh-Alhaddad, Waheedi, Barber, & Brock, 2015) augments these findings by the outcome of their study that indicated that the deficiency of knowledge and awareness on diabetes as a disease, its treatment regimens and misplaced beliefs on diabetes and its medications can negatively interfere with the patients' adherence to treatment regimens.

The patients in the current study also expressed their concern to the government on the need to recognize traditional medicines and healers, as well as allowing them to conduct their operations legally. The reason was because this was consistent with their beliefs on traditional or herbal prescriptions. One respondent indicated that

> *"Herbalists have acquired generational knowledge on the treatment regimens that they use and they are very good at it; therefore, the government need to consider giving them permits to attend to patients. Their treatment methods and herbs have been helpful to me especially since conventional medication is expensive"* (Patient A7)"

Some patients reported experiencing difficulties in administering the insulin injection as well as storage which required some equipment that they did not

have like refrigerators. As a solution, the patients thought that the healthcare providers should provide them with alternative ways of storing the insulin and also if possible, substitute insulin treatment with another form of treatment that is easier and manageable.

Some patients thought that the idea of availing mobile clinics in the villages would ease the access to care, consequently leading to better diabetes management. The participants expressed that mobile clinics would save them the high transportation costs incurred while visiting Thogoto Hospital. They expressed that the mobile clinics would especially be helpful when launched during significant days in the community like market days and during special community events like barazas or chief meetings.

> *"The hospital provides nice services, but it would be better if the government provides mobile clinics that can be accessed by masses especially in remote villages. Transportation costs are always hiking and now more than ever, people can hardly afford to visit the hospital for treatment. The mobile clinics will mostly help the poor and the old, who are the most affected population, in managing their disease."* (Patient A8)"

Patients complained that there was low social support especially from family members. This is because in this study, family, doctor and community were the three important sources of social support for the patients in regards to medication adherence. Of the three, the most important was the support from the family. Because of this reason, the patients recommended that the hospital

should have awareness classes maybe once a week for the social support system to attend, learn more about the disease and what kind of support they can offer the patients. This was supported by a patient who said that;

> *"Family unity is important when dealing with diabetes, especially when put on a special diet. Not everyone in the family understands the importance of special diet, hence it is difficult fully comply with the dietary prescription. It would be a good idea to arrange classes for families to sensitize them on the role of dieting in controlling diabetes. This is the best way to foster familial support"* (Patient A9)

According to another patient interviewed, this support would be easily attainable through family education. Besides, policymakers should also be educated to broaden insurance coverage for chronic cases and amass pressure on the media to develop programs that promote community awareness on diabetes. Health care providers should also be pressured to practice effective patient-doctor communication.

The key informants selected for the study expressed to the researcher the need for the national government to equip health care facilities at the County level with several diabetes clinics to curb the current tendency of referring diabetic patients to clinics that are hardly accessible to them when they require treatment. They also expressed the need to double up on the number of medical practitioners to enable quality treatment for patients countrywide.

In conclusion, for the enhancement of adherence among the diabetes patients the use of herbal medicine for those who believe in its healing powers should be encouraged by the healthcare workers. There is also the issue of recognizing the traditional healers in their provision of alternative medication to the patients. In addition, the government should look at how patients from all walks of life can be taught on the correct way to administer insulin and also on the alternative methods they can use for insulin storage. Social support education should be encouraged in all medical facilities; this is important because then the patients will not feel like they are alone in the management of their disease. There should be the availability of mobile clinics especially in the rural areas and more so during public gatherings so as to reach patients who cannot access the clinics because of lack of transportation and distance barrier. Lastly, policy makers should increase the insurance covers for patients with chronic illnesses and create awareness of the community on diabetes as a disease; how it can be managed and what can of treatment regimens are available for the patients.

4.9 Conclusions to the chapter

The chapter was a broad review of the elements significant in influencing treatment adherence among diabetic patients interviewed at Thogoto hospital when they came for treatment. The main factors that were considered as vital in influencing treatment adherence among patients included age, gender, and income.

The other important factor that contributed to the understanding of non-adherence tendencies to treatment regimens among patients were factors related to the history of individual patients. These factors were: the patient's level of prescription knowledge and the frequency of clinical review visits made by the patient. The findings from the study revealed that most patients visited the clinic on a monthly basis for their scheduled check-ups. These patients credited the frequency of the visits to ease of accessing the hospital and the fact that the clinic operated on a daily basis. However, a smaller fraction of the total participants interviewed indicated that they did not frequent the hospital for checkups. These patients blamed their inconsistency on being financially handicapped, thus they could neither afford transport to the clinic nor purchase the required medicines. An insignificant number was hindered by work-related issues and family commitments.

Additional factors that had significant influence on treatment adherence among the interviewed patients were related to health care systems. These factors included reception received from hospital workers and the availability of prescribed drugs in the hospital. From the study, it was evident that these factors had the patients feeling valued consequently encouraging them to follow their prescription as directed by the personnel at the clinic

The cultural or religious beliefs shared by the patient were also big influencers of treatment adherence. Some patients were found to be well informed about diabetes and the frequented the hospital for treatment. However, a significant also confessed to be using traditional treatment methods like herbal medicine.

Some patients from this group testified that whenever they visited the hospital and did not get medication, they used herbal medication and other traditional treatment methods. Others indicated that they used the herbal medication concurrently with the conventional drugs and other treatment regimens prescribed at the clinic. Most of the patients who used traditional medication explained that they used them because they were easily accessible and cheap to acquire. Others believed that they were an effective method of treatment. Finally, social support from friends, family and the community also influenced adherence to treatment among patients.

CHAPTER FIVE: SUMMARY OF FINDING, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter is a summary of all the findings made from the study. While some social factors were found to significantly influence diabetes treatment adherence, some did not have any impact.

5.2 Summary of findings

The current study was a broad analysis of a number of social aspects concerned with adherence traits towards to the recommended diabetes therapy among patients. The underlying study objectives included; to determine the non-adherence status to recommended diabetes treatment regimen among patients in Kiambu County; determine the socio-economic factors that promote non-adherence tendencies to the recommended treatment regimens among diabetic persons in Kiambu County; to determine the personal traits and cultural factors that promote non- adherence tendencies to diabetes recommended treatment regimen among patients; and to recommend methods of promoting adherence to specified treatment regimens among diabetic patients in Kenya.

The total participants included in the study were 285; this consisted of 136 males and 149 females. The inclusion criteria considered patients with type 2 diabetes and those who had been on treatment regimens for at least 12 months. The study revealed that the most common treatment for type 2 diabetes included insulin, blood sugar test and control, and oral medicines, while a minor fraction of the participants revealed using non-conventional methods like

herbal medication. The study revealed that a majority of the patients interviewed adhered to prescribed treatment regimen.

Furthermore, several social factors including the patient's age, gender, level of education and level of income were found to promote adherence tendencies among diabetic patients. Most of the patients who visited the clinic during the study were aged between 49 and 58 years. This was an indication that elderly people were better adherers to diabetes treatment and medication. Gender was also revealed to significantly influence diabetes treatment adherence among patients. However, despite the high number of females visiting the clinic, the study noted that this was not an outright sign that female patients were more compliant to diabetes treatment regimens than the males.

Additionally, financial income and treatment adherence were significantly related as per the study. The income data collected from the study divided the participants into two groups; those who earned above Ksh.50, 000 and those whose income was within the Ksh.10, 000 -Ksh.20, 000 brackets. This revealed that the patients who frequented the hospital had a manageable source of income that enabled them to adhere to the recommended treatment regimen. This finding supports conclusion reached by (Rolnick et al., 2013) that lower salary aggravates treatment adherence levels among diabetic patients.

The study further revealed the significance of factors related to individual patient history to treatment adherence. Patients who were recently diagnosed with diabetes were noted as poor adherers to treatment regimens in the initial

phase of their diagnosis. Those with longer diagnosis period were well versed with information about diabetes, thus making them feel more confident and safer. The data also showed that the majority of patients interviewed were diagnosed at least 5 years ago. This trend explained the high treatment adherence levels among Thogoto Hospital diabetes patients. Matters concerning the patient's knowledge on treatment prescription also influence adherence tendencies. This understanding was mainly promoted by patient counselling and education during diagnosis and follow-up visits using simple terms understood by the patient. Results from the study revealed that up to 64% of the participants claimed to have good knowledge of their prescribed treatment.

The cultural beliefs and values of the patients were also cited among factors influencing treatment adherence. Cultural principles highly influence patients' understanding and perception towards diabetes. Cultural assessment is vital for better understanding of the wider cultural context that an individual or a group resides. Equally, the assessment of one's culture can provide the needed background information to preside over the design of culturally acknowledged healthcare interventions. Kindred to these findings, most patients at Thogoto Hospital alleged that their religious and cultural beliefs influenced their adherence to diabetes treatment regimens.

Factors surrounding health care systems and how they influenced adherence among patients were also looked into. The relationship between doctors and their patients, and the presence of fitting healthcare service providers were

marked as either facilitators or barriers to treatment adherence among diabetes patients. The reception that patients received at the hospital and the availability of diabetes drugs were also significant determinants of patients' adherence. Most of the participants interviewed at Thogoto Hospital specified that they got a good reception at the clinic and that all their prescribed medication needed were readily available.

5.3 Conclusions

In closing, patients who visited Thogoto Hospital showed high adherence levels to their prescribed treatment regimens. Besides, most of them clearly understood their treatment regimens as prescribed by the doctor. The most adherent patients were aged between 49 and 58 years: this was evident from the high number of participants that visited the clinic from this age group. The numbers also showed that this group was the most affected by the illness. Income, sex and gender were the main social factor associated with adherence to diabetes treatment regimens, thus should be delved more into. The patients religious and cultural beliefs were also found to greatly influence treatment adherence. The other important aspects of treatment adherence were family and social support. These factors were beneficial to the patient's health by mitigating stressful events, promoting self-efficacy, converting a person's affective states, and persuading change in health outcomes by eradicating negative perceptions and behaviors.

Most of the interviewed patients carried a positive perception on diabetes management and self-care through complying with their doctor's medical

prescription and treatment. As mentioned in the study, diabetes is fast growing and more rampant among the elderly population. It should no longer be categorized as a lifestyle illness, but as a chronic illness.

5.4 Recommendations

- An important finding from the study was the significant role that social support through friends, family and the community played in promoting treatment adherence. The Ministry of Health should therefore initiate community awareness programs to sensitize family members and the general community on the significance and methods to boost social support.

- Considering the rising case of diabetes in Kenya and around the world, the government should encourage the development of more private and public diabetes clinics and supply them with modern equipment for diabetes treatment. Hospitals should also be supplied with more personnel who have specialized in diabetes therapy to monitor and educate patients during clinical review visits. This will enable wide and easy access to clinics nationwide.

- High adherence levels were reported among patients but not entirely. In order to scale up the adherence levels for treatment regimens, diabetic patients should be sensitized about the consequences associated with the illness, as well as the necessary safety measures needed to prevent

complications. Nevertheless, patients should be sensitized more on the importance of adhering to treatment regimens.

5.5 Suggestions for further research

- The findings on how social support influences adherences require future research. The social construct (friends, family, and the community) lack knowledge on how their combined support scales up treatment adherence levels. Considering that a large fraction of patients are still non-adherent to proposed treatment regimens, future studies on diabetes treatment should concentrate on elements of social support and how they promote adherence tendencies. Researcher can research on methods to effectively empower social support channels.

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APPENDIX

APPENDIX A: INFORMED CONSENT

My name is Roxventa Anyango. I am a Masters student at Kenyatta University conducting a study on Social contributors of Non- Adherence to diabetes treatment among patients in Kiambu County, Kenya. The information from the study will be used by the Ministry of Medical services and Ministry of Public Health and Sanitation to improve the access and quality treatment of Diabetes in this hospital as well as other regions in Kenya.

Participation in this study will require that I ask you some questions. You have the right to refuse participation in this study. Please remember participation in this study is voluntary, you may ask questions related to the study at any time.

Some of the questions may make you uncomfortable; if this happens, you may refuse to answer these questions if you so choose. You may also stop the interview at any time.

If you participate in this study, you will help us to learn how to improve the diabetes services, medical provision and treatment.

Interviews will be conducted in a private setting within the clinic. Your name will not be recorded on the questionnaire. The questionnaires will be kept in a locked cabinet for safe keeping. Everything will be kept private.

Thank you,

Roxventa Ongugo - 0722 842037; rongugo@gmail.com

If you have any questions you may contact;

Supervisors:

Dr. Lucy Maina – 0722 768104; lucyscholar@yahoo.com

Dr. Muia – 0721237458; dmuia@gmail.com

Or the Kenyatta University Ethical review Committee Secretariat on chaiman.kuerc@ku.ac.ke, secretary.kuerc@ku.ac.ke, ercku2008@gmail.com.

APPENDIX B: QUESTIONNAIRE FOR PATIENTS

Kindly tick the correct answer in the box.

Socio Economics Factors

1. Kindly indicate your sex.

Female ☐ Male ☐

2. Kindly show your age group by ticking the appropriate box.

18 – 28 years ☐

29 -38 years ☐

39 – 48 years ☐

49 – 58 years ☐

59 – 68 years ☐

69 years and above ☐

3. Please indicate your marital status.

Single ☐

Married ☐

Divorced ☐

Separated ☐

Widowed ☐

4. Please indicate your highest educational level.

None ☐

Primary ☐

Secondary ☐

Tertiary ☐

5. Kindly provide your estimated monthly salary ……

6. Kindly indicate your appropriate residence by ticking on the boxes below

Rural area ☐

Urban area ☐

Individual Factors

7. When were you diagnosed with diabetes? (Please indicate the month and year)

……

……..

8. Are you currently on medication?

Yes ☐ No ☐

b. If yes, what kind of medication?

……

……

……

……

9. Do you adhere to the treatment regimen prescribed?

Yes ☐ No ☐

10. Is there a treatment regimen other than the medications that has been given by the medical practitioner?

Yes ☐ No ☐

a. If yes, please state any

……

……

……

……

……

……..

b. Is it easy to maintain the regimen given?

Yes ☐ No ☐

c. Please explain your answer

……

……

……

…….

11. How frequently do you go for checkups?

Daily ☐

Weekly ☐

Biweekly ☐

Monthly ☐

Bimonthly ☐

12. a. Have you ever failed to attend the doctor's appointments?

Yes ☐ No ☐

b. If yes, how many appointments did you miss in the last six months?

……

……

……

……

c. Please explain your answer

……

……

……

……..

13. What is the estimated distance to the nearest health facility where you can receive diabetic treatment?

……

……

……

……

14. Has the distance affected your adherence towards the given treatment regimen?

Yes ☐ No ☐

15. Please explain your answer

……

……

……

……

……

16. What kind of reception do you receive from the health staff at the facility?

……

……

……

……

17. Are medications required for your treatment readily available in the health facility?

Yes ☐ No ☐

18. Do you feel trust towards the health care system?

☐Yes ☐No

19. Have you ever desisted from seeing the health care for medication or monitoring?

☐Yes ☐No

20. If you answered yes on above question, what was the reason/ reasons for not seeing the health care? Please

specify.....

.....

.....

.....

Socio Cultural

21. Do you understand your treatment regimen?

☐Yes ☐No

22. Have you ever participated in any diabetes education?

☐Yes ☐No

23. Do you feel that you have been given adequate information about diabetes treatment?

☐Yes ☐No

24. Do you feel that you have knowledge about diabetes diagnosis?

☐Yes ☐No

25. Do you know of any traditional medicine used to treat diabetes?

☐Yes ☐No

26. If yes, please state a few

……

……

……

……

27. Comparatively, do you prefer traditional medication to prescribed medication

☐Yes ☐No

28. If yes give reasons

……

……

……

……

29. On the whole, are you satisfied with the kind of support you are receiving? Tick appropriately

	No	Sometimes	Often	Regularly
Support from Family				
Support from friends				
Support from community				
Adequate support				
Psychological support				

30. Are there family members, friends and members of your community who give you support to regularly follow your medication and other treatment requirements?

No ☐

Sometimes ☐

Often ☐

Very regularly ☐

31. Please explain your answer.

_____

_____

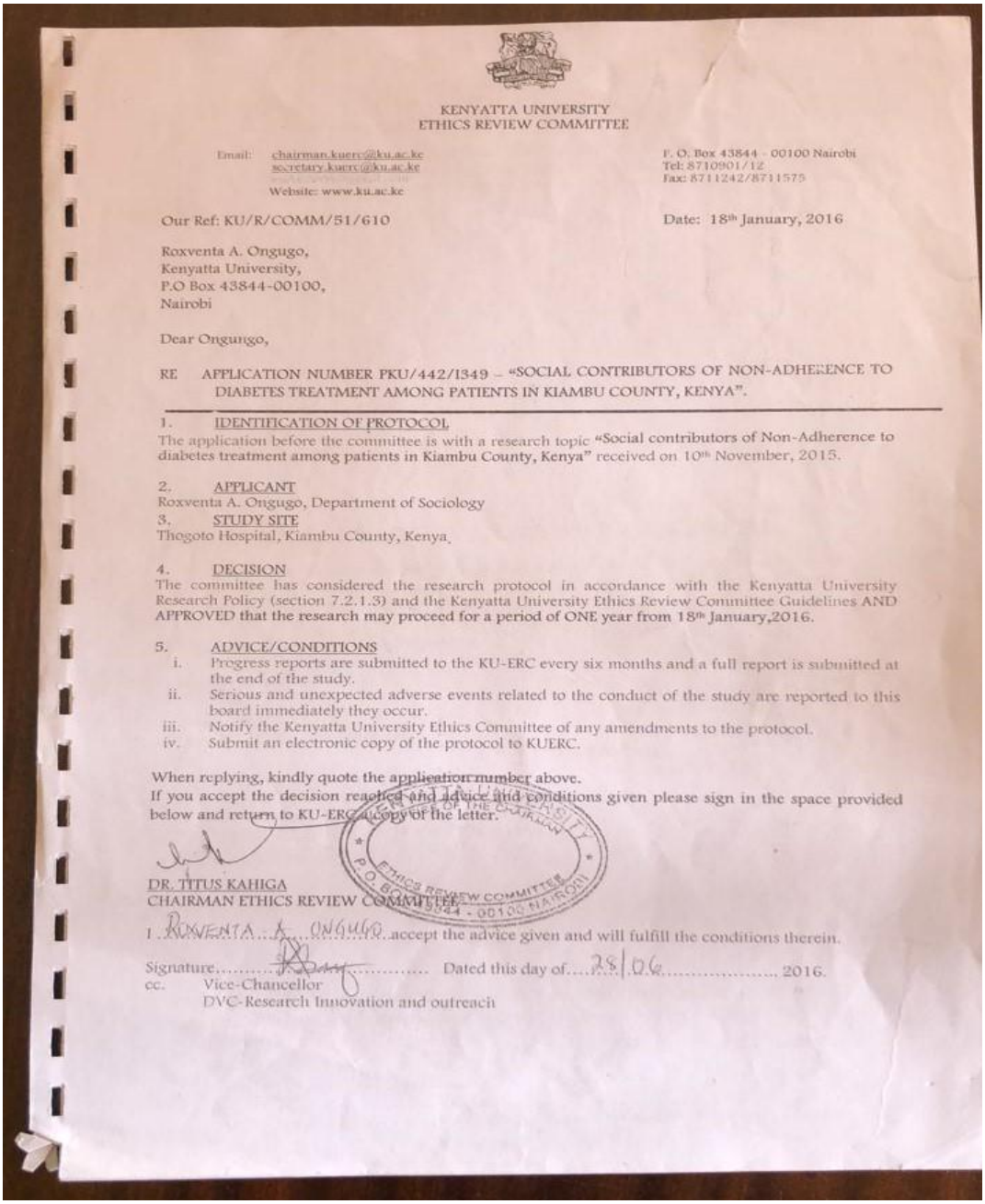
_____

Thank you for sparing the time to talk to me

APPENDIX C: KEY INFORMANT INTERVIEW FOR MEDICAL PERSONELL

1. What are some of the causes of diabetes in many of the patients under your treatment?
2. How do patients react to the news that they have diabetes?
3. How regularly do the patients come back for medical checkups?
4. What do you think are some of the reasons why some patients find it hard to follow their treatment schedules?
5. Do you think hospitals in Kenya have enough resources to care for diabetes patients?
6. What are some of the recommendations that you can make to enable most patients to adhere to diabetes treatment?

APPENDIX D: KENYATTA UNIVERSITY ETHICAL REVIEW COMMITTEE



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke
Website: www.ku.ac.ke

P. O. Box 43844 - 00100 Nairobi
Tel: 8710901/12
Fax: 8711242/8711575

Our Ref: KU/R/COMM/51/610

Date: 18th January, 2016

Roxventa A. Ongugo,
Kenyatta University,
P.O Box 43844-00100,
Nairobi

Dear Ongungo,

RE APPLICATION NUMBER PKU/442/1349 – "SOCIAL CONTRIBUTORS OF NON-ADHERENCE TO DIABETES TREATMENT AMONG PATIENTS IN KIAMBU COUNTY, KENYA".

1. IDENTIFICATION OF PROTOCOL
The application before the committee is with a research topic "Social contributors of Non-Adherence to diabetes treatment among patients in Kiambu County, Kenya" received on 10th November, 2015.

2. APPLICANT
Roxventa A. Ongugo, Department of Sociology

3. STUDY SITE
Thogoto Hospital, Kiambu County, Kenya.

4. DECISION
The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines AND APPROVED that the research may proceed for a period of ONE year from 18th January,2016.

5. ADVICE/CONDITIONS
i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
ii. Serious and unexpected adverse events related to the conduct of the study are reported to this board immediately they occur.
iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.
If you accept the decision reached and advice and conditions given please sign in the space provided below and return to KU-ERC a copy of the letter.

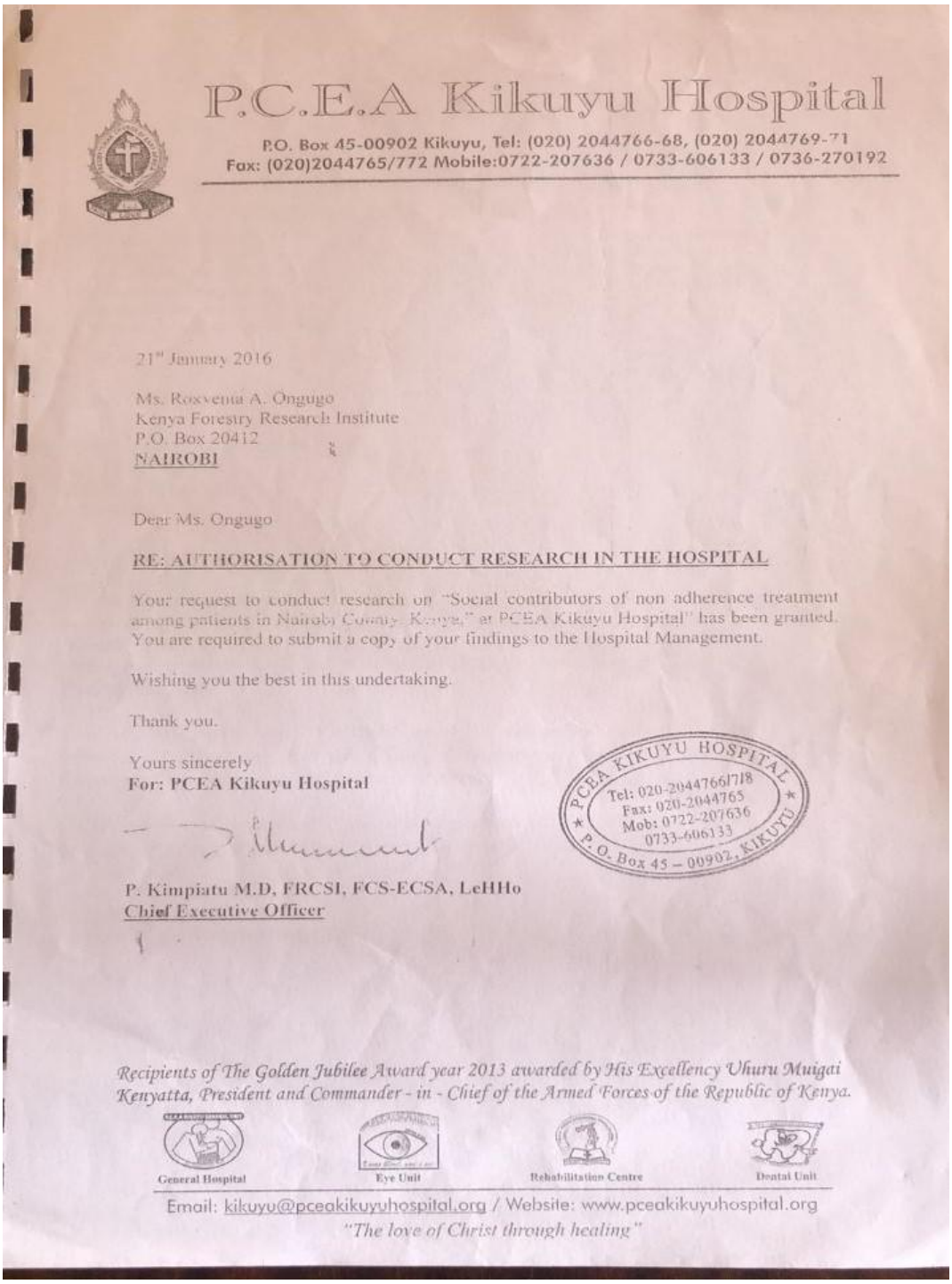
DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

I ROXVENTA A. ONGUGO accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of 28/06 2016.

cc. Vice-Chancellor
DVC-Research Innovation and outreach

APPENDIX E: NARCOSTI RESEARCH PERMIT



P.C.E.A Kikuyu Hospital

P.O. Box 45-00902 Kikuyu, Tel: (020) 2044766-68, (020) 2044769-71
Fax: (020)2044765/772 Mobile:0722-207636 / 0733-606133 / 0736-270192

21st January 2016

Ms. Roxvenia A. Ongugo
Kenya Forestry Research Institute
P.O. Box 20412
NAIROBI

Dear Ms. Ongugo

RE: AUTHORISATION TO CONDUCT RESEARCH IN THE HOSPITAL

Your request to conduct research on "Social contributors of non adherence treatment among patients in Nairobi County, Kenya," at PCEA Kikuyu Hospital" has been granted. You are required to submit a copy of your findings to the Hospital Management.

Wishing you the best in this undertaking.

Thank you.

Yours sincerely
For: PCEA Kikuyu Hospital

PCEA KIKUYU HOSPITAL
Tel: 020-2044766/718
Fax: 020-2044765
Mob: 0722-207636
0733-606133
P. O. Box 45 – 00902, KIKUYU

P. Kimpiatu M.D, FRCSI, FCS-ECSA, LeHHo
Chief Executive Officer

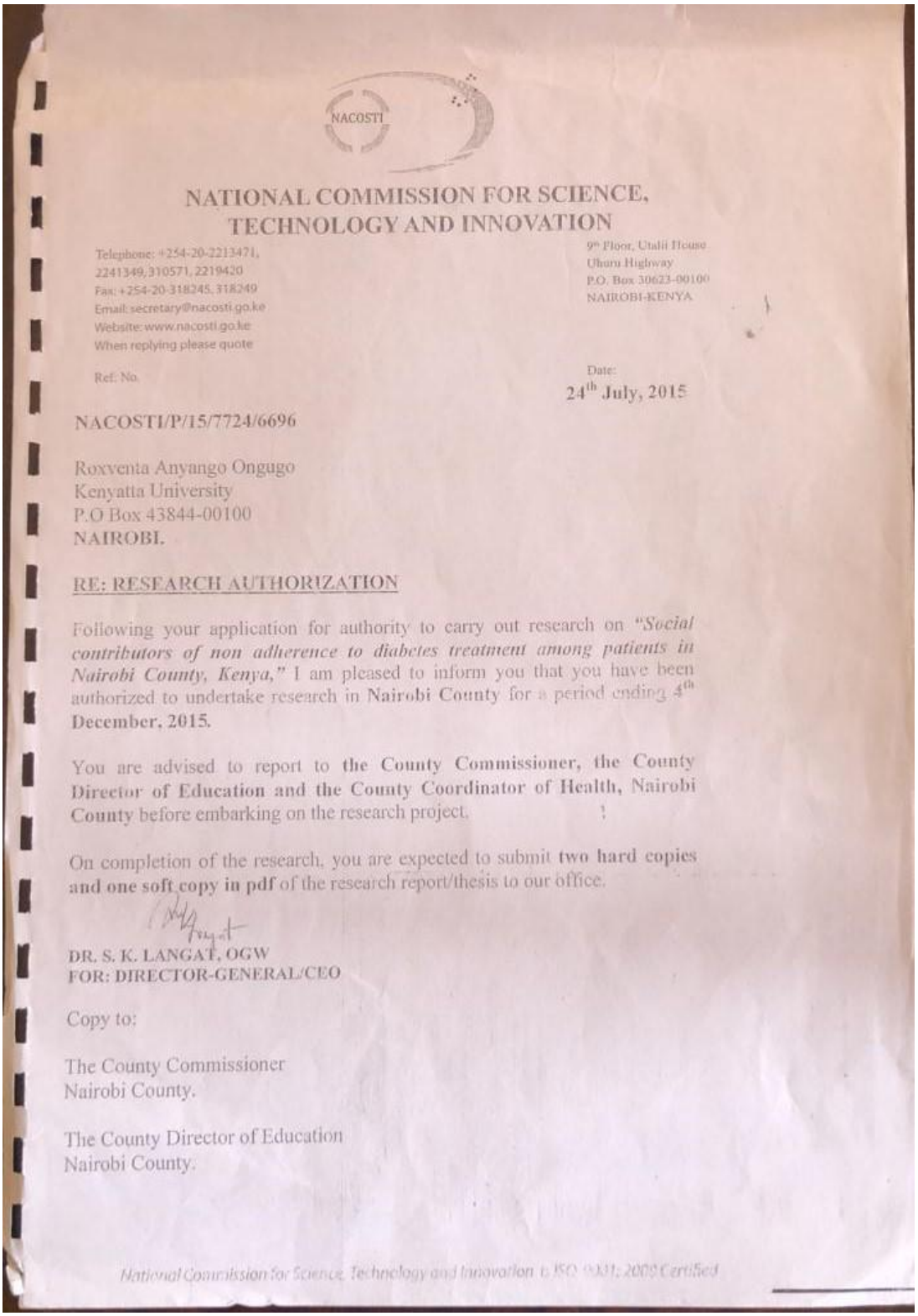
Recipients of The Golden Jubilee Award year 2013 awarded by His Excellency Uhuru Muigai Kenyatta, President and Commander - in - Chief of the Armed Forces of the Republic of Kenya.

General Hospital | Eye Unit | Rehabilitation Centre | Dental Unit

Email: kikuyu@pceakikuyuhospital.org / Website: www.pceakikuyuhospital.org

"The love of Christ through healing"

APPENDIX F: THOGOTO HOSPITAL PERMIT LETTER



NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

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2241349,310571, 2219420
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When replying please quote

9th Floor, Utalii House
Uhuru Highway
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No.

Date:
24th July, 2015

NACOSTI/P/15/7724/6696

Roxventa Anyango Ongugo
Kenyatta University
P.O Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *"Social contributors of non adherence to diabetes treatment among patients in Nairobi County, Kenya,"* I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for a period ending 4th **December, 2015.**

You are advised to report to **the County Commissioner, the County Director of Education and the County Coordinator of Health, Nairobi County** before embarking on the research project.

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

DR. S. K. LANGAT, OGW
FOR: DIRECTOR-GENERAL/CEO

Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

National Commission for Science, Technology and Innovation is ISO 9001: 2008 Certified