SOCIOECONOMIC INEQUALITIES IN HEALTH AMONG TYPE 2 DIABETES PATIENTS: THE ROLE OF SOCIAL CAPITAL

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DECLARATION

This research project is my original work and has not been presented for a degree in any other University or any other award.

Signature…… Date…….

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This research project has been submitted for examination with my approval as the University Supervisor.

Signature…… Date…….

Dr. Elizabeth Owiti

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To God Almighty for His enabling grace throughout my studies. Special gratitude to my supervisor, Dr. Elizabeth Owiti, for her commitment, encouragement and support. My colleagues in school thank you for your social capital. Friends and family, you always reminded me that I needed to finish school and indeed that kept me going.

DEDICATION

This research project is dedicated to my late dad who lived with and died due to complications of diabetes.

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OPERATIONAL DEFINITIONS

Social Capital - Is defined as membership and participation in a Diabetes Support Group (DSG).

Glycaemic control - Maintenance of blood sugar levels within normal ranges in a person with Diabetes Mellitus; Glycosylated haemoglobin (HbA1c) of less than or equal to 6.5% and Fasting Blood Sugar (FBS) of less than or equal to 7.0 mmol/l.

Educational level - The highest school grade completed or level of learning/training of individuals.

Income - Proceeds or earnings gained from businesses, employment, or investments.

Marital status - The position of an individual in regards to whether one is single, married, separated, divorced or widowed.

Occupation - Involvement in activities such as businesses, employment or artistries as a means of earning a living.

Socioeconomic - Behaviours of people including the ways they interact with one another or their family structures and their income or finances.

Socioeconomic inequalities in health - Are variations or disparities of glycaemic controls in relation to socioeconomic status of patients with type 2 diabetes mellitus (T2DM).

LIST OF ABBREVIATIONS

C:	Concentration index
DSGs:	Diabetes Support Groups
DM:	Diabetes Mellitus
FBS:	Fasting Blood Sugar
GDP:	Gross Domestic Product
GMM:	Grossman Model
HbA1c:	Glycosylated Haemoglobin
HBM:	Health Belief Model
IDF:	International Diabetes Federation
KDHS:	Kenya Demographic Health Survey
LMICs:	Low and Middle Income Countries
L(s):	Concentration curve
MOH:	Ministry of Health
NCD:	Non-communicable diseases
NHIF:	National Health Insurance Fund
NKLVH:	Nakuru Level V Hospital
QOL:	Quality of Life
HRQoL:	Health related quality of life
SDGs:	Sustainable Development Goals
SES:	Socioeconomic status
SGS:	School of Graduate Studies
T2DM:	Type 2 Diabetes Mellitus
UHC:	Universal Health Coverage
WHO:	World Health Organization

ABSTRACT

Background: This study assessed the socioeconomic inequalities in in health among patients with type 2 diabetes mellitus (T2DM) and evaluated the role of social capital. Social capital has been considered as an essential though intangible resource towards provision of healthcare services. Given the rising concern of socioeconomic inequalities in population health and the rising burden of diabetes in the country, understanding the extent of these inequalities in diabetes control is important in strengthening healthcare systems. Social capital provides useful insights into how social networks of persons and communities can be employed to boost the desired results for the person and the community in regards to their health. The current prevalence rate of Diabetes in Kenya is at 4.56%. In addition, about 14% of Kenyans have impaired glucose tolerance; a pre-diabetic state. There are more cases of diabetes in urban as compared to rural areas in Kenya.

Objectives: There is limited literature available on the role of social capital among diabetes patients in Kenya. The study sought to find out: The association between social capital and glycaemic control among type 2 diabetes patients; the estimated socioeconomic inequalities in health among type 2 diabetes patients and establish the link between social capital and socioeconomic inequalities in glycaemic control among type 2 diabetes patients.

Methodology: This was a cross-sectional study design with a sample size of 363 individuals with T2DM aged between 20 and 79 were selected through systematic random sampling approach and interviewed using semi-structured questionnaires at the Nakuru level V Hospital (NKLVH). Marginal effects analysis was used to estimate the determinants of glycaemic control and concentration index to estimate socioeconomic inequalities in glycaemic control and Random Blood Sugar control.

Findings: The results from probit regression showed that the chi square for likelihood ratio test was significant suggesting that the independent variables jointly influenced glycaemic control. The concentration index illustrated that good glycaemic control was concentrated among T2DM patients in higher income categories. When the concentration index was conducted comparing the T2DM patients in support groups and those not in support groups, there was no significant difference demonstrating that social capital was not influencing socioeconomic inequality among the T2DM patients in Nakuru County. In the probit regression analysis, not being a member of the support group had a negative effect on glycaemic control.

Conclusion: Based on the findings, it was observed that there exists inequity in glycaemic control among T2DM patients in Nakuru County. Social capital was found not to influence inequalities in glycaemic control. However, living in urban area, having secondary and above education and being female significantly caused inequality in T2DM control. To improve management and control of T2DM, the government needs to address socioeconomic inequalities associated with glycaemic control and random blood sugar control.

CHAPTER ONE: INTRODUCTION

1.1.1 Background of the Study

Diabetes mellitus (DM) is a chronic non-communicable disease (NCD) characterized by persistent high blood glucose owing to the body's incapacity to secrete enough insulin (a substance that controls blood glucose), use it effectively or both (Masharani, 2017). Typically, it presents in a triad of excessive thirst (polydipsia), hunger (polyphagia) and urination (polyuria). The main types of diabetes mellitus include: type 1, type 2 and gestational diabetes. Type 1 diabetes occurs when the body produces little or no insulin. Gestational diabetes affects women during pregnancy and is regarded as any extent of high blood sugar levels whose onset is during pregnancy. The definition is applicable regardless of the mode of treatment and whether the condition persists after pregnancy. In particular, Type 2 diabetes mellitus (T2DM) is more common and occurs when the body produces insulin, but is incapable of using it effectively. This means that the body is unable to respond to insulin effects, and thus resulting to accumulation of glucose in the blood. Many people having T2DM may not be aware of their condition over a long duration because symptoms may take years to appear or be noticed. During this time, the body remains exposed to the detrimental effects of excess blood glucose. Management of diabetes is through multiple measures including medication (pharmaceutical agents) and lifestyle modification (non-pharmaceutical agents) such as physical activities and dietary discipline (Natalia et al., 2018). This study focused on T2DM because it constitutes about 90% of all diabetes cases (World Health Organization (WHO), 2017).

The population of people with T2DM is on a rapid rise across the world. This is attributed to the growing economy, advancing age, modernization, dietary changes, reduced physical activities and embracing different lifestyle patterns (Hu et al., 2010). T2DM was in the past considered as a disease of the rich but prevalence data over the past decades have also shown remarkable increase of the incidence of diabetes in traditionally poor communities and in Low and Middle-Income Countries (LMICs) (International Diabetes Federation (IDF, 2015). Globally, approximately 415 million (about 1 in 11) adults aged between 20 and 79 years have diabetes and the numbers may rise to almost 642 million by the year 2040. About 75% of people with Diabetes live in LMICs (IDF, 2015). Diabetes prevalence in Kenya among adults is estimated at

4.56%. This translates to about 750,000 persons and 20,000 yearly deaths according to the Kenya National Strategy for the prevention and control of Non-Communicable Diseases (2015 - 2020).

1.1.2 Economic burden of Diabetes Mellitus

Globally as per the year 2015, the overall average expenditure (being the sum of healthcare spending and the value of indirect costs) of managing diabetes and related complications was at 1.8% of the global Gross Domestic Product (GDP) in US Dollars. With the increasing prevalence of diabetes, this figure is likely to rise up to a maximum of 2.2% (2.1–2.2) by the year 2040 (IDF, 2015). However, not many studies have looked at diabetes expenditure in African countries. In a study done by Mutyambizi et al., (2018) he found that for diabetes care, the indirect costs were largely higher than the direct costs. Most of the costs due to diabetes were among those of the lower income categories. Additionally, costs are generally higher for individuals with many complications (Mutyambizi et al., 2018).

Glycaemic control is the preventive measure for the reducing the micro and macro vascular complications related to diabetes. Good glycaemic controls are determined by Glycosylated Haemoglobin (HbA1c) of less than or equal to 6.5% and Fasting Blood Sugar (FBS) not exceeding 7.0 mmol/l. Therefore, people living with diabetes are required to have their HbA1c tested every 3 to 6 months in order to guide in their management (Holman, et al., 2015). Patients diagnosed with diabetes should be encouraged to achieve the target glycaemic control although some factors such as age (elderly), long duration of disease and co-morbidities like hypertension, hyperlipidemia and HIV/AIDS may hinder the attainment of the target levels. Younger patients with T2DM are more likely to achieve better controls than the elderly. In addition to lifestyle behaviour and several treatment-related factors, socioeconomic determinants also play a crucial role in achieving the target glycaemic levels. It has been shown that education level, employment status and income level significantly influence the control of diabetes (De Silva et al., 2016).

1.1.3 Policies on health and Non-Communicable Diseases (NCDS).

Globally the Sustainable Development Goals (SDGs) and specifically goal three, which were developed at the United Nations Assembly in 2015, focuses on health and well-being for all. Goal three commits to reduce early deaths among those with NCDs, eradicate the inequalities in healthcare costs and shield patients with diabetes from ruinous healthcare expenditure. The

Kenyan government enshrines in the Health Act 2017 and Article 43 of the Constitution, the right of highest standards of healthcare services for every citizen. Looking at the Country's future plans as described in Kenya's Vision 2030, there's commitment towards improving health services as way of enhancing the health standards of everyone. Additional pledges are espoused in the Kenya Health Policy 2014-2030, that focuses on achieving Universal Health Coverage (UHC) through improving essential health services for populations in underserved areas across the country (Kenya Health Policy 2014–2030, Ministry of Health (MOH), 2014). In the year 2018, the Kenyan government launched the piloting phase of Universal Health Coverage dubbed AfyaCare in four Counties: Nyeri, Kisumu, Isiolo and Machakos. UHC is aimed at cushioning the almost one million Kenyans who are made poor every year as a result of healthcare expenditures (MOH-Kenya 2018).

Most European Countries have got universal healthcare systems. Nonetheless, social inequalities in health have still been evidenced in these Countries. Studies have demonstrated that wide variances in compliance to treatment modalities and more especially precautionary measures exist among patients with chronic diseases (Sortsø et al., 2016). Conversely Sen (2002) argues that social justice in health is largely multidimensional as a concern and that important considerations in attaining equity must be put in place. He states that the factors that contribute towards good and bad health are very much beyond healthcare and include other influencers such as genetic predisposition, individual earnings, food and lifestyle habits, work conditions and epidemiologic environmental factors.

1.1.4 Social capital and health

Social capital refers to the way people are connected as individuals and in social groups, and takes into account both interpersonal relations and the tangible and intangible benefits as a result of these relationships (Hawe and Shiell, 2000). Robert Putnam regards social capital as "the networks (structural element), norms, and social trust (cognitive element) that facilitates ease of communal benefit." He looks at social capital in two ways: 1) bonding social capital as the relationships amongst individuals in a group and 2) bridging social capital as interactions across or between social groups (Putnam and Bowling 2000). Further definition of social capital considers its significance in the socioeconomic conditions of and inequalities within the society. Social capital has influence on human health through a number of ways; dissemination of

information about health promotion, treatment education, adherence support, strengthening healthy lifestyle, encouraging visits to health facilities, provision of psychosocial or physical support and influencing reciprocity in social circles (Murayama et al., 2012). In general, public health outcomes are likely to be better when social capital measures are higher (Holtgrave et al., 2003). In Kagera, an urban region in Tanzania, there was a decline in HIV trends attributable to social capital. The study found that good social support systems structurally and cognitively were linked to low prevalence rates of HIV (Gasto et al, 2014). An investigation of the influence of social capital on obesity and diabetes in United States of America (USA) found out that enhanced social capital could cushion against complications of obesity and diabetes (Holtgrave et al., 2006). Later on, it was revealed that social capital is helpful in enhancing glucose control among the diabetes patients, suggesting that social capital may improve symptoms of diabetes and its complications (Farajzadegan et al., 2013). In this particular study, social capital was considered to be membership and participation in Diabetes Support Groups (DSGs) of T2DM patients in Nakuru County. To support the patients, these facilities have existing social support groups that patients join voluntarily in order to facilitate treatment education, adherence monitoring as well as lifestyle and psychosocial support.

Theoretically and practically, there has developed an understanding of how higher social capital is connected to better health outcomes later in life among the elderly people. Important measures of social capital include: social set-up structure (composition and size of one's social network) and levels of societal participation which is basically involvement in social and community activities (Macinko, 2001). A study in the United States found significant relationship between social capital and accelerometer-measured physical activity, even after correcting for potential confounders. It was noted that extended networks with more numbers of friends and more frequent socialization with neighbors resulted to engaging in higher physical activities. This can be explained by the possibility that larger social networks safeguards against the harmful mental, emotional and physical effects of social loneliness. As much as the cause-effect of these associations was not clear, the study underscored the need for advocating for social support systems in the medical and public health sectors. It brought out the need of prioritizing social capital as a way of improving people’s health in general (Ho et al., 2018).

1.2 Problem Statement

The prevalence of non-communicable diseases (NCDs) like diabetes and related risk factors are on a rapid rise world-wide resulting to reduced quality of life, high mortality rates and catastrophic health expenditure in our economies. In Kenya, the emergent diabetes burden is a major public health concern with substantial socioeconomic repercussions in regards to healthcare needs, loss of productivity and untimely death. Unless proper interventions are put in place, this poses serious setbacks in the attainment of social, economic and developmental goals (WHO 2016).

Diabetes Support Groups (DSGs) are important in ensuring that individual members get the necessary support towards achieving adherence to lifestyle changes, medication and attainment of the target glycaemic control. The chronic nature of diabetes demands for family support, financial considerations, emotional and psychological support in dealing with the long term effects of the disease (Long et al., 2010). Much as social capital and supportive social networks are becoming recognized and essential for illness management and may offer new viewpoints for enhancing quality of life in people with chronic illness such as diabetes, there's still a felt gap in implementation at health facilities and community level (Fowler et al., 2008).

From the literature reviewed, no studies seem to have been done in Kenya to understand whether social capital is relevant in addressing socio-economic inequalities in health among patients with T2DM in Nakuru County. Social capital is an integral factor in enhancing better relationship between recognition of diabetes and setting appropriate goals for self-management (Glazier et al., 2006). If social capital is optimized among type 2 diabetes patients, it might help insulate the vulnerable populations against the socioeconomic inequalities in health. Furthermore, empirical evidence in developed countries shows that socioeconomic inequalities influence access and utilization of health care including management of diabetes, however, limited studies have been done in Kenya to assess the association between socioeconomic inequalities and diabetes control. This study fills in this gap.

1.3 Justification

Knowledge on the causative factors of socioeconomic inequalities in health and more especially among patients with T2DM could prompt plans to lessen unequal distribution of healthcare in future (Cutler et al., 2008). Social capital is particularly valuable to the patients as far as improving awareness about diabetes, modes of management and in promoting healthy interactions with other patients. Nonetheless, there is limited knowledge about how social capital matters in addressing socioeconomic inequalities in health among patients with T2DM. This study examined whether social capital mattered in addressing socioeconomic inequalities in health among patients with T2DM. Social capital was found to be useful in the improvement of glycaemic control, setting and attainment of self-management goals and thus this study is of benefit in the delivery of health care for patients with T2DM. It may inform policy structures in the Ministry of Health in so far as the setting of policies in regards to social capital and health.

1.4 Significance

The study findings will contribute to improvement of the management of diabetes and its complications through advocating for DSGs at health facilities and community level. It will also enhance passage of information about management of diabetes to the population. Moreover, the researcher will purpose to create key collaborations for fostering integration of DSGs with other national programmes in the Country.

1.5 Research Questions

1. Does socioeconomic inequalities in health exist among T2DM patients in Nakuru County?
2. Does social capital matter in addressing socioeconomic inequalities in health among patients with T2DM?

1.6 Objectives of the Study

The aim of this study is to estimate socioeconomic inequality in diabetes management among type 2 diabetes patients in Nakuru County and determine the role of social capital in the same.

1.6.1 Specific objectives

1) To determine the association between social capital and glycaemic control among type 2 diabetes patients.
2) To estimate socioeconomic inequalities in health among type 2 diabetes patients.
3) To establish the link between social capital and socioeconomic inequalities in glycaemic control among type 2 diabetes patients.

1.7 Assumptions of the Study

The assumption was that the respondents were approachable, trustable, truthful and that they provided the necessary data so that the study objectives can be achieved. Apart from Nakuru, the researcher also trusted that the results of this study may be relevant to other Counties in Kenya.

1.8 Scope of the Study

This study covered type 2 Diabetes patients in Nakuru County attending the daily diabetic clinic at the Nakuru level V Hospital (NKLVH). Nakuru County ranks as the fourth largest County in terms of population in Kenya and is also one of the highest ranking in the prevalence of Diabetes among all the Counties in Kenya (KDHS 2014). The respondents under this study consisted of type 2 diabetes patients aged between 20 and 79 years. This study looked at socioeconomic inequalities and the role of support groups among type 2 diabetes patients.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Literature is divided into two sections: Theoretical literature and empirical literature which covers socioeconomic inequalities in health among type 2 diabetes patients and the role of social capital in addressing socioeconomic inequalities in health.

2.2 Theoretical Literature

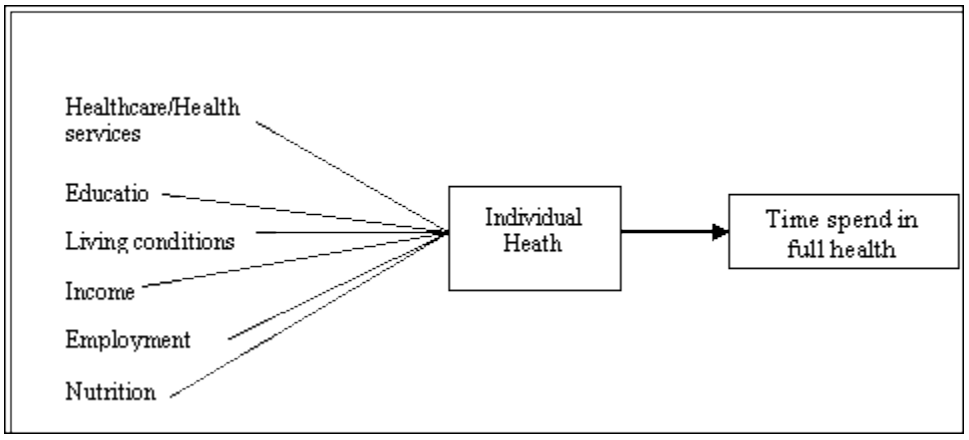
This section describes the Gross Man Model (GMM) as well as the Health Belief Model (HBM) and their relevance to the study.

2.2.1 The Grossman Model (GMM)

Grossman (1972) described how socioeconomic factors and demand for health affects health production. In his argument, he states that people desire good health which makes them to demand medical care inputs so as to produce health. Health is considered as a consumption good since it makes people feel better. On the other hand, it is also an investment good as it adds to the number of healthy days (health stock) for people to be productive at work and earn some income. People make various contributions to invest in their health (the inputs of health care) such as good diet, exercising, time, adherence to medication and many more. The health stock growth, decline or stagnation depends on age, illness or injury as well as measures that are put in place to avert illness, injury and premature death. All these are factors that have an influence on achieving glycaemic control among patients with diabetes.

Grossman model has generated great insight from these determinants of health and into the apportioning of time and finances towards production of health. This highlights the role of socioeconomic determinants of health. It is illustrated that there's an inverse relationship between health status and the demand for medical services. On the other hand, an individual's socioeconomic status has a huge impact on the demand of health services and as such one could be very sick but due to lack of finances, he or she may fail to seek medical services i.e. demand less medical services. For the diabetic patients, failure to seek proper medical services consequently results to poor glycaemic control that leads to various complications see Figure 2.

Figure 2. 1 The Grossman Model



Source: Grossman M (1972) The Demand for health: a Theoretical and Empirical Investigation. National Bureau of Economic Research Occasional Paper No.119. New York, Columbia University Press - citat de Cam Donaldson şi Karen Gerard n : Economics of Health Care Financing The Visible Hand. Macmillan 1992

2.2.2 Health Belief Model (HBM)

In the 1950's social scientists in the United States conceptualized the Health Belief Model (HBM) as a way of establishing reasons why people fail to take up disease prevention measures or modalities for timely diagnosing of diseases. HBM postulates how a person's belief in an illnesses' threat and the effectiveness of a recommended health action and behavior is a predictor of the adopted behaviour by that person. This is based on the premise of psychological and behavioral theories which assumes two important aspects: an individual's desire to avoid illness and the confidence in preventing illness or getting cured through a particular process. Ultimately any one person will take up or avoid a certain health recommendation based entirely on their individual's perception. This too explains the health seeking behaviour among diabetic patients.

There exist six components of the HBM based on what an individual perceives as: 1) Susceptibility :an individual's view of the possibility of acquiring any illness or disease, 2) Severity :one's feelings about the consequences of an illness or disease whether treated or not, 3) Benefits –how one regards the importance of the suggested actions aimed at curbing or reducing the harmful effects of the illness or disease, 4) Barriers - a person's feelings concerning the hindrances against a certain health recommendation, 5) Cue to action - the enticement required

for stimulating the thought processes of accepting a suggested plan. These signals can be internally generated (from the body) or from external sources such as reading through the internet and 6) Self - efficacy which is considered as the extent of an individual's will-power in his or her ability to effectively and thoroughly act in a certain manner.

2.3 Empirical Literature

Empirical literature was discussed under the following themes:

2.3.1 Socioeconomic inequalities in health among patients with type 2 Diabetes

Socio-economic status (SES) has been associated with health and its outcomes, although there's still inadequate explanation for the mechanisms of this association. People living with diabetes are not an exemption from this common pattern of SES and illness. Several studies illustrate a strong relationship between SES, morbidity and mortality (Roper et al. 2001).

Non-communicable diseases (NCDs) are associated with highest rate of complications as well as premature deaths. Socioeconomic inequalities are a cause of the disparities in the prevalence of NCDs in all population groups across the world. The World Health Organization (WHO) considers four major risk factors as the common causes of the major NCDs such as T2DM. These factors include cigarette smoking, sedentary lifestyle, alcoholism, and unhealthy nutrition. Overall, available evidence suggests that having low SES and or living in Low and Middle Income Countries (LMIC) increases susceptibility to NCDs (WHO 2011).

Socioeconomic determinants have an influence in the regulation and maintenance of blood glucose among patients with diabetes (Selim et al., 2016). Poor glycaemic control is highest among patients with low income (Delamater, 2006), financial constraints (Adisa et al., 2011; Pascal et al, 2015), no formal education and no employment (Almutairi et al., 2013). As such, achieving health equity amongst patients with diabetes is premised on proper understanding of the socioeconomic determinants of health. A study in Denmark on health services utilization among diabetic patients revealed that usage of services varied across patients of different SES in spite of the universal health care system. In addition, there were noted variations in outpatient, rehabilitation and specialists' services utilization in regards to the SES. Patients with higher

income were getting more outpatient services, unlike those of the lower income category who were benefitting more from inpatient and services in general practice (Sortsø et' al., 2017).

Poor education and living circumstances, stretching from little income to the deplorable situations in the places of residence, have an influence on health in numerous ways. Good progress in reducing health disparities is not possible if the root causes are not properly addressed. Policies on education, job opportunities, community and economic empowerment have huge implications in health and medical spending. Lack of political will on proper policies in these areas could actually escalate medical costs and widen health disparities (Woolf and Braveman 2011). Social determinants of health are largely the environmental (like air pollution) and health behaviors (such as exercising, adherence to medical care and observing dietary advice). These determinants are influenced by personal resources like education, income and the surrounding environment where individuals live, work, study and interact with one another on a regular basis. These resources determine how one will be vulnerable to infections, their health seeking behaviours and ability to learn self-management skills. They influence the ability of patients with diabetes to take up the required lifestyle modification in managing their blood sugar levels. Thus social determinants are likely the core causes of diseases and have relevance in addressing the inequalities in health among different populations (Woolf and Braveman 2011).

2.3.2 The impact of income and education among patients with diabetes

Diabetes Mellitus is considered very troublesome and demanding amongst the NCDs in the present day (WHO, 2015). Socio-economic inequalities exist among diabetic patients with more cases and deaths occurring among those of the lower socio-economic groups (Brown 2004). A study in Denmark revealed that usage of healthcare services among patients in the lower SES was not always matching to their needs regardless of the existence of a universal healthcare system. Elderly people, divorced, the unemployed and immigrants were mostly disadvantaged and sought less healthcare services when belonging to lower SES groups (Sortsø et' al., 2017).

Income and education, being one of the socioeconomic determinants, has a remarkable association with health (Braveman et al., 2011). The income-health relationship is not merely an issue of the third world Countries. Studies in America have demonstrated inferior health outcomes among the lower versus those at higher income levels (Braveman et al., 2010). Results

from a study in Canada revealed that material wealth and level of academic attainment had an influence on blood sugar control among patients with T2DM. In spite of the existence of a universal access healthcare system in Canada, socioeconomic inequalities in health was still a reality. Considering that diabetes is a disease more common among people of the lower SES and that inability to maintain the target sugar levels compounds the likelihood of health deterioration and death, the inequalities ought to be well addressed as far as the management of diabetes is concerned (Houle et al., 2016).

In Denmark it was found that diabetic patients in the higher SES, especially when SES was ranked using educational level, were very keen on seeking treatment when seriously sick and were readily able to accept rehabilitation and specialist's services in comparison to those of the lower SES. This indicates that in the assessment of disparities in healthcare service utilization, education level is a more reliable measure as opposed to income (Sortsø et' al., 2017). Education as such has a huge impact on health. Various studies have documented evidence of the relationship between education and health. People with low education and income have been found to be more vulnerable to poor health compared to those who are educated and of high income. The highly educated are likely to get employed and have disposable income to take care of medical expenses (Braveman, 2011). Therefore the lowly educated are prone to poor glycaemic controls and more complications relating from diabetes. On the other hand, patients who have attained post-secondary school education do easily understand the value of healthy lifestyle and properly monitor their blood glucose levels (Houle et al., 2016).

2.3.3 Socioeconomic determinants affecting the quality of life among patients T2DM.

In 1948, the World Health Organization (WHO) added to its definition of health the components of physical, mental and social well-being. Recently, there has been a growing awareness about the quality of life (QoL) issues and also health-related quality of life (HRQoL). This is attributed to the growing knowledge concerning effects of psychosocial factors on physical health and how that consequently affects work productivity and performance. In chronic conditions such as hypertension and diabetes, HRQoL is useful in determining the lifelong effects of the disease on the body. Generally, HRQoL has been observed to be poorer among individuals with diabetes as compared to the general population (ElShazly and Hegazy 2018).

2.3.4 The role of social capital in addressing socioeconomic inequalities in health

According to Nyqvist et al., (2013), he describes social capital as a factor of social groups that fosters trust through inculcated practices and networks, and enhances efficiency in a society by facilitating mutual activities. Since it aims to improve survival risk, there's involvement of conscious and unconscious effort individually and collectively (Nettle et al., 2014). In the health sector, social capital has been measured using individual perception and practical behaviour. It is classified into structural and cognitive. Structural social capital being considered as the degree and depth of associational links while cognitive social capital is evidenced by interpersonal trust, reciprocity, social support and cohesion (Harpham et al., 2002). Cognitive social capital puts into consideration how a given person can use the benefits from available social resources in the family, among friends, from the surrounding and available health services. This study will adopt a perspective of active involvement and participation in DSGs as a measure of social capital.

Studies have demonstrated how social capital is useful in minimizing high-risk health behaviors (Kielyet'al 2000). An assessment of social capital in respect to the Quality Of Life (QOL) for individuals with type 2 diabetes in China found out that in as much as social capital and QOL of the study population was generally low; perceptions on usefulness of social support systems was linked to the QOL of these patients (Hu et al., 2015). A different study that looked at how social capital influences glycaemic control concluded that living in good neighborhoods had a progressive impact in the control of blood glucose (Long et al, 2010). Other studies have also demonstrated how good social support systems may help control obesity and diabetes (Holtgraveet'al, 2006). A cross-sectional study of 1692 individuals who had T2DM from six European Countries revealed that dissemination of information about diabetes, good emotional support and active involvement in social support groups improved individual's ability to self-manage their condition (Koetsenruijteret'al, 2016). Moreover, information support is quite helpful in improving the self-managing abilities of diabetic patients with low education level. Furthermore, studies show that people with high education levels benefit more from enhanced emotional support systems (Keyvanara et al., 2012).

Henderson et al., (2014), performed 28 semi structured interviews among T2DM patients in Adelaide Southern Australia, an area populated by people in low socioeconomic status. It was observed that some of the key concerns and challenges related to self-care among these patients

were linked to inadequate knowledge about diabetes, financial strain and poor social support structures. Diabetes is largely influenced by personal behaviour and societal factors. Due to the long-standing nature of diabetes, it has numerous internal and external effects on patient's overall well-being. This raises the need to prioritize individual and societal determinants of health. Social capital is invaluable in so far as mobilizing efforts of patients towards maintaining good health at a personal and community level. Through it, there's restoration of hope for the future and enhancement of coping skills for diabetes and associated complications.

Patients with type 2 diabetes require proper self-management skills such as dietary discipline, engaging in regular exercise, monitoring of sugar levels and consistent treatment follow-up. While these behaviors are critical in ensuring good glycaemic control, low SES among patients with diabetes is associated with poorer self-management practices. In individuals with low SES, their situation is worsened by stress levels as a consequence of little finances, poor neighborhoods and lack of access to information. Coping strategies are needed for the management of the stress levels and in order to reduce its harmful effects on the body. Persons with diabetes thus are required to use proper approaches oriented towards providing solutions to their problems in order to maintain good glycaemic control. Empirical literature has revealed that diabetic persons in low SES tend to avoid more involving modalities for managing their condition than persons with higher SES. The less involving the modality, the poorer the glycaemic control (Henderson et al., 2014).

Brown et al., (2004) identified both quality and access to health care as key factors influencing the management of diabetes. Access to high quality of care among the diabetics resulted to improved glycaemic control. Patients in low SES category were generally not receiving good care. They were most inconvenienced and did not receive timely care, were not in a position to get involved in the educative sessions, didn't undergo Glycosylated hemoglobin monitoring regularly and were prone to eye and foot complications. Walker et al. (2014) is in agreement with Brown's model which lays emphasis on the association between income and glycaemic control in the backdrop of patient's own efforts and involvement in diabetes educative programs. Brown also identified that individual characteristics can influence health outcomes regardless of the SES. Stress-related symptoms and self-efficacy have also been established as intervening variables between SES and HbA1c in other studies. The implication here is that persons in the

low SES have high levels of depressions and are less confident in their abilities to learn and embrace behaviours or skills that help in the management of their condition. This poses a challenge in their attainment of the target glycaemic control. Illness representations (which illustrate the personal beliefs one clings to concerning diabetes) could be an additional individual mediator.

A study on patient's feelings on peer support for patients having type 1 diabetes done in Denmark exploring the function of peer support from the viewpoint of these patients revealed that they regarded peer support groups as highly relevant in reducing the feeling of loneliness related to the effects of diabetes as a chronic disease (Joensen et al., 2016).

2.3.5 Diabetes self-care activities among people living with diabetes

Diabetes self-care activities are the skill-sets and behaviours adopted by individuals living with diabetes in the management of their condition. According to a study done in India, seven self-care behaviours have been linked to good outcomes amongst people living with diabetes. These include: good diet, regular exercise, checking blood sugar regularly and good problem solving skills. These activities have been positively correlated with good glycaemic control, reduced rates of complications and enhanced quality of life. Among the Indians, there's poor adherence to medication owing to their socio-cultural setting that promotes bad attitude towards disease. Illiteracy also compounds the socio-cultural effects (The National Medical Journal of India 2012 Vol. 25, No. 1, 2012).

Another study done in Germany pointed out that those type 2 diabetes calls for a higher sense of individual responsibility since most of the daily care rests on the patient himself. Therefore, patients suffering from chronic diseases are now required to actively participate in the management of their condition. In order to achieve better health outcomes among patients with chronic diseases, the healthcare sector ought to strengthen patients' self-management skills (Kamradt et al. 2014).

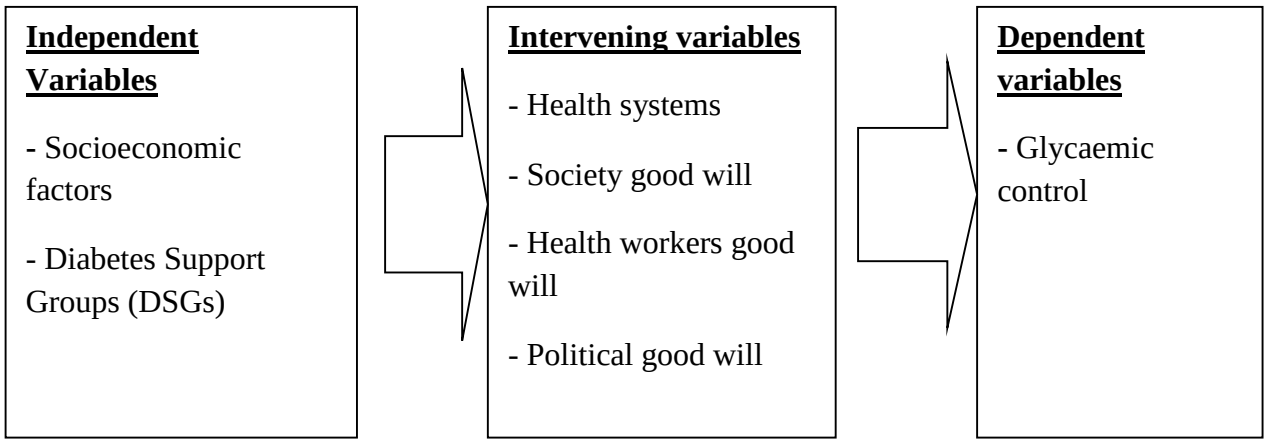
2.4 Conceptual framework

The independent variables in this study are socioeconomic factors and involvement in a diabetes support group. An assesment of how they affect glycaemic control which is the dependent

variable will be done using the relevant questions outlined in the questionnaire. Glycaemic control is the key preventive measure against complications relating to diabetes.

The intervening factors; health systems, society good will, health workers good will and political good will have an influence in the process of care for diabetic patients and significantly matter in achieving proper glycaemic control. Better health systems and health workers who go an extra mile to in their care for the diabetic patients for example by sending text reminders about clinic visits generally make it better for these patients to feel cared for and also improve their sugar levels. A society that is more cohesive also enables ease of patients coming together to have support groups and thus patients benefit from the social capital. Good political will towards promotion of better health systems improves the overall healthcare deliver

Figure 2.2 Conceptual Framework



CHAPTER THREE: METHODOLOGY

3.1 Study design

This was a cross-sectional study design using a quantitative method approach. Those included in the study were individuals with T2DM between 20 and 79 years of age, having been diagnosed not later than January 2019 and on follow up outpatient visits at the Nakuru level V Hospital (NKLVH). It utilized primary data collected using semi-structured questionnaires administered to the respondents by the research assistants.

3.2 Study area description

The study was conducted at Nakuru level V Hospital (NKLVH) in Nakuru County which is the referral hospital for the entire Nakuru County. Nakuru ranks as the fourth largest County in terms of population in Kenya. It is also one of the highest ranking in the prevalence of Diabetes among all the Counties in Kenya (KDHS 2014). The NKLVH has a well-established daily comprehensive diabetic clinic attended by diabetic patients from all the sub-counties within the County. At the NKLVH diabetes support groups were set up in order to help the patients cope with the lifelong adjustments in the care and management of diabetes.

3.3 Study population

This involved patients with T2DM aged between 20 and 79 years, attending outpatient follow-up diabetes clinic at NKLVH with a confirmed diagnosis (by a health practitioner) as evidenced in the treatment records. The targeted respondents were 381 in the study area. There was an inclusion and exclusion criteria.

3.3.1 Inclusion criteria

The study included patients with T2DM attending outpatient follow-up diabetic clinic at the NKLVH who met the following criteria:

i. Aged between 20 and 79 years.
ii. They had been diagnosed with type 2 diabetes not later than January 2019 and had been on regular follow-up at NKLVH.

3.3.2 Exclusion criteria

The study will exclude patients with T2DM with the following characteristics:

i. Aged below 20 years or above 79 years.
ii. Those who were pregnant.
iii. Patients with debilitating mental illness due to their inability to give informed consent.

3.4 Sampling size determination

The formula by (Yamane 1967:886) was used to calculate sample size was used by assuming a confidence level of 95% and P value of 0.05.

$$n = \frac{N}{1 + N(e^2)} \quad \ldots\ldots 1$$

Where **n** is the sample size, **N** the population size, and **e** the level of precision. As per the hospital records, the current (2019) population **(N)** of adults with T2DM on follow up at NKLVH were approximately 8346. By applying the formula, the computed sample size is as below:

$$n = \frac{8346}{1 + 8346(0.05^2)} \cong 381 \quad \ldots\ldots 2$$

As such, the sample size used in the study was 381.

3.5 Sampling procedure

A sample size of 381 individuals was selected through a systematic random sampling technique. According to the NKLVH patients register, the numbers of those attending the daily diabetic clinic from Mondays to Fridays range from 35 to 55 which give an average of 45 patients per day. They visited the clinic not in any particular order and as such, every 3rd individual was selected for the study making it an average of 15 respondents a day.

3.6 Recruitment and Consenting procedures

On the basis of voluntary participation and informed consent, patients with T2DM attending the diabetic outpatient clinic at the NKLVH were recruited in the study. As clarified, the inclusion and exclusion criteria were followed. The consenting procedure was guided by the standard

KNH-ERC informed consent form attached in Appendix 1. A trained research assistant provided a consent form that gave information which helped the respondent decide whether or not to participate in the study. The purpose of the study, possible risks and benefits of participation and rights as outlined in the consent form were clearly explained to each respondent. Once the respondent had understood it, he/she signed off via a signature or thumb print to constitute consent for participation in this study. A trained researcher administered the questionnaire, for about 20 minutes, in a designated private room within the NKLVH. Recruitment of the consenting respondents continued until the desired sample size of 381 was achieved. Respondents were free to contact the principal investigator or the KNH-ERC via email or telephone to respond to any questions and concerns that may arise during or after the interview session.

3.7 Data collection procedures

The process of collecting data took an average of 5 weeks. Two research assistants who had attained at least secondary school education and were hired by the researcher to collect data. They were taken through a comprehensive training to enhance their capacity prior to the actual collection of data. Discussions among the research assistants were carried out based on the lessons acquired in the training sessions. Thereafter, the data collection exercise commenced in a designated private room within the NKLVH. Proper scheduling of the daily activities was done to ensure that the exercise went on smoothly. A semi-structured questionnaire was used to collect data from the respondents. The level of glycaemic control was assessed through the review of patients' treatment records. Thereafter data was entered into SPSS version 20 then transferred into STATA version 14.1 for analysis. In order to establish an association between socioeconomic variables, social capital and glycaemic control, this study assessed a wider range of social, economic, behavioural and treatment related factors. Some lifestyle factors that have been implicated in poor glycaemic control are lack of physical activity, dietary intake patterns and attitude towards self-monitoring of blood glucose. The research instruments were designed in accordance with the research objectives. Data on socio-demographic characteristics as well as treatment related factors were captured.

3.8 Quality assurance procedures

The study had the following as the quality assurance procedures:

3.8.1 Pilot Study

A pilot study was done to assess whether the instruments could adequately answer the research questions. It also assisted in finding out any weaknesses in the questionnaire. The questionnaire was administered by the researcher to 18 T2DM patients in Rongai Sub-county hospital. The researcher ensured that the piloted respondents did not participate in the actual study. Responses during the pilot study were used to conduct reliability analysis and allowed for modification of the research instruments before starting the actual data collection.

3.8.2 Reliability of the study

Reliability assesses the consistency of the study results (Carmines and Zeller, 1979). The sample calculation was based on 95% confidence level and 5% margin of error in order to obtain a sample large enough to limit the probability of chance influencing the results. To ensure reliability, the researcher recruited experienced data collectors who were further retrained for this study in particular. Efforts were made to interview the respondents in the early morning hours to minimize chances of having biased responses due to fatigue as the day advances. The respondent's contacts were also taken for purposes of follow-up or any other further clarification. The researcher utilized standard tools of measurement. There was clear operational definitions of the variables to make sure all stakeholders were conversant with these definitions.

In testing the reliability, the researcher used Cronbach's Alpha coefficient whose formula is:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}} \quad \text{..... 2}$$

Where **N** is the number of items, $\bar{\mathbf{c}}$ the average covariance between item pairs and $\bar{\mathbf{v}}$ the average variance.

The threshold for a reliable questionnaire is a coefficient of 0.7. A value greater or equal to 0.7 would be deemed reliable and could be used to collect data for the main survey. If the values were less than 0.7 then the questionnaire would be deemed unreliable requiring modification and repeat of the pilot test (Singleton et al., 2010).

3.8.3 Validity of the questionnaire

Validity measures the accuracy of the study results and is classified into content validity, criterion validity, construct validity and face validity (Saunders *et al.,* 2012). The research adopted content validity which assessed the extent to which the research instruments provided adequate measurement of the variables. Content validity of the questionnaire was determined by having the supervisor review the questionnaire, looking for inadequacies and suggesting the appropriate corrections. The questionnaire was also pretested through a pilot study. Recommendations from these were incorporated in the final questionnaire. Construct validity shows the degree to which an instrument measures what it purports to measure. There are two types of construct validity namely; convergent and discriminant validity. Testing of construct validity utilises the principal component analysis (PCA) (Koh*et al*., 2005).

3.9 Ethical considerations

Approval of this study was sought from the Kenyatta National Hospital - University of Nairobi Ethics and Research Committee upon clearing and being issued with a letter of introduction from the school of graduate studies (SGS). To futher meet the ethical requirements of the study, the researcher only administered data collection tools to willing repsondents. Those willing to participate in the study were guided on what the study was about and once they understood they were provided with a consent form to fill. The participants were assured that the study findings were to be used solely for academic purposes and no one would be victimized and confidentaility will be upheld. There was also a provision of debriefing, counseling and additional information was provided to the participants before the data collection.

3.10 Data management and analysis

The data was collected using semi-structured questionnaires and kept in closed cabinets for privacy. Upon completion of the collection exercise, the questionnaires were scrutinized to verify if they were duly filled and the incomplete ones were sorted and kept separately. For the completely filled questionnaires, the data was entered in SPSS version 20 and transferred to STATA version 14.1. Once the data was entered into STATA, we analyzed the socio-demographic characteristics of the T2DM patients using descriptive statistics such as mean,

mode, standard deviation, frequencies and percentages. Probit regression and concentration index were also conducted.

3.10.1 Probit model

Probit regression is a special type of the Generalized Linear Models (GLM) where the bivariate outcome YY has a Bernoulli distribution with parameter p (probability of success p∈ (0, 1)).

The probit link function (EY = p) where

$$probit\ (EY) = \Phi^{-1}(p) = \Phi^{-1}\ (P[Y = 1]) \quad \text{.....3}$$

Is used to transform the expectation of this 0 or 1 dependent variable.

$$probit(EY) = X\beta \quad \text{.....4}$$

Where β is a vector of unknown parameters. The predicted probabilities can be obtained by the inverse Probit transformation

$$P\hat{}[Yi = 1] = \Phi(Xi,\cdot\ \beta\hat{} \quad \text{.....5}$$

An assumption is made that there is a presence of latent variable Y* such that

$$Y^* = X\beta + \varepsilon \quad where\ \varepsilon \sim N(0, \sigma^2) \quad \text{.....6}$$

In a linear regression we would observe Y* directly but in Probit, we observe only

$$y_i = \begin{cases} 0\ if\ y_i^* \leq 0 \\ 1\ if\ y_i^* > 0 \end{cases} \quad \text{.....7}$$

This translates to possible values for the error term such that:

$$\Pr(y_i^* > 0|Xi) = \Pr(y_i = 1|x_i) = \Phi\left(\frac{-\beta x_i}{\sigma}\right) \quad \text{.....8}$$

And similarly,

$$\Pr(y_i = 0|x_i) = 1 - \Phi\left(\frac{-\beta x_i}{\sigma}\right) \quad \text{.....9}$$

Since β and σ cannot be estimated as they enter the equation as a ratio. So, σ=1 is set to make the distribution on ε a standard normal density.

The dependent variable in the study was Glycaemic control (outcome_ HbA1c) which was measured as a binary variable. The (outcome_ HbA1c) was computed from the HbA1c results with a cut off of 6.5, where 6.5 and below is good control and 6.6 and above poor control. The independent variables included; employment status, education level, income, age, marital status, religion, complications, social capital, and number of children. This implied that the regression model transformed to:

$$PGlyC_{ij} = \beta_0 + \beta_1 Agecat_i + \beta_2 Agedx + \beta_3 Sex + \beta_4 Educ_i + \beta_5 MS_i + \beta_6 Res + \beta_7 HSI_i + \beta_8 Occ_i + \beta_9\ SC$$

$$+\beta_{10}\,\text{Smok}+\beta_{11}\text{Alcohol}_i+\ \ \beta_{12}+\varepsilon$$

……..10

Where **GlyC** = Glycaemic control; **Agecat** = Age category**; Agedx** = Age at diagnosis; **Educ** = Education level; **MS** = Marital Status; **Res** = Residence; **HSI** = Household income; **Occ** = occupation; **SC** = Social Capital; **Smok** = history of smoking; **Alcohol** = history of alcohol intake **ε** = Error term.

3.10.2 Concentration index

The concentration index (C), a common tool derived from a concentration curve L(s) used for measuring health inequality (Wagstaff, 1991), was used to measure relative socioeconomic inequality in achieving target glycaemic control among the T2DM patients. A concentration curve L(s) illustrates the increasing proportion of a population ranked by SES against the increasing proportion of a health variable (Glycaemic control in this study). If L(s) lies at the 45 degrees, it demonstrates that there is equity in the distribution of the health variable. Any deviation of L(s) below or above the diagonal line means that the health variable favors the rich and the poor respectively. The concentration index, C, was computed as double the area between the line of equity and the concentration curve L(s). C ranges between −1 and +1. Negative values denote that the health variable is concentrated among the poor whereas a positive value shows that the variable is concentrated among the rich. A value of 0 illustrates equity.

According to Wagstaff (2000), if the dependent variable is dichotomous the C lies within the interval (μ-1, 1-μ). The interval shrinks as the mean rises and to normalize we divide the C by 1-μ. Therefore, health C is a normalized sum of weighted health levels with the weights being determined by the socioeconomic ranks m_i.

$$C = \frac{2}{\mu} cov\ (h,r) \quad \text{.....11}$$

$$C(h) = \frac{2}{n^2 \mu_h} \sum_{i=1}^{n} m_i h_i \quad \text{.....12}$$

Where $m_i = \lambda i : \left[\frac{n+1}{2}\right]$.

The Concentration Index of the health variable given y is defined as:

$$C(h|y) = \frac{2cov(h_i R_i)}{\bar{h}} \sum_{i=1}^{n} \{2R_i - 1\} \quad \text{.....13}$$

When the health variable is bounded, we can define the health $C(h)$ as the generalized health C $V(s)$ as:

$$V(s) = \frac{2}{n^2}\sum_{i=1}^{n} m_i h_i \quad \text{.....14}$$

Additionally, Wagstaff (2000), and Erreygers (2009) developed the Wagstaff Index $W(x)$ and the Erreygers Index $E(x)$, with the following expression:

$$W(x) = \frac{2(b_x - a_x)}{n^2(b_x - \mu_x)(\mu_x - a_x)}\sum_{i=1}^{n} m_i x_i \quad \text{.....15}$$

While the

$$E(x) = \frac{8}{n^2(b_x - a_x)}\sum_{i=1}^{n} m_i x_i \text{ Where } x = h, s \quad \text{.....16}$$

Equation 14 and 15 are all variants of a general expression which differ only with respect to the normalization applied to the weighted sum of health levels. Generally, the C ranges between -1 and +1, when it is 0, there is no difference in Glycaemic control among the different socioeconomic groups. A C with a positive value implies that the good glycaemic control concentrates in higher SES.

3.11 Study results disemmination plan

Findings of the study were disemminated through this dissertation that is to be presented to the Postgraduate school of economics after approval by the supervisor. The results may also be published in relevant economic journals.

3.12 Study limitations and delimitations

As a cross-sectional study, there was a potential challenge in the respondents not providing accurate information especially for socially undesired behaviours such as smoking, alcohol intake, unhealthy diet and medicine adherence. Fasting Blood Sugar (FBS) and Random Blood Sugar (RBS) were not reliable indices for estimating glycaemic control because they fluctuate with exercise, food or drug intake. It was still not possible to use the criteria of an average of the last two FBS as most of the respondents come to the clinic having taken breakfast and are not able to have the FBS checked. The only reliable criteria for glycaemic control was Glycosylated

hemoglobin (HbA1c) yet only a small fraction (58.1%) had it done over the last three months prior to data collection. Lack of HbA1c test for all patients in our study setting, owing to its cost implication, made a uniform criterion unachievable. This study only covered Nakuru County.

This study only concentrated on DSGs and socioeconomic determinants in health among patients living with T2DM in Nakuru County aged between 20 and 79 years on follow up outpatient visits at the NKLVH. A sample size of about 363 diabetic patients who had been diagnosed not later than January 2019 were selected through a systematic random sampling process and interviewed using semi-structured questionnaires.

CHAPTER FOUR: FINDINGS

4.1 Introduction

The focus of this chapter is the detailed presentation of findings of the study. The data was collected through administration of semi-structured questionnaires to 363 patients with T2DM selected in a systematic random sampling process. The basic procedures before data analysis were: Data coding, checking for inconsistencies of the data in the questionnaires and if found were queried with research assistants. Any missing data was documented. Data entry was done via SPSS version 20 and later analyzed via STATA version 14.1.

A pilot study was conducted and it involved 18 T2DM respondents at Rongai Sub-County Hospital. The responses were crucial in identifying gaps and validity of content in the data collection tool. Corrections from the pilot study were taken into consideration before commencement of the actual study. The results are presented in both descriptive and analytical form, in frequencies, percentages, tables and inferential statistics.

4.2 Response Rate

The researcher sought to collect data from 381 TD2M patients but managed to collect from 363 respondents. This translates to a 95.28% response rate. According to Jack (2008), this response rate is adequate for the study and is highly representative of the population. High nonresponse bias of more than 30% can be a major setback to the reliability and validity of the study findings.

Table 4.1: Response Rate

Response	**Frequency (n)**	**Percentage (%)**
Expected sample	381	100
Actual sample	363	95.28
Nonresponse	**18**	**4.72**

4.3 Socio-demographic characteristics

In a total of 363 respondents, the distribution according to gender showed more than half of the respondents were female accounting to 66% while the remaining 34% were male. This also projected the gender distribution of T2DM patients that attend Diabetes Clinics within the County. The inclusion criterion in the study was for patients aged between 20 and 79 years. Descriptive analysis of the demographic age showed that the mean age of the respondents was 56.6 years with the youngest being 25 years and the oldest at 79 years.

The demographic distribution of age categories showed that majority (28.7%) of the respondents were aged between 51-60 years, followed by those aged between 61-70 at (25.9%) and 71-79 at (13.2%). This showed a higher prevalence in older respondents compared to the younger respondents who account for about 11% of the total population. Additionally, analysis of the study findings showed that the mean age at diagnosis was at 49 years with the youngest being diagnosed at 22 years and the oldest at 75 years. A bigger percentage (32.78%) of the T2DM patients are diagnosed between ages 41-50 years. Only 4% were diagnosed between ages 21-30 years and just 3% diagnosed in the ages 71-79 years.

In terms of marital status, the study established that majority of the respondents (80.7%) were married. Those that indicated to have been widowed accounted for about 10.4% while those that were separated/divorced stood at 5.5%. Only 3.3% out of the total respondents recorded to have been single. The findings also established that more than half (59.2%) of the respondents had 4-7 children, a quarter (25.6%) of them had 0-3 children and about (15.2%) having over 7 children.

In regards to the residence of the respondents, it was evident that a majority (54.57%) of them resides in the rural areas and a fairly good number of them (45.43%) live in the urban areas of the Nakuru County. It was further established that majority (56.5%) of the T2DM respondents had been educated below secondary level while only 43.5% had reached secondary level and above. Looking at employment, majority (51%) of the respondents were employed and those that were unemployed represented about 48% of the total respondents. Most of the respondents were in business (29.8%) and farming (27.4%). Only a small proportion of respondents (3.3%) were casual workers. Additionally, about 17% of the participants did not have any form of occupation. In view of the monthly household income earned by the T2DM patients, the results showed that

about 35.3 % earned an income between Kshs 4,000 :10,000 every month. Only about 13% of the respondents further indicated that they earned an income of KShs 0 :4,000 every month. Slightly more than a quarter (27.3%) generated an income of 10,001 :20,000 and about 24.2% of the respondents earned an income of above Kshs 20,000.

A majority (91%) of the T2DM patients were affiliated with Christianity and about 9% were non-Christians with some recording to have no religious affiliation.

The study results showed that 35.6% of the T2DM respondents did not have any family history of Diabetes type 2. On the other hand majority (64.5%) reported to have had a family history of T2DM of either their parents, siblings or other relatives.

Table 4.2: Socio-demographic characteristics

Variable		Freq.	Percent
Sex	Male	122	33.61
	Female	241	66.39
Age category	20-30	2	0.55
	31-40	39	10.74
	41-50	76	20.94
	51-60	104	28.65
	61-70	94	25.9
	71-79	48	13.22
Age at diagnosis	20-30	15	4.13
	31-40	66	18.18
	41-50	119	32.78
	51-60	96	26.45
	61-70	56	15.43
	71-79	11	3.03
Education level	Below secondary	205	56.47
	Secondary and above	158	43.53
Employment	Yes	185	51.39

	No	175	48.61
Variable		**Freq.**	**Percent**
Occupation	Business / Trade	108	29.83
	Casual Worker	12	3.31
	Formal Employment	48	13.26
	Farmer	99	27.35
	None	95	26.25
Household income	0-4000	48	13.22
	4001-10000	128	35.26
	10001-20000	99	27.27
	Above 20000	88	24.24
Marital Status	Single (never in a union)	12	3.31
	Married	293	80.72
	Widow/widowed	38	10.47
	Separated /divorced	20	5.51
Number of children	0-3 Children	93	25.62
	4-7 Children	215	59.23
	Over 7 Children	55	15.15
Residence	Rural	197	54.57
	Urban	164	45.43
Religion	Christian	329	90.63
	Non-Christian	34	9.37
Family history of diabetes	Parents	64	17.68
	Siblings	91	25.14
	Other relatives	78	21.55
	None	129	35.64

4.4 Clinical characteristics

The findings showed that of the 363 respondents, only 58.1% had done HbA1c over the last three months. Only 28% of the respondents who had taken the HbA1c test had good glycaemic control, while 72% of the participants with HbA1c results indicated poor control of blood glucose. The descriptive study results showed that the respondents who had HbA1c done had an average of 8% (generally the whole population being poorly controlled; cut-off for good control being $\leq 6.5\%$) with the lowest having 4.6% and the highest at 17%.

A majority of the T2DM respondents (58.7%) were on tablets regimen as their main treatment. About 28% of the study population was on insulin therapy, whereas those on both tablets and insulin regimen accounted for about 10%. Apart from drug therapy, there were only a few participants on diet therapy (3.3%) and lifestyle change (0.3%).

The findings established that most (90.6%) of the T2DM patients visit the hospital on a monthly basis. This was mainly because they are given a monthly return date as well as medication that last just about the same period. The patients that require close monitoring visit the hospital every 2 weeks accounting for 2.5% of the respondents. Less than 7% of the respondents visited the hospital after more than one month. Most of the patients under this category stated that logistical difficulties such as transport and lack of finances were the major reasons for their reduced number of visits.

Majority (76%) of the respondents reported to have had NHIF as their insurance cover with about 3.3% having other private insurances. A number of respondents (2.5%) indicated that they were covered by both NHIF and private insurances. 16.7% of the total sample population reported to have no form of medical insurance.

From the study results it was evident that most (83.2%) of the participants did not have a prior history of smoking while about 16.8% indicated to have had smoked at one point in life with a few of the participants still smoking. The study further showed that only 19% had a history of alcohol consumption while about 81% had not consumed alcohol before.

Table 4.3: Clinical characteristics of the participants

Variable		Freq.	Percent
Outcome HbA1c	Good	60	28.44
	Poor	151	71.56
Nature of Diabetes Treatment	Diet only	12	3.31
	Tablets only	213	58.68
	Insulin only	101	27.82
	Insulin and tablets	36	9.92
	Lifestyle change only	1	0.28
Frequency of hospital visit	2 weeks	9	2.48
	Every month	329	90.63
	2 months	16	4.41
	3 months	4	1.1
	6 months	2	0.55
	Once a year	2	0.55
	Other	1	0.28
Insurance cover	Private Insurance	12	3.34
	NHIF	273	76.04
	Other	5	1.39
	NHIF & Private Insurance	9	2.51
	None	60	16.71
History of tobacco smoking	Yes	61	16.8
	No	302	83.2
History of alcohol intake	Yes	69	19.06
	No	293	80.94

4.4 Social support characteristics

The research sought to investigate the state of social support that the sample population had access to. According to the research findings, a third (33.3%) of the respondents are members of a support group with nearly all of them having attended a diabetes support group at least once. Majority (66.7%) of the participants are not affiliated with any diabetes support group. Most of the non-members reported that the main reason they have no membership or attendance to support groups is because they were not aware of its existence and also due to logistical difficulties such as distance and transport costs. The study also established that a majority (70.09%) of the support group members were average members. The other 29.95% were active members meaning that they were either group leaders or attended the support group meetings more frequently or both.

According to the study results, more than half (54.6%) of the support group members reported to have joined the group for treatment, care and lifestyle change support. Additionally, those that joined purposely for treatment, lifestyle change and emotional support accounted for 16% of all the members recorded. About 9% of the members stated that their main reasons for joining support groups were treatment, lifestyle change, financial support, emotional support and lack of support from family and friends.

Table 4.4: Support group characteristics

Variable		Freq.	Percent
Support Group Member	Yes	121	33.33
	No	242	66.67
Attendance of diabetes support group	Yes	118	99.16
	No	1	0.84
Level of participation	Average member	82	70.09
	Active member	35	29.91
Main reason for joining the group	Treatment & care support	8	6.72
	Life style change support	3	2.52
	Lack of support from family & friends	1	0.84
	Treatment Care/Lifestyle Change/Financial/Lack of Support from Family & Friends /Emotional support	11	9.24
	Treatment & Care/Lifestyle Change support	65	54.62
	Treatment & Care/Emotional support	5	4.2
	Treatment & Care/Lifestyle Change/Financial/ Emotional Support	6	5.04
	Treatment & Care/Lifestyle Change/Emotional support	19	15.97
	Treatment & Care/Lifestyle Change/lack of support	1	0.84

4.5 Socioeconomic status

The study conducted a PCA in order to rank the wealth index of the T2DM patients in their SES. According to Filmer & Pritchett (2001), the most commonly used arbitrary cut-off points are classification of the lowest 40% of households into 'poor', the highest 20% as 'rich' and the rest as the 'middle' group or consequently the division of households into quintiles (Gwatkin et al. 2000). The socioeconomic factors used were electricity, radio, television, refrigerator, bicycle, motorbike car, floor material, wall and roofing material, cooking fuel, whether living in a rental house and amount of rent paid. Households were classified into quintiles and socioeconomic score for each category was computed. The study findings indicated a Kaiser-Meyer-Olkin measure of sampling adequacy as 0.6165. This was below the threshold of 0.7 that demonstrates a stronger output. The wealth index approach was then abolished and socioeconomic status was thus ranked as per the income level as represented by the table below.

Table 4.5: Household income ranking

Household income (Kshs)	Frequency (n)	Percentage (%)	Cumulative %.
0-4000	48	13.22	13.22
4001-10000	128	35.26	48.48
10001-20000	99	27.27	75.76
above 20000	88	24.24	100

Majority of the respondents (35.26%) were earners of between 4001 and 10000 Kshs. per month in a single household while on 13.22% fell in the least category of earners. An illustration of the household income and number of children is represented below.

Table 4.6: Household income and number of children

Household income (Kshs)	Number of children			
	0-3	**4-7**	**Over 7**	**Total**
0-4000	7	26	15	48
4001-10000	25	78	25	128
10001-20000	29	60	10	99
above 20000	32	51	5	88
Total	93	215	55	363

4.6 Diagnostic Tests

The following tests were performed to assess the suitability of the research instruments.

4.6.1 Multicollinearity Test

The study tested for multicollinearity using variance inflation factor and found that variance inflation factors for all the variables were less than 10 suggesting that variables were not severely correlated.

4.6.2 Heteroscedasticity Test

Heteroscedasticity test(s) using levels of independent variables only was performed and the results were as below:

Null hypothesis: Disturbance is Homoscedastic

White/Koenker n R2 test statistic: 55.29 Chi-sq (38) P-value = 0.0346

This statistic is distributed as chi-squared under the null of no heteroscedasticity and under the maintained hypothesis that the error of the regression is normally distributed. The degrees of freedom of all these chi-square tests are equal to the number of indicator variables. The relationship between these independent variables was statistically significant with Chi-Square ($X^2_{(25)} = 55.29$, $p<0.05$) indicating that heteroscedasticity was absent.

4.7 Regression Analysis

Probit regression analysis was done and marginal effects generated.

4.7.1 Probit Analysis Results

The study estimated Probit model using glycosylated haemoglobin as the variable for glycaemic control and found that the chi square for likelihood ratio test was significant suggesting that the independent variables jointly influenced glycaemic control in Nakuru County. Table 4.7 shows the coefficients, standard errors and the significance of the variables. The coefficients of female gender, employment, income categories of (4001-10000, 10001-20000), married, widow/widowed, separated/divorced, not smoking and not being a member of a diabetes support groups are negatively associated with glycaemic control. The variables that are positively associated with age categories and age at diagnosis, compared to patient ages between 20 and 30, the patients age 31 to 70 have a better glycosylated haemoglobin control. The same applies to the age at diagnosis. This simply reveals younger T2DM patients ages 20-31 may have a poorer glycaemic control. Patients living in the urban areas have a negative coefficient value i.e. negative association with glycaemic control compared to those in the rural areas.

Table 4.7: Probit regression results

Outcome_HbA1c	Coef.	St.Err.	p-value	95% Conf Interval]	
Age category					
31-40	2.47	0.91	0.007	0.68	4.26
41-50	1.82	0.79	0.022	0.27	3.37
51-60	1.27	0.73	0.082	-0.16	2.71
61-70	0.64	0.65	0.326	-0.64	1.91
Age at diagnosis					
31-40	0.64	0.70	0.364	-0.74	2.01
41-50	1.45	0.77	0.058	-0.05	2.96
51-60	1.91	0.83	0.020	0.30	3.53
61-70	2.24	0.98	0.022	0.32	4.16
Sex					
Female	-0.13	0.27	0.635	-0.66	0.40
Marital status					
Married	-0.32	0.59	0.584	-1.47	0.83
Widow/widowed	-0.12	0.70	0.861	-1.49	1.24
Separated/divorced	-0.26	0.72	0.721	-1.66	1.15
Education					
Secondary+	0.04	0.25	0.881	-0.46	0.53
Residence					
Urban	-0.62	0.25	0.014	-1.11	-0.13
Occupation					
Formal	-0.07	0.30	0.824	-0.66	0.52
Informal	-0.21	0.29	0.463	-0.78	0.36
Income					
4001-10000	-0.58	0.38	0.124	-1.32	0.16
10001-20000	-0.50	0.38	0.189	-1.25	0.25
Above 20000	0.06	0.39	0.881	-0.71	0.82
Smoking					
No	-0.09	0.46	0.851	-0.99	0.82
Alcohol					
No	0.71	0.43	0.102	-0.14	1.56
Support group					
Non-member	-0.27	0.23	-1.21	0.225	-0.72

4.7.2 Marginal effects

The study sought to determine the marginal effects of the various patient characteristics on diabetes control. Table 4.8 presents the findings. Marginal effects can be an informative means for summarizing the direction and strength of association given by the levels of confidence.

The patient ages were dropped due to multicollinearity with age at diagnosis. Looking that age at diagnosis, age has a positive and significant association with glycaemic control, compared to patients who were between age 20 and 30 at diagnosis, patients who were between ages 41 to 70 are more likely to have a better glycaemic control. For example, patient diagnosed at 41 to 50 years, 51 to 60 years and 61 to 70 years are 25%, 38% and 48% more likely to have a better diabetes control than those diagnosed at age between 20 to 30. All these associations are significant at 1%. Those living in urban areas are less likely to have controlled Type 2 diabetes than those living in rural area and this is significant at 1% level.

Table 4. 8 : Marginal Effects Analysis of Glycaemic Control

Outcome_HbA1c	dy/dx	Std.Err.	p-value	95% Conf Interval]	
Age at diagnosis					
31-40	0.08	0.07	0.253	-0.05	0.20
41-50	0.25	0.08	0.001	0.11	0.40
51-60	0.38	0.10	0.000	0.19	0.57
61-70	0.48	0.17	0.005	0.14	0.82
Sex					
Female	-0.04	0.08	0.638	-0.19	0.12
Marital status					
Married	-0.10	0.18	0.603	-0.45	0.26
Widow/widowed	-0.04	0.22	0.862	-0.46	0.39
Separated/divorced	-0.08	0.22	0.724	-0.50	0.35
Education					
Secondary+	-0.10	0.18	0.603	-0.45	0.26
Residence					
Urban	-0.17	0.06	0.008	-0.29	-0.04
Occupation					
Formal	-0.02	0.09	0.823	-0.19	0.15
Informal	-0.06	0.08	0.464	-0.22	0.10
Income					
4001-10000	-0.17	0.11	0.140	-0.39	0.06
10001-20000	-0.15	0.12	0.205	-0.37	0.08
Above 20000	0.02	0.13	0.880	-0.23	0.27
Smoking					
No	-0.03	0.13	0.852	-0.29	0.24
Alcohol					
No	0.18	0.09	0.050	0.00	0.35
Support group					
Non-member	-0.08	0.07	0.226	-0.21	0.05

Note: dy/dx for factor levels is the discrete change from the base level.

4.7.3 Inequalities in control of Type 2 diabetes

Figure 4.1a and Figure 4.1b shows the concentration curves for glycaemic control and Random Blood Sugar levels respectively. The two figures plot the cumulative percentage of the T2DM patients ranked by household monthly income on the x-axis against the cumulative percentage of glycosylated haemoglobin (HBA1C) and Random Blood Sugar (RBS) on the y-axis. The concentration index coefficient is used to express the extent of inequality against a health variable. This index ranges between −1 and +1. Both concentration curves (L) lies below the diagonal line of equality confirming that T2DM control is directly proportional to patient's wealth status.

The results of inequality statistics measure by concentration index (C) are presented in Table 4.9. Concentration index is positive. This is interpreted that good glycaemic control is more prevalent amongst the households with higher income. A normalized C was computed as proposed by Wagstaff and Erreygers resulting in positive values; 0.1842 and 0.15 respectively. The standard computed concentration index yielded a value of 0.1318.

Figure 4.2a: Concentration curve (L) of cumulative % of glycaemic control and Cumulative % of household income

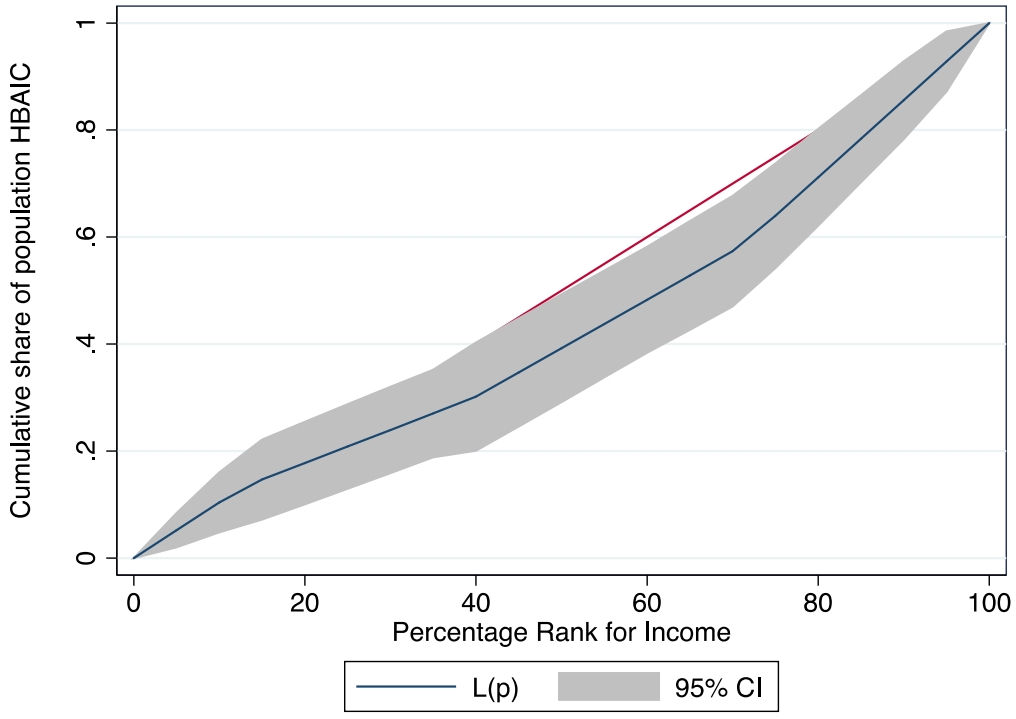


Figure 4.3b: Concentration curve (L) of cumulative % of Random Blood Sugar and Cumulative % of household income

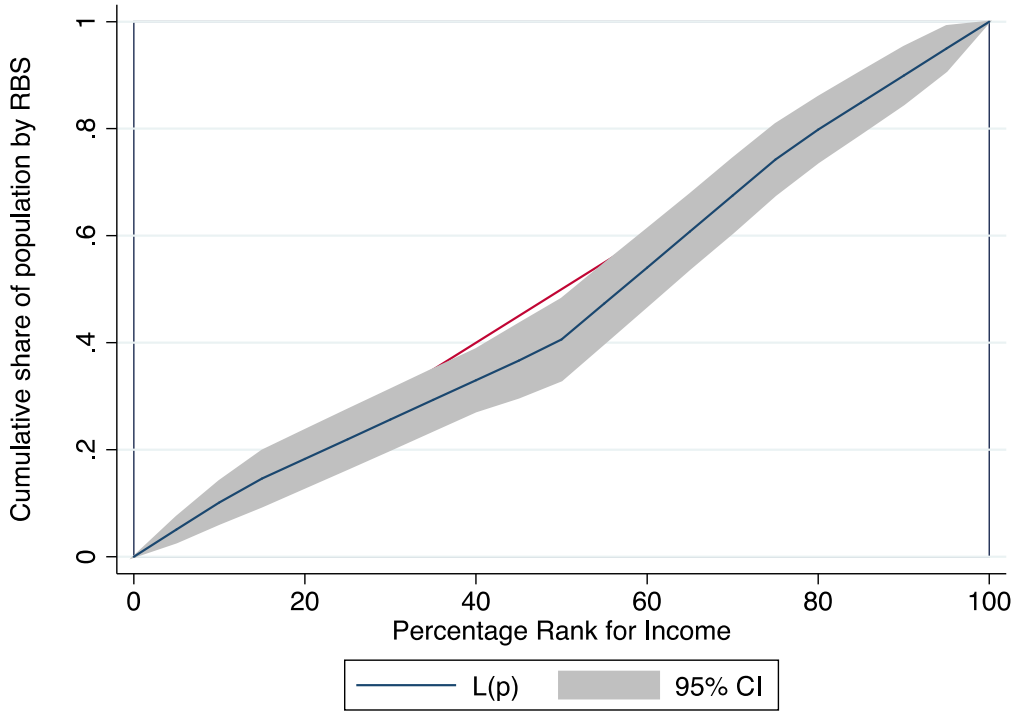


Table 4.9: Concentration indices

Glycaemic Control	**No. of observations**	**Index value**	**Std. error**	**p-value**
Standard CI	211	0.1318	0.0602	0.0296
Erreygers CI	211	0.1500	0.0685	0.0296
Wagstaff CI	211	0.1842	0.0811	0.0296
Random Blood Sugar	**No. of observations**	**Index value**	**Std. error**	**p-value**
Standard CI	335	0.0610	0.0417	0.1450
Erreygers CI	335	0.0837	0.0573	0. 1450
Wagstaff CI	335	0.0928	0.0636	0. 1450

Concentration indices comparing the support groups were also computed and the C values were 0.1369 and 0.0865 for group members and non-group members respectively. These point estimates are not significant and both F-test and Difference tests are insignificant, hence we fail to reject the null hypothesis that the index is the same none members and members of T2DM

support groups. Being a group member does not influence socioeconomic inequality among the T2DM patients in Nakuru County.

The results are as indicated in the table below:

Table 4.10: Erreygers Concentration indices for glycaemic control by various categories

Categories	No. of obs	Index value	St. Error	p-value
Group Membership				
Total	211	0.150	0.068	0.030
Not Group Member	109	0.087	0.089	0.333
Group Member	102	0.137	0.103	0.189
Residence				
Total	210	0.141	0.068	0.041
Urban	98	0.173	0.095	0.073
Rural	112	0.136	0.097	0.163
Alcohol & Smoke				
Total	211	0.150	0.068	0.030
No	164	0.131	0.080	0.103
Yes	47	0.228	0.125	0.074
Education[1]				
Total	211	0.150	0.068	0.030
Below Secondary	102	-0.017	0.095	0.859
Secondary & above	109	0.224	0.096	0.022
Marital status				
Total	211	0.150	0.068	0.030
Not Married	45	0.170	0.151	0.267
Married	166	0.146	0.077	0.060
Sex				
Total	211	0.150	0.068	0.030
Female	141	0.165	0.083	0.049
Male	70	0.115	0.122	0.350

Education[1:] Both tests are significant at 10% levels

The Erreygers concentration indices for glycaemic control from combine samples for various categories are shown as total, the group specific estimates are provided and labelled by category in Table 4.10. There is significant glycaemic control among the wealthy in all categories. Looking at area of residence, there is significant concentration of patients with controlled glycaemic levels in urban areas and the point estimate shows that the degree of inequality is

highest in urban areas. in terms of glycaemic control and level of education, there is significant concentration of glycaemic control among wealthy patients with secondary and above levels of education. The point estimate suggests that the level of inequality is highest among those with secondary and above levels of education. In all categories except for educational level, both F-test and Difference tests are insignificant and fails to reject the null hypothesis that the index is the same in rural and urban areas. For education, both tests are significant at 10% levels, hence need to reject the null hypothesis that the index is the same for those with secondary and above education and those with below secondary level of education.

Table 4.11: Erreygers Concentration indices for Random Blood Sugar control by various categories

Categories	No. of obs	Index value	St. Error	p-value
Group Membership				
Total	335	0.084	0.057	0.145
Not Group Member	218	-0.001	0.065	0.994
Group Member	117	0.022	0.102	0.831
Residence*				
Total	333	0.086	0.057	0.136
Urban	153	0.232	0.083	0.006
Rural	180	-0.032	0.078	0.686
Alcohol & Smoke				
Total	335	0.084	0.057	0.145
No	262	0.082	0.066	0.215
Yes	73	0.127	0.107	0.241
Education				
Total	335	0.084	0.057	0.145
Below Secondary	187	0.088	0.074	0.234
Secondary & above	148	0.011	0.088	0.898
Marital status				
Total	335	0.084	0.057	0.145
Not Married	64	0.107	0.116	0.358
Married	271	0.069	0.065	0.287
Sex*				
Total	335	0.084	0.057	0.145
Female	219	0.152	0.070	0.031
Male	116	-0.053	0.098	0.590

Table 4.11 presents the Erreygers concentration indices for Random Blood Sugar control from combine samples and group specific estimates. The index shows significant concentration of controlled random blood sugar among the wealthy living in urban areas and among wealthy women. The point estimates also shows that inequality is highest in urban areas and among women. Furthermore, the F-statistics and Difference tests are significant at 5% and 10% levels for urban areas and female patients, hence need to reject the null hypothesis that the index is the same for urban and rural areas as well as among male and female.

CHAPTER FIVE: SUMMARY, DISCUSSIONS, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the study, discusses findings and provides the conclusions and recommendations of the study.

5.2 Summary of findings

The study conducted a probit regression analysis to determine the effect of the influencing variables on the glycaemic control. The glycaemic control was measured by the glycosylated haemoglobin and a cut-off of 6.5% was used whereby ≤ 6.5% was considered as good control and > 6.5% considered as poor control. From the probit regression the chi square for likelihood ratio test was significant suggesting that the independent variables jointly influenced glycaemic control among the T2DM patients in Nakuru County.

There was a significant impact of those living in rural areas; patient's age and age at diagnosis which are positively associated with T2DM control, with younger patients having a poorer outcome.

The study findings showed that a normalized C based on monthly income was computed resulting in positive values; 0.1500 and 0.1842 respectively, implying that good glycaemic control is more among the patients of the higher SES than those of the lower SES. Household income category was used as a measure of the SES. Delamater, 2006 also found out that poor glycaemic control is highest among patients with low income.

Avoiding alcohol was demonstrated to have a positive influence on glycaemic control with a unit increase in each enhancing the glycaemic control by 0.177. Alcoholism is one of the factors resulting to increased susceptibility to NCDs. For those who were non-smokers the study findings revealed a different perspective whereby not smoking had a negative influence on the glycaemic control which contradicts what is understood in literature (WHO 2011).

In Kenya, more cases of diabetes are common in urban as compared to rural areas (Kenya National Strategy for the prevention and control of Non-Communicable Diseases, 2015 - 2020). As per the finding in this study, living in urban areas was demonstrated to have a negative impact on glycaemic control as well.

For diabetes support groups, though not statistically significant, there was a negative coefficient of -0.274 for non-members as demonstrated from the regression results as well as marginal effects which showed a negative coefficient of -0.078 for the T2DM patients who were not members of a support group. This implies that there's a slight poor glycaemic control amongst non-members of the support groups in comparison to the members. Social capital has been found to be helpful in enhancing glucose control among the diabetes patients, obesity, enhancing early recognition of diabetes and setting self-care goals (Farajzadegan et al., 2013; Glazier et al., 2006; Holtgrave et al., 2006). The concentration index for support group was 0.1369 as compared to 0.0863 for those not in support groups implying that social capital was useful in mitigating the socioeconomic inequalities.

5.3 Conclusion

Understanding socioeconomic inequalities in health is essential towards the efforts of attaining equity in health (Sortsø et' al., 2017). Evidence from this study suggests that good diabetes control is concentrated among those of the higher income category than those of the lower income category. This is in congruence with other studies that have been done assessing the socioeconomic inequalities in health (WHO 2011) and even especially among the diabetic patients (Brown 2004). Support systems have been found to be useful in improving health outcomes and quality of life (Hu et al., 2015).

Findings from this study demonstrated socioeconomic inequality among the T2DM patients in Nakuru County with good glycaemic control concentrating among those with higher household income. Participation in support groups was revealed to be helpful in achieving good glycaemic control, though the results did not demonstrate statistical significance. This may have been contributed by the fact that there was still a gap in the knowledge of support groups and its usefulness among the diabetes patients. The results also demonstrated that support groups were not able to address the socioeconomic inequality among the T2DM patients.

5.4 Recommendations

Based on the findings presented in this study, there's need to offer a subsidy or a solution to patients with diabetes in terms of assessing their average three-monthly sugar control with glycosylated haemoglobin (HbA1c) test. Many patients who were not able to do the test may have been hindered by financial circumstances. On a better note, if the social insurance scheme offered by the government i.e. NHIF can have a package for chronic conditions, it will really help cater for the costs of HbA1c amongst other routine organ function tests that are done for all patients with chronic diseases.

Further still, the enhancement of social support groups should be adopted as a policy within the Ministry of Health in all the cases of chronic diseases. This will facilitate better health outcomes amongst those living with chronic diseases.

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APPENDIX III : PARTICIPANT'S QUESTIONNAIRE

Diabetes Patient Demographic and Clinical Questionnaire. Reference No. _____

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9
Age (Years)	**Year of birth**	**Health facility for follow up visits**	**Sex**	**Marital status**	**Residence**	**Highest Level of completed education**	**Religious status**	Do you have any children
		1. NKLVH	1. Male 2. Female	1. Single (never in a union) 2. Married 3. Widow/widowed 4. Separated 5. Divorced	1. Rural 2. Urban	1. None 2. Primary 3. Post primary /vocational 4. Secondary 5. Higher (college/tertiary)	1. Catholic 2. Protestant 3. Muslim 4. Traditionalist 5. Atheist 6. Other (Specify)	1. Yes 2. No
Q10	**Q11**	**Q12**	**Q9**	**Q14**	**Q15**	**Q16**	**Q17**	**Q18**
Number of children	Are you currently employed?	What is your occupation/kind of work you do?	Are you paid in Kind or cash for the work you do?	Health Decisions: Who makes decisions about your health care?	Year of diabetes diagnosis	Age at diabetes diagnosis	Latest Glycaeted Haemoglobin (HbA1c) value N/D if not done	Value of last two fasting blood glucose results (mmol/l)
	1. Yes 2. No		1. Cash only 2. Cash & kind 3. In kind only 4. Not paid	1. Self 2. Spouse 3. Father/Mother 4. Sons /daughter 5. Other				1. 2.
Q19	**Q20**	**Q21**	**Q22**	**Q23**	**Q24**	**Q25**	**Q26**	**Q27**
Value of last two	Nature of	How often do you	Family history	How long does it take	Due to diabetes,	Have you had any	If yes, which of the	Degree of

random blood glucose results (mmol/l)	Diabetes Treatment	visit the hospital for Diabetes care	of diabetes	you to go to hospital from home? Hours	have you visited the following specialists?	complications due to diabetes?	following problems?	severity
1. 2.	1. Diet only 2. Tablets only 3. Insulin 4. Insulin & tables 5. Lifestyle change 6. None 7.	1. Every month 2. 3 months 3. 6 months 4. once a year	1. Parents 2. Siblings 3. Other relatives 4. None		1. Cardiologist 2. Eye doctor 3. Nephrologist 4. Podiatrist 5. Psychologist	1. Yes 2. No	1. Eye 2. Heart attack 3. Kidney / Nephropathy 4. Foot ulcer / amputation 5. Erectile dysfunction 6. Stoke 7. Neurophathy 8. Other	1. Slight 2. Medium 3. Severe
Q28	**Q29**	**Q30**	**Q31**	**Q32**	**Q33**	**Q34**	**Q35**	**Q36**.
				How much did you spend in the last 12 months for in-patient diabetes treatment from the household income?				
During the last 12 months, were you admitted or stayed overnight in a hospital?	**If yes, how many nights**	**Cause of admission**	**How do you finance the payment for your treatment**	In-Patient charges	Diabetes medications	Transport Costs	Lab fees	Total
1. Yes 2. No		1. Diabetes 2. Diabetes & something else 3. Something else	1. Insurance full cover 2. Insurance partial cover 3. Self 4. other	Shs----------	Shs----------	Shs----------	Shs----------	Shs----------

Q37	**Q38**	**Q39**	**Q40**	**Q41**	**Q42**	**Q43**	**Q44**	**Q45**
How much money did you spend in the last 4 weeks on outpatient diabetes services from the household income?								
Out-Patient charges	Diabetes medications	Transport Costs	Lab fees	Total	Are you covered by any health insurance?	What type of health insurance are you covered by?	On average how long do always wait before seeing the doctor?	Do you smoke cigarettes
Shs----------	Shs----------	Shs----------	Shs----------	Shs----------	1. Yes 2. No	1. Community Health insurance 2. Employer provided private insurance 3. NHIF 4. Other	1.	1. Yes 2. No
Q46	**Q47**	**Q48**	**Q49**	**Q50**	**Q51**	**Q52**	**Q53**	**Q54**
On average, how many cigarettes do you smoke per day		Do you currently smoke tobacco everyday, some day or not at all?	In the past, have you ever smoked tobacco everyday	If YES, when last did you smoke a cigarette?	Do you currently drink alcohol everyday, some day or not at all?	In the past, have you ever drunk alcohol everyday?	When last did you drink alcohol?	**Weight (Kg)**
		1. Every day 2. Some days 3. Not at all	1. Yes 2. No	1. More than two years ago 2. 1-2 years ago 3. 4-12 months 4. 1-3 months 5. Today	1. Every day 2. Some days 3. Not at all	1. Yes 2. No	1. More than two years ago 2. 1-2 years ago 3. 4-12 months 4. 1-3 months 5. Today	
Q55	**Q56**	**Q57**	**Q58**	**Q59**	**Q60**	**Q61**	**Q62**	**Q63**

Height (metres)	**Body Mass Index (calculation)**	**Waist circumference (cm)**	Do you get any support towards your diabetic condition from your close family members?	If yes, what type of support	Does your health care provider remind you (through email, phone calls, letters etc.) of your follow up?	What is your level of satisfaction with the services rendered by your diabetes health management team	Are you on treatment for any of these diseases in addition to diabetes?	What is the average total monthly income for your household?
			1. Yes 2. No 3. Not sure	1. Diet support 2. Adherence to medication 3. Physical exercises 4. Financial 5. Emotional	1. Yes 2. No	1. Very satisfied 2. Satisfied 3. Dissatisfied 4. Very dissatisfied	1. None 2. Hypertension 3. Dyslipidemia 4. Cardiac Failure 5. HIV & AIDS 6. Other	1. Less than 10,000 2. 10,000 - 50,000 3. 50,001-100,000 4. > 100,000
Q64	**Q65**	**Q66**	**Q67**	**Q68**	**Q69**	**Q70**	**Q71**	**Q72**
Social Support and Diabetes patient Networks								
Are you a member of any support group for type 2 diabetes	How frequent does the group members meet?	Have you ever participated in any group activities for type 2 diabetes?	How often do you participate in support group activities?	What is the main reason you joined the support group for type 2 diabetes?	What are the messages disseminated by the support group to patients with type2 diabetes?	Which population does the support group target?	What are the avenues used for dissemination of messages?	How strong is the feeling of togetherness or closeness in your support group? Use a five point scale where 1 means feeling very distant and 5 means feeling very close.

1. Yes 2. No 3. Don't know	1. Once a week 2. Once a month 3. Twice a month 4. Once a year	1. Yes 2. No 3. Don't know	1. Only once 2. Once a week 3. Once a month 4. Twice a month 5. Once a year	1. To get treatment & care support 2. Life style change support 3. Lack of support from family & friends 4. Financial support 5. Emotional support	1. Adherence to medicine 2. Physical activity participation 3. Nutrition 4. Income generating activities 5. Other(s)___	1. Health workers 2. Patients with type 2 diabetes 3. Government leaders 4. Family members 5. Church leaders 6. Others(s)_____	1. Meetings 2. Leaflets 3. Word of mouth 4. Training 5. Others(s)_____	1. Very distant 2. Somewhat distant 3. Neither distant nor close 4. Somewhat close 5. Very close
Q78	**Q79**	**Q80**	**Q81**	**Q82**	**Q83**	**Q84**	**Q85**	**Q86**

In this section, I want to ask you questions on how the diabetes management team (doctor, nurse, dietician or diabetes educator) advised you today. In the following areas of diabetes self-management, were you advised to do the following? Please check all that apply:

Follow a meal or diet plan	Take special care of your feet	Follow an exercise program	Constituently test your Blood sugar level	Adhere to prescription medications	General diabetes education	Need to stop smoking	Need to stop drinking alcohol	
1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	1. Yes 2. No 3. Not sure	

For the following questions, please <u>check</u> the appropriate response

Diabetes Control Problems Scale	1	2	3	4	5	6
a) How many **times** in the last **month** have you had a **low blood sugar** (glucose) reaction with symptoms such as sweating, weakness, anxiety, trembling, hunger or headache?	None	1-3	4-6	7-12	More than 12 times	Don't know
b) How many **times** in the last **year** have you had **severe low blood sugar** reactions such as passing out or needing help to treat the reaction?	None	1-3	4-6	7-12	More than 12 times	Don't know
c) How many **days** in the last **month** have you had **high blood sugar** with symptoms such as thirst, dry mouth and skin, increased sugar in the urine, less appetite, nausea, or fatigue?	None	1-3	4-6	7-12	More than 12 times	Don't know
d) How many **days** in the last **month** have you had **ketones** in your urine?	None	1-3	4-6	7-12	More than 12 times	Don't know

Diabetes Self-Management Questionnaire (DSMQ)

The following statements describe self-care activities related to your diabetes. Thinking about your self-care over the **last 8 weeks**, please specify the extent to which each statement applies to you.	**Applies to me very much**	**Applies to me to a consider-able degree**	**Applies to me to some degree**	**Does not apply to me**
1. I do check my sugars regularly ☐ *Suagr check not necessary for my treatment*	☐1	☐2	☐3	☐4
2. My diet makes it easy to achieve good glycaemic control	☐1	☐2	☐3	☐4
3. Am keen to keep the doctor's appointment for my treatment	☐1	☐2	☐3	☐4
4. I take my drugs as prescribed	☐1	☐2	☐3	☐4
5. Occasionally I eat lots of sweets or other foods rich in carbohydrates.	☐1	☐2	☐3	☐4
6. I record my blood sugar levels regularly (or analyse the value chart with my blood glucose meter).	☐1	☐2	☐3	☐4
7. I sometimes avoid hospital appointments	☐1	☐2	☐3	☐4
8. I do regular exrecises	☐1	☐2	☐3	☐4
9. I strictly follow diet plans	☐1	☐2	☐3	☐4
10. I do not check my blood sugar levels frequently enough to achieve good blood glucose control.	☐1	☐2	☐3	☐4
11. I avoid physical activity, although it could improve my diabetes.	☐1	☐2	☐3	☐4
12. I often forget to take my medication ☐ *Diabetes medication / insulin is not required as a part of my treatment.*	☐1	☐2	☐3	☐4
13. Sometimes I really want to eat a lot of food	☐1	☐2	☐3	☐4
14. I feel that I need to see the doctor more often for my diabetes	☐1	☐2	☐3	☐4
15. I exercise less than is required to keep my sugar levels normal	☐1	☐2	☐3	☐4
16. My diabetes self-care is poor.	☐1	☐2	☐3	☐4

Thank you for your time and participation

APPENDIX IV: KISWAHILI QUESTIONNAIRE

Idadi ya Wagonjwa wa Kisukari na dodoso la kliniki. Rejeleo Na. .....

Q1	**Q2**	**Q3**	**Q4**	**Q5**	**Q6**	**Q7**	**Q8**	**Q9**
Umri (Miaka)	Mwaka wa kuzaliwa	Kituo cha afya kwa kufuata ziara	Jinsia	Hali ya ndoa	Makazi	Kiwango cha juu cha elimu iliyokamilishwa	Haliyakidini	Je! Una watoto wowote
		1. Hospitali ya Nakuru Kiwango ya tano	1.Mwanaume 2.Mwanamke	1.Moja (kamwe/.kwenye muungano) 2..Kuolewa 3. Mjane / mjane 4.Kinachotengwa 5.Talaka	1.Vijijini 2.Mjini	1. Hakuna 2. Msingi 3. Chapishamsingi / ufundi 4. Sekondari 5. Juu (chuo / chuokikuu	1. Katoliki 2.Mprotestanti 3. Muislamu 4. Jadi 5.Mwamini 6. Nyingine (Taja)	1. Ndio 2. Hapana
Q10	**Q11**	**Q12**	**Q9**	**Q14**	**Q15**	**Q16**	**Q17**	**Q18**
Idadiyawatoto	Je! Umeajiriwa	Je! Kazi yako ni ya aina gani?	Unalipwa kwa Aina au pesa taslimu kwa kazi unayofanya?	Maamuzi ya kiafya: Ni nani hufanya maamuzi juu ya utunzaji wako wa	Mwakawautambuziwaugonjwawasukari	Umri katika utambuzi wa ugonjwa wa	Thamaniya Glycaeted Hemoglobin (HbA1c) yahivikaribuni N / D	Thamaniyamatokeomawiliyasukariyakufungayasukari (mmol / l)

	sasa?			afya?		sukari	ikiwahaijafanywa	
	1. Ndio 2. Hapana		1. Fedhatu 2. Fedhanaaina 3. Kwaainatu 4. Hailipwi	1. Ubinafsi 2. mwenzi 3. baba / mama 4. Wana / binti 5. Nyingine				
Q19	**Q20**	**Q21**	**Q22**	**Q23**	**Q24**	**Q25**	**Q26**	**Q27**
Thamani ya matokeo mawili ya mwisho ya sukari ya damu (mmol / l)	Asili ya Tiba ya kisukari	Je! Hutembelea hospitali mara ngapi kwa huduma ya ugonjwa wa kisukari?	Historia ya familia ya ugonjwa wa sukari	Inachukuamudaganikwendahospitalinikutokanyumbani? Masaa	Kwasababuyaugonjwawasukari, umetembeleawata alamwafuatayo?	Je! Umekuwa na shida yoyote kutokana na ugonjwa wa sukari?	Ikiwandio, niyapiyashidazifuatazo?	Uzaniwaukali
	1. Lishe	1. Kilamwezi 2. miezi 3 3. Miezi 6 4.	1. Wazazi		1. Daktari wa moyo	1. Ndio	1. Jicho	1. Kidogo

	tu 2. Vidonge tu 3. Insulini 4. Insulini na vidonge 5. Mabadiliko ya mtindo wa maisha 6. Hakuna7.	maramojakwa mwaka	2. Ndugu 3. Jamaawengine 4. Hakuna		2. Daktari wa macho 3.Nephrologist 4. Podiatrist 5.Mwanasaikolojia	2. Hapana	2. Shambulio la moyo 3. figo / Nephropathy 4. Kidonda cha mguu / kukatwa 5.Kukosekana kwa erectile 6. Stroke 7.Neuropathy 8. Nyingine	2. Kati 3. Mkal
Q28	**Q29**	**Q30**	**Q31**	**Q32**	**Q33**	**Q34**	**Q35**	**Q36**.

				Je! Umetumiapesangapikatikamiezi 12 iliyopitakwamatibabuyaugonjwawasukariyamgonjwakutokamapatoya kaya?				
Katikamiezi 12 iliyopita, ulilazwa au kukaausikummoja hospitalini?	Ikiwa ndio, ni usiku ngapi	Sababu ya kulazwa	Je! Unafadhili aje malipo ya matibabu yako	Beiyamashtakayakukaa	Dawa za ugonjwa wa sukari	Gharama za Usafiri	Ada ya maabara	**Jumla**
1.Ndio 2.Hapana		1. Ugonjwawasukari 2. Ugonjwawasukarinakituking ine 3. Kitukingine	1. Bima kamili ya bima 2. Bima ya bima ya sehemu 3. Ubinafsi 4. zingine	Sh----------	Sh----------	Sh----------	Sh----------	Sh----------
Q37	**Q38**	**Q39**	**Q40**	**Q41**	**Q42**	**Q43**	**Q44**	**Q45**
Je! Umetumia pesa ngapi katika wiki 4 zilizopita kwenye huduma za ugonjwa wa sukari ya nje kutoka kwa mapato ya kaya?								
Mashtaka ya nje ya	Dawa za	Gharama	Ada ya maabara	Jumla	Je! Weweunafunikwa	Je! unafunikwanabimayaai	Kwa wastani unasubiri muda gani kabla ya	Je! Wewe huvuta

Mgonjwa	sukari	za Usafiri			nabimayoyoteyaafya?	nagani?	kumuona daktari?	sigara
Sh----------	Sh----------	Sh----------	Sh----------	Sh----------	Ndio Hapana	1. BimayaAfyayaJamii 2. Mwajiriametoabimayakibinafsi 3. NHIF 4. Nyingine		1.Ndio 2.Hapana
Q46	**Q47**	**Q48**	**Q49**	**Q50**	**Q51**	**Q52**	**Q53**	**Q54**
Kwa wastani, ni sigara ngapi kwa siku		Je! Kwasasaunavutasigara kilasiku, sikukadhaa au huvuti ?	Hapo zamani, umewahi kuvuta sigara kila siku	Ikiwa NDIYO, ni lini ulivuta sigara?	Je! Hivisasaunakunywapombekilasiku, sikukadhaa au sivyo?	Zamani, je! Umewahikunywapombekilasiku?	Je! Ulinywapombelinimwisho?	Uzito (Kg)
		1. Kila siku 2. Siku kadhaa 3. Sio kabisa	Ndio Hapana	1. Zaidiyamiakamiwiliiliyopita 2.Miaka 1-2 iliyopita 3. Miezi 4-12 4. Miezi 1-3 5. Leo	1. Kilasiku 2. Sikukadhaa 3. Siokabisa	1.Ndio 2. Hapana	1. Zaidiyamiakamiwiliiliyopita 2.Miaka 1-2 iliyopita 3. Miezi 4-12 4. Miezi 1-3 5. Leo	

Q55	**Q56**	**Q57**	**Q58**	**Q59**	**Q60**	**Q61**	**Q62**	**Q63**
Urefu (mita)	Kielelezo cha Misa ya Mwili (hesabu)	Mzunguko wa kiuno (cm)	Je! Unapata msaada wowote kuelekea hali yako ya kisukari kutoka kwa wanafamilia wako wa karibu?	Ikiwa ndio, ni aina gani ya msaada	Je! Mtoaji wako wa huduma ya afya hukumbusha (kupitia barua pepe, simu, barua nk) kuhusu ufuatiliaji wako?	Je! Ni kiwango gani cha kuridhika na huduma zinazotolewa na timu yako ya usimamizi wa afya ya ugonjwa wa sukari	Je! Ukokwenyematibabuyam agonjwahayayoyotepamoj anaugonjwawasukari?	Je! Ni mapato gani ya wastani ya kila mwezi kwa familia yako?
			1. Ndio 2. Hapana 3. Sinahakika	1. Msaada wa Lishe 2. Ufuataji wa dawa 3. Mazoezi ya mwili 4. Fedha 5. Kihisia	1.Ndio 2.Hapana	1. Imeridhika sana 2. Imeridhika 3.Hajaridhika 4.Hajaridhika sana	1. Hakuna 2.Hypertension 3.Dyslipidemia 4.Kushindwa kwamoyo 5. HIV/ na UKIMWI 6. Nyingine	1. Chiniya 10,000 2. 10,000 -50,000 3. 50,001-100,000 4.> 100,000
Q64	**Q65**	**Q66**	**Q67**	**Q68**	**Q69**	**Q70**	**Q71**	**Q72**
Mitandao ya Msaada wa Kijamii na Wagonjwa wa kisukari								
Je!	Je!	Je! Umewahi	Je!	Je! Ni	Je! Ni ujumbe	Je! Kundi la	Je! Ni njia gani zinazotumiwa	Je! Hisia kali ya umoja

Wewenimwanachamawakikundichochote cha msaadakwaugonjwawakisukari cha ainaya 2	Washiriki wa kikundi hukuta na mara ngapi?	kushiriki katika shughuli za kikundi chochote kwa ugonjwa wa kisukari cha aina ya 2?	Unashirikimarangapi kwenyeshughulizaki kundi cha msaada?	sababuganikuuulijiungan akikundi cha msaadakwaugonjwawakis ukari cha ainaya 2?	gani uliosambazwa na kikundi cha msaada kwa wagonjwa walio na ugonjwa wa kisukari cha aina ya2?	watu wa msaada linalenga idadi gani?	kwa usambazaji wa ujumbe?	au umoja katika kikundi chako cha msaada ina nguvu vipi? Tumia kiwango cha alama tano ambapo 1 inamaanisha kujisikia mbali sana na 5 inamaanisha kujisikia karibu sana.
1. Ndio 2. Hapana 3. Sijui	1. Mara moja kwa wiki 2. Mara moja kwa mwezi 3. Mara mbili kwa mwezi 4. Mara	1. Ndio 2. Hapana 3. Siju	1. Mara moja tu 2. Mara moja kwa wiki 3. Mara moja kwa mwezi 4. Mara mbili kwa mwezi 5. Mara moja kwa mwaka	1. Kupata matibabu na msaada wa utunzaji 2. Msaada wa mabadiliko ya mtindo wa maisha 3. Ukosefu wa msaada kutoka kwa familia na marafiki 4. Msaada wa kifedha 5. Msaada wa kihemko	1. Kuzingatia dawa 2. Ushiriki wa shughuli za kiwmili 3. Lishe 4. Shughuli za uzalishaji mapato 5. Nyingine (s) ___	1. Wafanyikazi wa afya Wagonjwa walio na ugonjwa wa kisukari cha aina ya 2 3. Viongozi wa serikali 4. Wanafamilia 5. Viongozi wa kanisa 6. Wengine (s) _____	1. Mikutano 2. Majarida 3. Neno la kinywa 4. Mafunzo 5. Zingine (s) _____	1. Mbali sana 2. Kiasi fulani 3. Wala sio mbali wala karibu 4. Karibu 5. Karibu sana

	moja kwa mwaka							
Q78	**Q79**	**Q80**	**Q81**	**Q82**	**Q83**	**Q84**	**Q85**	**Q86**
Katika sehemu hii, nataka kukuuliza maswali juu ya jinsi timu ya usimamizi wa ugonjwa wa sukari (daktari, muuguzi, mtaalamu wa lishe au mwalimu wa ugonjwa wa sukari) alivyokushauri leo. Katika maeneo yafuatayo ya usimamizi wa kisukari, je! Ulishauriwa kufanya yafuatayo? Tafadhali angalia yote yanayotumika:								
Fuata mpango wa chakula au lishe	Chunga miguu yako maalum	Fuata programu ya mazoezi	Pima mara kwa mara kiwango chako cha sukari ya Damu	Zingatia matibabu ya dawa	Elimu ya jumla ya ugonjwa wa sukari	Haja ya kuacha sigara	Haja ya kuacha kunywa pombe	
1.Ndio 2.Hapana 3. Sinahakika	1Ndio 2. Hapana 3. Sinahakika	1. Ndio 2. Hapana 3. Sinahakika	1. Ndio 2. Hapana 3.Sina hakika	1. Ndio 2. Hapana 3. Sinahakika	1. Ndio 2. Hapana 3. Sinahakika	1. Ndio 2.Hapana 3. Sinahakika	1.Ndio 2.Hapana 3.Sina hakika	

Kwamaswaliyafuatayo, tafadhaliangaliamajibusahihi

Upeo wa Matatizo ya Ugonjwa wa kisukari	1	2	3	4	5	6
Ni mara ngapi katika mwezi uliopita umekuwa na mwitikio mdogo wa sukari ya sukari (sukari) na dalili kama vile kutapika, udhaifu, wasiwasi, kutetemeka, njaa au maumivu ya kichwa?	Hakuna	1-3	4-6	7-12	Zaidi ya mara 12	Siju
Ni mara ngapi katika mwaka uliopita umekuwa na athari nzito za sukari ya damu kama vile kupita au kuhitaji msaada wa kutibu majibu?	Hakuna	1-3	4-6	7-12	Zaidi ya mara 12	Siju
c. Ni siku ngapi katika mwezi uliopita umekuwa na sukari kubwa ya damu na dalili kama kiu, kinywa kavu na ngozi, sukari iliyoongezeka kwenye mkojo, hamu ya kula, kichefichefu, au uchovu?	Hakuna	1-3	4-6	7-12	Zaidi ya mara 12	Siju
Ni siku ngapi katika mwezi uliopita umekuwa na ketoni kwenye mkojo wako	Hakuna	1-3	4-6	7-12	Zaidi ya mara 12	Siju

Jarida la Usimamiziwakibinafsi la ugonjwawa-kisukari (DSMQ

Taarifa zifuatazo zinaelezea shughuli za kujitunza zinazohusiana na ugonjwa wako wa sukari. Kufikiria juu ya kujitunza kwako kwa wiki 8 zilizopita, tafadhali taja kiwango ambacho kila taarifa inatumika kwako	Inatumika kwangu sana	Inatumika kwangu kwa kiwango cha kufikiria	Inatumikakwangukwakiwangofulani	Haitumiki kwangu
1. Mimi huangaliaviwangovyanguvyasukariyadamukwauangalifunaumakini. ☐ *Upimajiwasukariyadamuhauhitajwikamasehemuyamatibabuyangu*	☐1	☐2	☐3	☐4
2. Chakula ninachochagua kula hufanya iwe rahisi kufikia viwango vya sukari vya damu vyema.	☐1	☐2	☐3	☐4
3. Ninahifadhimiadiyoteyamadaktari (miadinawataalamuwaafya) inayopendekezwakwamatibabuyanguyaugonjwawasukari.	☐1	☐2	☐3	☐4
4. Nachukuadawayanguyakisukari (k. Insulini, vidonge) kamailivyoamriwa. ☐ Dawa ya ugonjwa wa kisukariau insulini hauhitajwi kama sehemu ya matibabu yangu	☐1	☐2	☐3	☐4
5. Wakatimwinginemimi hula pipinyingi au vyakulavinginevyenyewanga.	☐1	☐2	☐3	☐4
6. Nakarekodi viwango vyangu vya sukari ya damu mara kwa mara (au kuchambua chati ya thamani na mita yangu ya sukari ya damu). ☐*Upimaji wa sukari ya damu hauhitajwi kama* sehemu ya matibabu yangu.	☐1	☐2	☐3	☐4
7. Ninajaribu kuzuia miadi ya madaktari inayohusiana na ugonjwa wa sukari (miadi na wataalamu wa afya).	☐1	☐2	☐3	☐4
8. mazoezi ya mwili mara kwa mara ili kuboresha matibabu yangu ya ugonjwa wa sukari.	☐1	☐2	☐3	☐4
9. Nafuata kabisa mapendekezo ya lishe aliyopewa na daktari wangu au mtaalamu wa ugonjwa wa sukari.	☐1	☐2	☐3	☐4
10. Sikiangaliaviwangovyanguvyasukariyadamumarakwamaravyakutoshakufikiaudhibitimzuriwasukariyadamu. ☐	☐1	☐2	☐3	☐4

	Upimaji wa sukari ya damu hauhitajwi kama sehemu ya matibabu yangu				
11.	Ninaepuka mazoezi ya mwili, ingawa inaweza kuboresha ugonjwa wangu wa sukari.	☐1	☐2	☐3	☐4
12.	Mimi husahau kuchukua au kuruka dawa yangu ya ugonjwa wa sukari (k. Insulini, vidonge). ☐*Dawa / ugonjwa wa kisukari hauhitajwi kama sehemu ya matibabu yangu*	☐1	☐2	☐3	☐4
13.	Wakati mwingine huwa na 'kuumwa chakula cha kweli' (sio kusababishwa na hypoglycaemia).	☐1	☐2	☐3	☐4
14.	Kuhusuutunzajiwanguwaugonjwawasukari, ninapaswakumuonadaktariwanguwamatibabumaranyingizaidi.	☐1	☐2	☐3	☐4
15.	Sijui sana kuliko inavyoweza kuwa sawa kwa ugonjwa wangu wa sukari.	☐1	☐2	☐3	☐4
16.	Utunzajiwanguwakisukariniduni.	☐1	☐2	☐3	☐4

Asante **kwawakatiwakonaushiriki.**

APPENDIX V: TIME FRAME

ACTIVITY	**DURATION (WEEKS)**
Description of area of interest	Week 1
Proposing study topic	Week 2
Concept note and presentation	Week 3 to 4
Literature review	Week 3 ongoing
Defense Proposal and Seeking Ethical Approval	Week 8
Data Collection	Week 9 to 10
Data Sorting and Analysis	Week 11 to 12
Compilation and Presentation	Week 13