# SELF-CARE KNOWLEDGE AND PRACTICES AMONG PERSONS LIVING WITH TYPE 2 DIABETES ATTENDING AN OUTPATIENT DIABETES CLINIC AT THIKA LEVEL 5 HOSPITAL, KENYA

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# Self-care knowledge and practices among persons living with Type 2 Diabetes Mellitus attending an outpatient diabetes clinic at Thika level 5 hospital, Kenya

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## DECLARATION

This thesis is my original work and has not been presented for a degree m any other University.

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

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## DEDICATION

I dedicate this thesis to my family. I highly appreciate their support, patience, and understanding throughout the years of my study.

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **ADA** | American Diabetes Association |
| **DM** | Diabetes Mellitus |
| **KEMRI** | Kenya Medical Research Institute |
| **KNH** | Kenyatta National Hospital |
| **MOPHS** | Ministry of Public Health and Sanitation |
| **NGOs** | Non-Governmental Organizations |
| **SDSCA** | Summary of Diabetes Self-Care Activities Scale |
| **SKILLD** | Spoken Knowledge in Low Literacy in Diabetes Questionnaire |
| **SPSS** | Statistical Package for Social Sciences |
| **WHO** | World Health Organization |
| **NCDs** | Non-Communicable Diseases |
| **IDF** | International Diabetes Federation |
| **DM** | Diabetes Mellitus |
| **T1DM** | Type 1 Diabetes Mellitus |
| **T2DM** | Type 2 Diabetes Mellitus |
| **DKQ** | Diabetes Knowledge Questionnaire |

## OPERATIONAL DEFINITION OF TERMS

**Self-care knowledge** the ability to care for oneself through awareness, self-control, and self-reliance to achieve, maintain, or promote optimal health and well-being.

**Self-care practices** The regimen of tasks that a person living with diabetes performs daily intending to manage diabetes.

**Diabetes Mellitus** A non-communicable disease characterized by chronic hyperglycemia.

**Type 2 Diabetes Mellitus** A type of diabetes mellitus that is caused by the inability of the pancreatic β- cells to produce sufficient amounts of insulin to overcome insulin resistance in peripheral tissues.

**Type 1 Diabetes Mellitus** A type of diabetes characterized by the body's inability to produce insulin due to the autoimmune destruction of the beta cells in the pancreas.

**Haemoglobin A1c (HbA1c)** also referred to as glycosylated hemoglobin

## ABSTRACT

Diabetes is a chronic condition associated with many complications, and its management needs sufficient levels of self-care knowledge, self-care practices, and adherence to medications. The main objective of the study was to determine the level of self-care knowledge and practices among persons living with diabetes at Thika Level 5 Hospital. A cross-sectional study design was used in this study. A sample size of 190 respondents was selected using a systematic random sampling method. A researcher-administered semi-structured questionnaire was used to collect data. The indicators that were assessed to indicate the knowledge level of the respondents included knowledge of the diabetes diet plan, hyperglycemia signs and symptoms such as increased thirst, increased urination, increased hunger, tiredness, blurred vision, unintentional weight loss, recurrent infections, such as thrush, bladder infections, and skin infections. Symptoms such as fast heartbeat, shaking, sweating, nervousness or anxiety, irritability or confusion, dizziness, and hunger were used to indicate the knowledge of hypoglycemia signs and symptoms. Knowledge of the management of hypoglycemia, diabetes complications, foot care, exercises, blood sugar monitoring, and eye care was also assessed. Adherence to diabetes self-care practices was assessed using indicators such as adherence to a diabetes diet plan, thirty minutes of daily exercise, frequency of blood sugar testing, foot care, eye care, and smoking score. Descriptive statistical analysis was used to analyze the frequencies, mean, and standard deviation of self-care knowledge and adherence to self-care practices scores, Regression analysis was used to test for the relationship between age, duration since diagnosis with Type 2 Diabetes Mellitus, and the knowledge of self-care and practice scores. The Chi-square test was used to test for the association between personal characteristics and self-care knowledge and self-care practices scores. Pearson correlation was used to assess the strength of the association between self-care knowledge and adherence to self-care practices. The strength of association between the variables was done at $p< 0.05$ significance levels. The females were the majority preponderance at 69.5% and a majority of the study participants were above 50 years old (60.5%). The mean diabetes knowledge score was $7.7 \pm 3.4$ and the mean adherence to recommended self-care activities score was $7.6 \pm 4.0$, indicating a deficit in several key areas in the self-care knowledge and self-care practices. Regression analysis test indicated that age and duration since diagnosis with T2DM significantly predicted knowledge level of self-care practices $F(1,189) = 6.279$, $p=0.013$, $F(1, 189) = 4.943$. $p=0.027$ respectively. The chi-square test indicated a statistically significant relationship between the patient's level of knowledge of diabetes self-care practices and education level, ($p = 0.01$), and employment status, ($p = 0.01$). The regression analysis test also indicated age significantly predicted adherence score to self-care practices $f(1,189) = 4.963$, $p=0.027$. Moreover, the chi-square test indicated that there was a statistically significant relationship between adherence to recommended diabetes self-care practices and age, ($p = 0.03$), education level, ($p = 0.01$), and employment status, ($p = 0.005$). Pearson correlation showed that there was a weak correlation between knowledge of diabetes self-care practices and adherence to diabetes self-care practices which was statistically significant, ($p=0.0001$). The research

demonstrated gaps in self-care knowledge and adherence to self-care practices. Age, education level, duration since diagnosis, and employment status influenced the level of self-care knowledge while age, education level, and employment status influenced self-care practices score. The relationship between self-care knowledge and adherence to diabetes self-care practices was weak. Based on the findings, we would recommend that the patients equip themselves with adequate knowledge and skills that would help them make informed choices while practicing self-care. The patients should also make an effort to understand their individual unique needs to be able to prioritize the areas that they need improvement as far as diabetes self-care is concerned. It is also recommended that the patients own up self-care which would help apply the knowledge acquired into practice.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background information

Diabetes mellitus (DM) is a non-communicable disease (NCD) that is the 4th main cause of death globally (International Diabetes Federation, 2017). The global burden of diabetes has risen from 108 million in the year 1980 to 246 million people in the year 2007, (Rocha Fernandes *et al.*, 2016). In 2019, IDF indicated that approximately 463 million adults (20-79 years) were living with diabetes and estimated that by 2045 the number would rise to 700 million (IDF, 2020) Type 2 Diabetes Mellitus accounts for about 90% of all diabetes cases worldwide where in most countries, the proportion of people with T2DM is increasing (IDF, 2020).

According to the IDF Diabetes Atlas 9th Edition, the prevalence of diabetes in Africa in 2019 was 3.9%. The report also estimated that approximately 19.4 million adults aged 20-79 years were living with diabetes in the African region in 2019 (IDF, 2019). On the other hand, this number is likely to be higher since worldwide, Africa is the region with the highest proportion of undiagnosed diabetes, where approximately 60% of adults currently living with diabetes are unaware of their condition (IDF, 2019).

In Kenya, the World Health Organization (WHO) estimates the prevalence of diabetes to be 3.3% and forecasts a rise to 4.5% by 2025 (WHO, 2019). However, this figure is likely to be an underestimation because over 60% of people living with diabetes in Kenya are undiagnosed and are unaware that they have the disease. Majority of them present to the healthcare facility with seemingly unrelated complaints (Fitzgerald, et al., 2016).

Type 2 Diabetes Mellitus is one of the growing epidemics that threatens to overwhelm health services and affect economies, especially in developing countries (Mbutiti, 2016). Healthcare expenditures on diabetes were estimated to be 11.6% of the total healthcare

expenditure in the world in 2010 (Bommer, *et al*., 2018). Being a developing country, Kenya has limited resources to take care of the additional burden of diabetes and its complications (MOPHS, 2015).

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from insulin secretion, action, or both causing disturbances in carbohydrates, protein, and fat metabolism (IDF, 2017). Diabetes Type 1 (T1DM) and Type 2 (T2DM) are the two main types of diabetes mellitus, (Kassahun & Mekonen, 2017). Insulin-dependent diabetes mellitus (T1DM) is caused by the autoimmune destruction of pancreatic β- cells which leads to insulin deficiency (Kassahun & Mekonen, 2017). T2DM also referred to as non-insulin dependent diabetes mellitus is the most common affecting over 90% of people living with diabetes. It is associated with a combination of resistance to insulin action and inadequate compensatory insulin secretory response (ADA, 2019). Insulin deficiency in turn leads to chronic hyperglycemia with disturbances of carbohydrate, fat, and protein metabolism (Heesemann, Bommer, & Sagalova, 2018).

Insulin release and action have to precisely meet the metabolic demand; hence, mechanisms involved in the synthesis and release of insulin, and the insulin response in tissues must be highly regulated. Therefore, faults in any of the mechanisms involved can lead to a metabolic imbalance that leads to the pathogenesis of T2DM (Galicia-Garcia, et al., 2020). People living with T2DM are mostly characterized by being obese or having a higher body fat percentage, distributed mainly in the abdominal region. In this condition, adipose tissue promotes insulin resistance through various inflammatory mechanisms, including increased free fatty acid (FFA) release and adipokine deregulation. (Chatterjee, Khunti, & Davies, 2017).

The risk factors for T2DM include a complex combination of genetic, metabolic, and environmental factors. These factors interact with one another contributing to its prevalence. Even though individual predisposition to T2DM due to non-modifiable risk factors (ethnicity and family history/genetic predisposition) has a strong genetic basis,

evidence from epidemiological studies suggests that many cases of T2DM can be prevented by improving the main modifiable risk factors (obesity, low physical activity, and an unhealthy diet) (Zheng, Ley, Hu, & Nat, 2018)

Type 2 Diabetes Mellitus is among the highest leading causes of reduced quality of life, disability, and death through its complications (ADA, 2019). The disease is a risk factor for cardiovascular diseases, amputations, visual impairment, and renal failure, which are life-changing through disruption of the physical, psychological, and social balance of an individual's life (Jones, 2013). Furthermore, complications of diabetes such as loss of sexual function, blindness, and amputations result in loss of self-esteem in individuals and change in social relationships (Iregbu, 2016).

Since Type 2 Diabetes Mellitus is a chronic condition, it is normally managed throughout the life of individuals suffering from it (Formosa & Cynthia, 2016). Effective diabetes management requires a complex approach that is not merely just being adherent to medical advice but also involves the adoption of various skills and behaviors to effectively manage the disease (Luo, et al., 2015). Change of personal lifestyle in a person living with diabetes is enhanced through an enhanced self-care education program that provides knowledge and skills which motivate them to adopt a healthy lifestyle that helps them manage the disease (Anderson, 2010). Self-care is the regimen of tasks that a person living with diabetes performs daily intending to manage diabetes (El-busaidy, et al., 2014). The recommended self-care practices by the Kenya National guidelines for the management of T2DM include regular physical activity, healthy dietary practices, daily foot care, compliance with the treatment regimen, tackling complications such as hypoglycemic episodes, and regular blood glucose monitoring (MOPHS, 2015).

Earlier studies found that self-care knowledge correlates well with good self-care practices and a significant reduction in T2DM complications (Sharma, *et al.*, 2008).

However, many people living with diabetes find the self-care routine challenging, difficult, and demanding when they are instructed to make certain changes in their entire lives, especially in terms of food consumption and physical activity in addition to their medications (Chin, *et al.*, 2016). Limited evidence has been documented on adherence to self-care management in Kenya. This study hence aims to evaluate the level of adherence to recommended self-care practices among people living with T2DM and also find out the factors associated with the level of adherence.

### 1.2 Statement of the Problem

The prevalence of Type 2 Diabetes Mellitus has been on the rise worldwide over the past years. In Kenya, the World Health Organization estimates the prevalence of diabetes to be 3.3% and forecasts a rise to 4.5% by 2025 (WHO, 2019). Type 2 Diabetes is a major public health concern associated with significant morbidity and mortality (ADA, 2016). Effective diabetes management requires people living with the disease to have adequate self-care knowledge and the ability to apply self-care knowledge in real-life situations (Alowais & Shido, 2020). Moreover, people living with diabetes should be in charge of their self-care behaviors by making their own decisions and choices (Mwaloma, 2016).

Poor self-care has been associated with poor glycemic control among a majority of people living with T2DM, which leads to multiple complications, co-morbidities, and death (Foss, *et al.,* 2016). Studies done in Kenya indicated that glycemic control is poor among people living with T2DM. In addition, similar results have also been reported in other countries (Omari, et al., 2020).

Furthermore, most research done in Kenya focuses more on the medical prescriptive approach which is only one aspect of self-care for diabetes management (Adeniyi, *et.al*, 2015). Little, therefore, is known about the level of self-care knowledge and practice of self-care and the factors that influence both the level of self-care knowledge and adherence to self-care practices among people living with T2DM in Kenya. A study hence

is needed to shed more light on any deficit in knowledge and inadequacies in self-care practices and the influencing factors among these patients.

### 1.3 Justification

Knowledge of self-care has been associated with improved self-care practices which in turn improves glycemic control which is the main goal of Type 2 diabetes mellitus management (Chali, Salih, & Abate, 2018). Assessment of the patient's level of self-care knowledge and awareness of self-care practices about T2DM is important in developing educational material relevant to their needs. Assessing the patient's characteristics that affect both self-care knowledge and self-care practices is also important as strategies can be localized for particular groups in terms of their characteristics.

Few research studies on the level self-care knowledge and practice among people living with T2DM in central Kenya. Thika level 5 Hospital was purposively selected since it is among the largest referral hospital in the region serving both Kiambu county and neighboring counties. Studies have shown that the onsent of T2DM occurs at around the age of 45 years (ADA, 2020). This informed the choice of the age of the study respodents which was 45 years and above.

This study sheds light on other components of the management of T2DM that give the reasons for the poor self-care of the disease and poor glycemic control prevalent in many people living with the disease. The information that will be gathered will hence help policymakers to make informed suggestions for improvements and assist in priority setting for diabetes management among diabetic persons by the health facilities and relevant NGOs.

## 1.4 Objectives

### 1.4.1 General objectives

To determine self-care knowledge and practices among persons living with Type 2 diabetes mellitus attending the diabetic clinic at Thika level 5 hospital.

### 1.4.2 Specific objectives

1. To determine the level of knowledge on self-care and adherence to self-care practices among people living with T2DM at Thika Level 5 Hospital.
2. To assess the influence of social-demographic, social-cultural, economic, and clinical factors on the level of knowledge of diabetes self-care practices among people living with T2DM at Thika Level 5 Hospital.
3. To determine the influence of social-demographic, social-cultural, economic, and clinical factors on adherence to recommended diabetes self-care practices among people living with T2DM at the Thika Level 5 Hospital.
4. To establish the relationship between knowledge of self-care and level of adherence to self-care-practice among people living with T2DM at Thika Level 5 Hospital.

## 1.5 Hypothesis

1 The level of knowledge on self-care practices and adherence to self-care practices among people living with T2DM at Thika Level 5 Hospital is low.

2 Social-demographic, social-cultural, economic, and clinical factors do not influence the level of self-care knowledge among people living with T2DM at Thika Level 5 Hospital.

3 Social-demographic, social-cultural, economic, and clinical factors do not influence the level of adherence to self-care practices among people living with T2DM at Thika Level 5 Hospital.

4 There is no statistically significant relationship between the level of knowledge and level of adherence to self-care practice among people living with T2DM at Thika Level 5 Hospital.

### 1.6 Scope of the study

The purpose of this study was to determine the level of self-care knowledge and self-care practices and their influencing factors among persons living with T2DM at Thika Level 5 Hospital. The independent variables included social-demographic, social-cultural, economic, and clinical factors while the dependent variables included knowledge on self-care and adherence to self-care practices. The target population was comprised of both males and females living with T2DM aged above 18 years and attending Thika Level 5 Hospital outpatient Diabetic clinic during the time of the study. The study was carried out from November 2019 to January 2020 at Thika Level 5 Hospital diabetic clinic in Kiambu County, Kenya.

### 1.7 Limitations of the study

Data on proficiency in recommended self-care practices were obtained by self-report and may be limited by recall and other biases. The study also had a limited scope of coverage where it was only done in Thika Level 5 Hospital excluding other nearby health centers and medical centers. Some of the study areas of health and self-care were also sensitive and therefore some respondents were not willing to respond to some questions. Nevertheless, the protection and confidentiality of information were guaranteed to the respondents. In conclusion, the small sample size and restricted research site might limit the extrapolation of the results findings to the general population with diabetes.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Background information

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, action, or both causing disturbances in carbohydrates, protein, and fat metabolism (IDF, 2017). There are two main types of diabetes mellitus namely; T1DM (insulin-dependent diabetes mellitus) and T2DM (non-insulin-dependent diabetes mellitus) (ADA, 2020).

T2DM is the most common affecting over 90% of people living with diabetes. It is caused by the inability of the pancreatic β- cells to produce sufficient amounts of insulin to overcome insulin resistance in peripheral tissues like the adipose tissue, skeletal muscle, and the liver established by genetic and environmental factors (ADA, 2018). Insulin resistance is a result of a combination of impaired uptake of glucose by the muscle and adipose tissue and reduced suppression of hepatic glucose output in response to insulin. Insulin resistance is the hallmark of T2DM (Ketema, et al., 2020).

During the early stages, increased blood glucose (hyperglycemia) characterizes T2DM despite the presence of normal to high insulin concentrations in the blood. During the later stages, T2DM is characterized by low insulin concentrations and this necessitates the use of exogenous insulin due to the exhaustion of the insulin secretory capacity of pancreatic β- cells (Chali, Salih, & Abate, 2018). The disease is characterized by chronic hyperglycemia which may end up damaging major human organs as the majority of people with diabetes mellitus remain for a long time unaware of the complication. Persisting hyperglycemia causes clinical complications such as neuropathy, retinopathy, nephropathy, cardiovascular diseases, chronic kidney disease, chronic liver disease, and cancer increasing morbidity and mortality (ADA, 2013).

Management of T2DM requires a multipronged approach for its management, wherein the patient has an important role to play. They are required to follow certain self-care practices to achieve optimal glycemic control and prevent complications. Its worth noting that adequate self-care needs to be persistent over time for it to lessen complications and prolong life (International Diabetes Federation, 2017). These self-care practices include regular physical activity, daily foot care practice, compliance with the treatment regimen, appropriate dietary practices, and tackling complications such as hypoglycemic episodes (Eunyoung & Suh, The level of diabetes knowledge and related factors among patients with diabetes mellitus in Hyderabad, India, 2018). Subsequently, poor knowledge of self-care can cause poor long-term metabolic control which may cause the development of diabetic complications such as nephropathy, retinopathy, neuropathy, and atherosclerotic changes (Iwuala, Olamoyegun, & Sabir, 2015). Studies have shown that properly executed and sustained self-care practices by patients lead to good glycemic control, reduced healthcare costs, prevents or delay the onset of complications, and enhances quality of care (Dedefo, Ejeta, & Wakjira, 2019).

Studies have documented that poor glycemic control among people living with T2DM remains a challenge (ADA, 2016). The American Diabetes Association in 2019, reported that an estimated 30%–49% of diabetic patients do not have adequate control of blood sugar, blood pressure, or blood cholesterol and that only 14% have adequate control of these three factors. In Kenya, scholars had also documented poor glycemic control among people living with T2DM (Alowais & Shido, 2020). Poor T2DM-related knowledge had been documented among people living with T2DM in India (Eunyoung & Suh, 2018), Ethiopia (Kassahunl, Gesesew, Mwanri, & Esthetie, 2016), and Nigeria (Sabo, Moh'd, & Emenike, 2019).

A significant relationship had been found to exist between T2DM knowledge and self-care practice among people living with T2DM in Malta (Formosa, Improving Diabetes Knowledge and Self-Care Practices, 2016), India (Mehta, Trivedi, & Maldonado, 206) India and, Malaysia, (Abbasi, See, & Ping, 2018) However, little is known about the

relationship between T2DM-related knowledge and self-care among people living with T2DM Kenya. Therefore, the purpose of this study was to assess the knowledge of diabetes management and self-care practices, their influencing factors and determine the relationship between respondents' knowledge and reported self-care practices.

## 2.2 Theoretical framework

Orem's self-care model is a complete self-care theory that offers a good clinical guide for planning and implementing the principles of good self-care (Dorothea, 2001). According to Orem, human beings can always take care of themselves and whenever their capacity is distorted, nurses can assist the individual to recover their ability by providing direct care, and compensatory educational support, (Hemmati, et al., 2012). This capacity may differ subject to the individual knowledge level, education level, age, economic status, culture, health status, and life experience of the individual.

According to this theory, self-care is the practice of activities that an individual develops and performs on his or her behalf to maintain life and well-being; self-care agency, which is a human ability to engage in self-care. According to Orem, the ability is determined by age, developmental state, life experience, socio-cultural orientation, health, and available resources; therapeutic self-care demands. The self-care practices should be performed over a specific duration to meet self-care fundamentals by using valid methods and related sets of operations and actions (Dorothea, 2001).

The theory stipulates that there are situations when patients are encouraged to bring out the best in themselves despite falling sick for some time in health care. This is especially prominent in a rehabilitation setting in which a patient is expected to be self-reliant after being taken care of by nurses and physicians (Lippincott, et al., 2011). Type 2 Diabetes Mellitus management requires lifestyle modification through self‑care practices. This in turn help manage T2DM through glycemic control and maintain a healthy lifestyle Similarly, adherence to self‑care practices is determined by the patients' knowledge and

Understanding of self-care T2DM (Dedefo, Ejeta, & Wakjira, 2019). It is against this backdrop that this study applied Orem's theoretical framework to investigate the patient's level of knowledge and whether they were able to apply the acquired knowledge into practice.

### 2.3 Level of knowledge level on diabetes self-care practices among people living with T2DM

Increased knowledge may change attitudes toward diabetes and aid prevention by motivating individuals to take responsibility for their health. This includes taking strategies such as the 'change life' UK strategy to improve the patient's lifestyle and behavior. However, knowledge needs to be enforced for it to translate into practice since knowledge alone does not always lead to practice (Maina *et al.,* 2011).

Adibe and others in a study done in Nigeria found that most people living with diabetes in Nigeria count on healthcare workers to decide for them, set goals, and instruct them on what they are supposed to do while they comply with the instructions on diabetes self-care (Adibe *et al.,* 2014). Sufficient knowledge of diabetes and effective self-care practices are key factors in achieving glycemic control. However, the knowledge has to be enhanced continuously by the patient. This empowers the patient with the ability to think critically enabling them to make independent and informed decisions in their daily disease management (Anderson, 2010).

Jones (2013) indicated that in Kenya, less than 30% are aware and knowledgeable about the control and self-care practices for diabetes which are determined by educational level and region. Similar findings were reported by the Kenya National Diabetes Strategy which indicated that there is a low level of public knowledge, (below 30%), about diabetes in Kenya (MOPHS, 2010). However, a study done in Kenyatta National Hospital in Kenya, on the assessment of knowledge and self-care practices and glycemic control showed that the level of knowledge among the study population was high where more

than 75% had knowledge of diabetes and self-care practices. Nevertheless, the study population showed poor glycemic control, and a significant gap was identified in their self-care practices (Gesare,2016).

### 2.3.1 Knowledge of diabetes diet therapy

Knowledge and skills in nutrition diet therapy enable individuals with type 2 diabetes (T2DM) to make food choices that optimize metabolic self-management and quality of life. A study done by Famakinwa and others indicated that 83.2% of the research respondents demonstrated knowledge of the diet management of Type 2 diabetes (Famakinwa, et al., 2022). Another study done in Ireland by Breen et al. reported that the average knowledge score on diet therapy was 59·2 (SD 16·4) % (Breen, Ryan, Gibney, & O'Shea, 2015). Similar results were reported in a large-scale study using the ADK knowledge measure to examine nutrition knowledge among 789 patients in two hospital-based UK diabetes clinics, where significant knowledge deficits were identified on diet among people living with T2DM (Speight & Bradley, 2019). In Kenya, a study done by Muoki (2017) indicated that the majority of the participants were not able to identify foods that rises blood glucose levels (Muoki, 2017). Similar results were reported in Mombasa which established that despite listing sugary and starchy foods, many patients were not able to mention many actual examples of these types of foods that increase blood sugar (Dropkin, 2010).

### 2.3.2 Knowledge of foot care

Foot complications as a result of T2DM, which more often affect older adults, have diminishes a person's quality of life (Matricciani & Jones, 2015). Booners et al. in a study found that when patients were properly informed about foot care, disease-associated morbidity, hospitalization, and amputation rates were lower than for those that did not have foot care information (Bonner, Foster, & Spears-Lanoix, 2016).

Huimin et al. in a study conducted in North China found that 56.1% of the participants had moderate and 25.1% had poor knowledge of diabetic foot Knowledge (Huimin, Xiaocheng, & Jingmin, 2022). Similar results were reported by Li et al. where most patients with type 2 diabetes had a medium level of knowledge (Li, Guo, Lou, Fang, & Shen, 2014). In Kenya, similar findings were reported from two studies which reported that the level of knowledge on T2DM foot care among the participants was low (Muoki, 2017), (Kones, 2016).

### 2.3.3 Knowledge of T2DM complications

Chronic T2DM comorbidities develop in significant proportions of T2DM clients with uncontrolled T2DM. These complications include cardiovascular disease, diabetic retinopathy, diabetic neuropathy (resulting in autonomic dysfunction), and potential complications resulting in lower extremity amputation (Abbasi, See, & Ping, 2018). Studies conducted in Ghana found that among persons living with T2DM, only 13.1% had adequate knowledge of diabetes-related comorbidities (Afaya, Bam, Azongo, & Afaya, 2020). Contrary results were reported in a similar study which reported that there was inadequate (54.1%) knowledge on T2DM associated complications among individuals living with T2DM (Afaya, Bam, & Azongo, Knowledge of chronic complications of diabetes among persons living with type 2 diabetes mellitus in northern Ghana., 2020) . Similar studies conducted by Nyamu et al. in 2017 in Kenya found contradicting results with 61% of the study respondents reporting having adequate knowledge of diabetes-related complications (Nyamu, et al., 2017).

### 2.3.4 Knowledge of blood glucose monitoring

Self-monitoring of blood glucose (SMBG) is a key component of T2DM management which has been proven to improve glycemic outcomes in patients with T2DM (Kellee, et al., 2013). Serial self-monitoring and treatment of blood glucose help to prevent the development of further microvascular and macrovascular complications (ADA, 2013). A

study conducted in Pakistan indicated that seventy (70%) study participants had average knowledge regarding blood glucose monitoring (Karad, et al., 2019). However, a study done in two states of Nigeria indicated that, although the knowledge level of self-care was high, knowledge of specific aspects such as glycosylated hemoglobin (HbA1c) performed relatively poorly (Idongesit, Adibe, Okonta, & Chinwe, Knowledge of self-care among type 2 diabetes patients in two states of Nigeria, 2014). A cross-sectional, community-based study conducted in India found that 24.1% of patients possessed adequate knowledge of self-blood glucose monitoring whereas 75.8% of patients were not aware and not following the steps of self-monitoring properly (Krishnan & Thirunavukkarasu, 2016).

The hemoglobin A1C (HbA1C) test is the currently accepted gold standard biochemical indicator of long-term glycemic control in diabetic patients The test is also referred to as glycated hemoglobin which is a blood test that shows a person living with T2DM average blood glucose level over the past two to three months (Atak, 2015) Few studies have been documented on the level of knowledge as well as the frequency of use of this test among diabetic patients in Kenya. This lack of knowledge and awareness about the test may lead to increased susceptibility to the development of diabetic comorbidities and, higher healthcare costs among these patients (Matheka, Kilonzo, Munguti, & Mwangi, 2013). A study done in a Kenyan tertiary referral hospital found that 67.7% of the respondents had heard of the HbA1C test. The study also indicated that only forty patients 20.2% had at one point done the test while 79.8% had never done the test. Similar findings were reported from a study done at Kenyatta national hospital where a low level of awareness of the HBA1c test was reported (Omari, et al., 2020).

### 2.3.5 Knowledge of the importance of exercise

Physical exercises have been found to improve acute and chronic insulin action which helps in both acute and chronic blood glucose control. American Diabetes Association recommends at least 150 minutes a week of moderate-intensity aerobic physical exercises

for people living with diabetes (ADA, 2016). There are additive benefits of combining both aerobic and resistance exercises in adults living with T2DM (Gesare, 2016).

Studies have indicated that T2DM impairs insulin-stimulated blood glucose uptake into the skeletal muscle which predominates at rest while muscular contractions stimulate blood glucose transport via a separate stabilizer mechanism which is not impaired by insulin resistance or type 2 diabetes.

A study conducted by Palaniswamy (2020), indicated that 78% of the study respondents knew the benefits of physical exercises in the management of T2DM (Palaniswamy, 2020) . Similar results were reported in a descriptive cross-sectional study conducted among patients living with T2DM in the Kilimanjaro region, Northern Tanzania where high levels of knowledge (98.4%) and positive attitudes (95.6%) towards physical exercises were reported (Mwimo, et al., 2021).

### 2.3.6 Knowledge of the importance of eye care

Diabetic retinopathy is one of the main causes of blindness and one of the most commonly diagnosed diabetic comorbidities experienced by people living with diabetes aged between fifteen and sixty-four years. Worldwide, the condition is considered one of the major threats to global health which affects approximately 26% of people living with T2DM. A meta-analysis study indicated a prevalence of 28% among people living with T2DM in Asian countries. In China, study results reported a prevalence of 34%. In Kenya, diabetic retinopathy is currently estimated to contribute to about 3% of blindness.

Screening is the only way to diagnose diabetes retinopathy as the condition is symptomless in its early stage. Eye care is considered an important factor in preventing complications of diabetic retinopathy, as many studies indicate that diabetic patients have poor knowledge of eye care methods and ocular complications. Loss of vision from diabetic retinopathy can be prevented or minimized through better control of blood sugar,

early diagnosis, and treatment of retinopathy. Periodic retinal examinations (even when there are no symptoms) are therefore a key to preventing diabetes-related vision loss.

A study conducted in Malaysia indicated that 87.2% of people living with diabetes were aware that diabetes can affect the eyes (Krishna, et al., 2011). The study results agree with studies done by (Mohammed & Waziri, 2009), and ( Rajiv et al., 2010) who found a high level of awareness of diabetes eye complications among people living with diabetes. In a study conducted at Kenyatta National Hospital, 95% of the people living with diabetes responded that diabetes affects the eye. However, only 22.7% of the respondents had the correct knowledge of what diabetic retinopathy was (Cheruiyot & Gilbert, 2013). These results agree with study results from an urban (supposedly better informed) population in southern India involving 2,522 which reported that only 28% were aware that diabetes could reduce vision (Babu, Kim, Ramchandani, & Sachin).

### 2.4 Adherence to diabetes self-care practices among people living with T2DM

Diabetes self-care practices involve three key components which include, one, taking care of personal health and illness needs which include but are not limited to healthy dietary intake, being physically active, regular blood sugar monitoring, adherence to the prescribed medication, excellent problem-solving skills, healthy coping skills and avoidance of risky behaviors (Shrisvastava & Ramasamy, 2013).

Second, learning and practicing new responsibilities helps in developing problem-solving skills and having the ability to apply self-care knowledge in real-life situations (Suglo & Evans, 2020). Component number three involves the utilization of resources to enable one to deal with day-to-day health. Different factors can explain the reasons for non-compliance and poor self-care including lack of resources. Information on how to engage in self-care comes from different sources including healthcare providers (Shaya, et al., 2014). Patients also need to adjust to their new selves by appreciating the limitations caused by the illness.

Self-care in persons living with T2DM is vital because these individuals, together with their families, provide 95% of the overall care for their condition (Hashim, Mustafa, & Ali, 2017). Adequate self-care practices have been shown to result in delaying the development and progression of complications associated with uncontrolled T2DM diabetes. In addition, the literature indicates a rise in diabetes complications mainly due to a lack of adherence to the medical regimen and self-care practices (Karam *et al*., 2012).

Ayele et.al (2012) found that only 39.2% of the study population had high self-care behavior in a study in Ethiopia (Ayele, *et al.,* 2012). However, studies done in Kenya have shown a deficiency in self-care (Maina et al., 2010; Lugaya et al., 2017; & Ndirangu, 2019). According to research performed by Mlale (2016), only 54.87% of respondents displayed positive self-care behaviors (Mlale, 2016). The study results show that adherence to diabetes self-care practices is still suboptimal and there is still a mile ahead to go in as much as adherence to diabetes self-care practices is concerned.

### 2.4.1 Adherence to self-monitoring of blood glucose

Self-monitoring of blood sugar levels is vital among people living with T2DM as it enables them to determine whether their glycemic goals have been attained as well as monitor their response to the various therapies used in the treatment and management of the disease (Gesare, 2016). Patient self-glucose monitoring may help with self-management and medication adjustment, particularly in individuals taking insulin (IDF, 2017). American Diabetes Association in a study indicated that 24.1% of the study population occasionally (once or less a month) monitored their sugar levels to adjust their diets (ADA, 2020). However, a study done in France indicated otherwise as 27.7% were found to monitor sugar levels once or twice a day to test dietary assessment while 36.2% tested thrice or more times a day to determine the impacts of physical activity (Mukeshimana, et al., 2015).In Kenya,

### 2.4.2 Adherence to diet therapy

Diet therapy is one of the cornerstones of the management of T2DM. Diet modification is based on the principles of eating healthy with consideration of psychological, social, and cultural factors that influence individual dietary choices. Diet therapy in the management of T2DM is an essential approach that should be observed by all people living with T2DM. Diet therapy has been reported to solely improve non-insulin-dependent diabetes mellitus, without recourse to any medication. Even in cases of insulin-dependent diabetes mellitus, insulin therapy cannot exert its effects fully unless appropriate diet control is also practiced concurrently (Abbasi, See, & Ping, 2018).

Although dietary modification has been recommended as the first step of diabetes type 2 management, it is considered one of the most challenging aspects of diabetes management (Emmanuel & Otovwe, 2015). For instance, a study conducted in Ethiopia indicated that more than half of the study population was not adhering to the recommended dietary practices (Mohammed & Sharew, Adherence to dietary recommendation and associated factors among diabetic patients in Ethiopian teaching hospitals, 2019). Similar findings were reported by other studies conducted in India and Botswana (Parajuli, *et al*.,2014) (Adewale, *et al*., 2013). Another study done by Adbelkarim and others found that very few study participants (14.6%) had knowledge of diet therapy and that only 34.5% of the study respondents were reported to adhere to a diet regime (Abdelkarim, *et al.,* 2010).

### 2.4.3 Adherence to physical activity

Regular exercise is one of the most significant approaches to regulating sugar levels in a person living with T2DM. Exercises improve insulin action and metabolism, protects against cardiovascular diseases, and weight control, and give a sense of well-being (ADA, 2016). It is recommended that persons living with diabetes should do exercises at least three times a week and that it would be better to do daily exercise with a session lasting for at least 30-45 minutes (Amanat, *et al.*,2020). A study on factors related to poor sugar

control among patients with T2DM indicated that 54.8% of the study population had at least 30 minutes of physical activity daily (Alowais & Shido, 2020). The study, however, contradicts the findings of a study by Mukeshimana and others that found that only 7.3% of the study population engaged in regular physical exercises (Mukeshimana, *et al.*, 2015).

### 2.4.4 Adherence to foot care practices

Foot self-care behaviors, including daily inspection of feet, professional treatment, hygiene, and proper shoe gear help minimize the risk of foot complications (Matricciani & Jones, 2015)**.** People living with diabetes are at high risk of foot ulcers and amputations which have various predisposing factors such as peripheral vascular disease, poor foot hygiene, peripheral neuropathy that causes loss of sensation, or unsuitable or no footwear (Kones, 2016) Therefore, education and early recognition with prompt treatment can help prevent the complications.

According to Pourkazemi and others in 2020, daily inspection of the feet prevents foot complications, helps recognize any abnormality early, and helps early medical treatment before the complication advances to an irreversible state (Pourkazemi, et al., 2020). It is vital to check closed shoes before wearing them to identify any foreign matter that may harm the foot. Retrospective research by Desalu and others, (2011) found that 30.1 % of the study population had the knowledge and out of which only 10.2% engaged themselves in good foot care practices. Among the respondents, 68.8% were ignorant of what to do when they noticed any unusual occurrence between their toes, and less than half of the study participants consistently inspected their feet. A study conducted by Mukeshimana and others indicated that more than half of the study respondents reported knowing the importance of inspecting shoes before putting on closed shoes (Mukeshimana, *et al.*, 2015). Similar results were reported by Kones (2016) where the foot self-care behavior was at a poor level overall, especially when it comes to performing daily foot-checking and shoe-checking before wearing shoes (Kones, 2016).

## 2.5 Factors that affect knowledge level of diabetes self-care practices and adherence to diabetes self-care practices

A systematic review done in 80 studies on determining barriers to diabetes self-care, indicated that negative cultural beliefs, values, and attitudes about diabetes and treatment of diabetes, social support, ignorance, financial resources, and core morbidities were the main barrier to self-management of diabetes. This has been evident in a majority of developing countries (Ketema, et al., 2020).

### 2.5.1 Effect of self-care knowledge Level on diabetes self-care Practices

Increased knowledge may change attitudes toward diabetes and aid prevention by motivating individuals to take responsibility for their health both at diagnosis and on a continuous and regular basis (Worku, Abebe, & Wassie, 2015). This has been shown to empower the patient with the ability to think critically enabling them to make independent and informed decisions in their daily disease management (Anderson, 2010). However, many health centers in a majority of African countries lack structured self-management programs and the only support given is through the physician's office on a need basis (Azevedo M, 2015).

### 2.5.2 Effect of Poverty on diabetes self-care Knowledge and Practice

Poverty has been seen to play as a contributor to the lack of adherence to diabetes self-care practices (Stephani, Opoku, & Beran, 2018). A study carried out in Nigeria indicated that 56% of cohorts had inadequate glycemic control and 59% of the study population did not adhere to oral antidiabetic drugs due to lack of finances (Atak, 2015). Similar results were found in South West Nigeria where 82% had never practiced self-blood sugar monitoring since they lacked the affordability to purchase self-monitoring blood glucose equipment and were ignorant of how to use them. In fact, 35 % of the respondents did have regular medication intake due to their high cost, (Adisa, 2009).

Also, due to insufficient funding from the Kenyan government, the private sector acts as the primary source of funds for the health sector where 36% of the funds come from households through out-of-pocket spending (MOPHS, 2015). According to Lester (2014)**,** a person living with diabetes uses approximately Ksh. 510 to self-monitor his or her glucose at home for a month. Lester (2014) also approximated the cost of insulin use in 8 months to be Ksh. 2125 (Lester, 2014) This cost is often out of reach, especially in the majority of developing countries where a majority of people live on less than Ksh.170 per day, (Mlale, 2016).

### 2.5.3 Effect of Culture on Knowledge of diabetes self-care and Practice

Family dynamics and cultural practices especially in Africa where cultural values and beliefs are highly rated play a key role in diabetes self-management. Family members have been seen to both support and inhibit success in diabetes self-management (Rebolledo & Arellano, 2016). Culture also plays a role concerning health beliefs on the cause of T2DM and the expected treatment which affects the adherence to the recommended self-care practices. For instance, the belief that diabetes is caused by supernatural powers may hinder effective self-care practices as people seek help in places of worship such as churches and mosques (Adeyemi, *et al.,* 2011). In contrast, a study done at Kenyatta National Hospital in Kenya stated that 92.3% of the study population did not believe in witch doctors and herbalists to cure their disease while 4.8 % were not sure (Mlale, 2016).

### 2.5.4 Effect of social demographic factors on Knowledge of diabetes self-care and Practices

Age, sex, education, time duration during which a person living with diabetes had lived with diabetes, and marital status are related to the individual's knowledge and self-care according to a study done in Southeast Nigeria (Adisa R, 2009). Young people tend to have more knowledge of self-care practices, and good cognitive function, are more likely

to retain what they were taught, and have fewer hindering factors to effective self-care practices compared to their old counterpart's education (Formosa & Muscat, 2016). Similar results were indicated in a study done in Kenya where middle-aged females were seen to adhere to self-care practices including regular medical checkups (Gesare,2016).

### 2.5.5 Effect of education level and employment status on Knowledge of Self-care and Practice

Respondents with lower education status have been reported to have low self-management behavior, lower self-efficacy, and lower continuity of care (Ghannadi, et al., 2016). This finding was consistent with other studies from United Arab Emirates (UAE) and Bangladesh (Islam, et al., 2015). It is therefore important to note that measures to improve literacy levels would be cost-effective to reduce diabetic morbidity and mortality (Guatam, Bhatta, & Aryal, 2015).

Employment status is seen to be related to the level of education as it is obvious that the majority of individuals formally employed have higher educational levels as compared to individuals that are not formally employed. Furthermore, low socioeconomic status is associated with limited access to education, information, and transportation, which are necessary drivers to required necessary services including medication (Mayberry & Osborn, 2012).

### 2.5.6 Effects of duration since diagnosis on the knowledge of self-care and practice among people living with T2DM

Research has indicated that with longer duration, there are more opportunities for exposure to information regarding the self-care practices effective for the management of T2DM. Reinforced information or lessons about self-care in diabetes might eventually be grasped no matter how 'complex'. Likewise, individuals living with the disease for some time might have experienced some overt complications which might have propelled them to seek help, gaining more knowledge in the process. Studies conducted by Al-Qazaz and

others indicated that duration since diagnosis with diabetes was statistically associated with self-care knowledge of diabetes (Al-Qazaz, et al., 2011). Similar results have been reported by (Abdo & Mohamed, 2010) and (Idongesit, Adibe, Okonta, & Chinwe, 2014).

It is imperative, therefore, to intensify training on self-management for newly diagnosed patients and also for asymptomatic patients to prevent the development/reduce the progression of diabetes complications. However, education about diabetes and its care is a continuous process.

### 2.6 Summary and Research Gaps

Few research studies have focused on the factors that contribute to poor knowledge levels and adherence to the recommended diabetes self-care practices which are significant for improving diabetes outcomes. Furthermore, few research studies have been done in Kenya regarding the knowledge level and self-care practices among diabetes patients and besides, and no research findings have yet been published from Kiambu County.

This research aimed to address the lack of understanding regarding the nature and factors that determine both the level of diabetes-related knowledge and the adherence to diabetes self-care practices in patients living with T2DM. We hypothesized that patient characteristics do not affect both the level of knowledge and adherence to self-care practices among people living with T2DM. Information gathered will help inform the future development of educational interventions that are more effective in the management of diabetes

# CHAPTER THREE

# METHODOLOGY

## 3.1 Study Site

The study was carried out at Thika Level 5 Hospital in Kiambu County, Thika Municipality division in Biashara sub-location along the General Kago Road. The Hospital is one of the largest government facilities in Central Kenya and runs a special weekly diabetes clinic on a designated day. According to the hospital records of the year 2019, the diabetes clinic serves approximately 60 patients a day. Since the clinic operates 5 days a week this would sum up to approximately 1200 patients in a month visiting the diabetes clinic per month.


**Figure 3.1: A map showing the location of Thika Level 5 Hospital**

### 3.2 Study design

This study used a cross-sectional study design. This enabled the determination of the associations between the level of knowledge of diabetes self-care practices, the level of adherence to diabetes self-care practices, and the patient's characteristics. The research participants included people living with T2DM. Researcher administered questionnaire was used to collect data from 190 participants who were randomly selected using systemtic random sampling. Data was analyzed using SPSS software version 21. Ehical considerations were factored in through informed concent as well as seeking permissions from the relevant authorities.

### 3.3 The study participants

The study participants comprised both males and females living with T2DM aged above 18 years and attending Thika Level 5 Hospital outpatient Diabetes clinic from November 2019 to January 2020.

#### 3.3.1 Inclusion criteria

3 People living with T2DM attending the diabetic clinic at the time of the study.
4 Participants who agreed to participate and sign the consent form
5 Participants between the age of 45 and above years

#### 3.3.2 Exclusion criteria

3 Patients who were below 45 years
4 All those patients who declined to consent.

### 3.4 Sample Size Determination

Adherence rates to self-care practices regimens and lifestyle regimens are generally estimated at 50% (Delamater, 2006). Therefore, the value of adherence rate (P) 50.0%

was used to calculate the sample size using Fisher *et al.,* 1998 formula. To be able to determine the true proportion at the 95% confidence level and 7.5% level of precision, a minimum sample size below was required.

**$n = [z^2 * p (1-p)/d2]/RR$ (Fisher et al, 1998)**

Where:

n= sample size

Z=1.96 standard variant which corresponded to a 95% confidence interval

P= Adherence rate of 50.0%

d= Level of precision at 7.5% (acceptable error margin of 0.075)

RR=Response rate (1- 0.10)

$n = \{(1.96)^2 * 0.50 (1- 0.50)/0.075^2\} /0.90$

n=189.7086 round off to **190** participants.

### 3.5 Sampling Procedure

Thika Level 5 Hospital was purposely selected because it is the largest referral hospital that serves patients from the entire Kiambu County as well as other neighboring counties. The estimated number of people living with diabetes visiting the clinic in a month was an average of 1200 people based on the total attendance record in the year 2019. A sampling interval of 6 was arrived at by dividing the average number of patients visiting the diabetic clinic in a month with a sample size of 190 (1200/190=6). The clinic operated for 5 working days every week. Therefore, 60 patients were expected to visit the clinic per day. The first respondent was randomly selected and the rest of the study subjects were selected systematically taking every $6^{th}$ patient until the expected number was obtained. The

process was repeated for 10 working days between 8.00 am and 1.00 pm until a study sample size of 190 participants was obtained.

### 3.6 Data collection tools

A researcher-administered questionnaire was designed for the exploration of the level of knowledge of and adherence to diabetes self-care practices. The questions were both open-ended and closed-ended. Part I of the questionnaire assessed the social-demographic, cultural, economic, and clinical factors of people living with diabetes. Part II assessed the level of knowledge of diabetes self-care practices by use of the Spoken Knowledge in Low Literacy in Diabetes Questionnaire (SKILLD) (Cairampoma, *et al.*, 2015) (part 5 of appendix iii). Knowledge of diet, hyperglycemia and hypoglycemia signs and symptoms, management of hypoglycemia, diabetes complications, foot care, exercises, blood sugar monitoring, and eye care was assessed.

Part III assessed the level of adherence to the recommended diabetes self-care practices by use of the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) questionnaire (Deborah, *et al.,* 2019) (Part 6 of Appendix iii). The main questions on the SDSCA assessed the respondent's adherence to the recommended diet, exercise, blood sugar testing, foot care, eye care, and whether the respondent was a smoker or not. Part IV assessed medical adherence by use of the Modified Morisky Medication adherence scale questionnaire (Shankar, Babu, & Ramya, 2019) The tool comprised 6 questions that assessed the level of adherence to treatment plans by assessing the individual patient's motivations and knowledge (Part 6 of Appendix III).

Each measurable knowledge aspect had a series of questions to be answered by the study respondent. Each knowledge aspect question was given the same or equal weight rated at 100 percent. Hence, for knowledge of every aspect, the patient's level of knowledge was expressed as a percentage by taking the number of questions correctly answered by the study respondent divided by the total number of questions in each aspect, and the answer

multiplied by 100. A respondent who scored 50% and above in each of the measurable knowledge aspects was termed to have sufficient knowledge in that particular knowledge aspect. A study respondent who scored less than 50% was termed to have insufficient knowledge in the respective aspect of knowledge (Hsieh, Chen, Ho, & Lin, 2022) This was done against the backdrop that there were no previous studies on the level of knowledge among people living with T2DM.

The respondents' diabetes self-care practice score was assessed using the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA) (Part 6 of Appendix iii). The questionnaire had 16 questions that assessed the level of adherence to diet, exercise, blood sugar testing, foot care, eye care, and whether the respondent was a smoker or not. The number of days the patient adhered to recommended diabetes self-care practices the previous week was recorded. The score ranged from 0 to 7. Adherence to the recommended self-care practices was given a numerical value of 1 and failure to adhere was given a numerical value of 0. The total adherence score ranged between 0 reflecting a low level of adherence and 16 translating to the highest level of adherence.

A three-point Morisky scale was used to assess medication adherence where every 'Yes' answer was accorded a numerical value of 1 and 'No' was accorded a score of 0. The scores ranged from 0 translating to a low level of adherence to 3 reflecting a high level of adherence to medication use.

### 3.7 Questionnaire pretesting

The questionnaire was pretested on a small group of 19 representative samples of people living with T2DM at Thika Level 5 Hospital diabetes clinic. This formed 10% of the study sample of 190 participants (Ponto & Julie, 2015). The pretesting was done to assess the ease of comprehension and recall of parts I, II, III, and IV of the questionnaires by the different respondents. Pretesting was also done to help determine the reliability and

validity of the questions. After pretesting, changes in question format and order were factored in before data collection.

### 3.8 Data Collection Procedure

Upon arrival at the clinic, each T2DM patient was registered on a clinic register dated that day in the order of their arrival in line with the clinic procedures. The sampled participants were then screened for case definition using the appointment cards. Those that had participated in the study on an earlier date failed to meet the inclusion criteria or did not give consent, were excluded from the study. Those who met the inclusion criteria were requested to participate.

The objective of the study was then explained to all the participants. The risks benefits and confidentiality issues were also conveyed to the participants (Appendix IV). The participant would then sign the consent form. A trained enumerator would then use an researcher-administered questionnaire to collect data by asking the respondent specific questions and recording the answers for the respondent During the administration of the questionnaire, the enumerator would read a question for the respondent and later give any clarification if need be. The respondent would then be given 10-15 seconds to respond. Thereafter participants' answers were recorded and marked as correct or incorrect. Having the correct knowledge was given a numerical value of 1 and 0 for insufficient or lack of knowledge.

### 3.9 Data management

After data collection was over, all the questionnaires were later consolidated and stored safely in a cabinet, to which only the researcher had access. Subsequently, data cleaning was done to remove any outliers and missing values and to ensure their completeness. The data was later coded where responses were given codes such as low level of adherence to diabetes self-care practices was given a numerical value of 1 and high level of adherence as 2. The codes for every respondent were entered into an SPSS version 20 software for analysis.

### 3.10 Data analysis

Data were analyzed using SPSS version 21 software where the strength of association between the variables was done at $p< 0.05$ significance levels. Descriptive statistical analysis was used to calculate the percentages, means, and standard deviations of the patient's characteristics, knowledge level, and level of proficiency in diabetes self-care practices. The chi-square test statistic was used to test for the association between qualitative variables. This included the association between the patient's characteristics and knowledge level of diabetes self-care practices and also the relationship between the patient's characteristics and level of adherence to self-care practices.

Regression analysis was used to test for the relationship between independent quantitative variables such as age and duration since diagnosis with T2DM with the quantitative dependent variables that is knowledge of diabetes self-care practices score and adherence to diabetes self-care practices scores. Pearson correlation analysis was used to assess the relationship between the level of adherence to diabetes self-care practices and knowledge of diabetes self-care practices.

### 3.11 Ethical considerations

Approval to carry out this study was first sought from the JKUAT University Scientific Steering Committee (Appendix V) and NACOSTI (Appendix VI) and also clearance was sought from the management of Thika Level 5 Hospital. The objective of the study was also explained to all the participants. The participants were also made aware that there were no direct benefits gained by participating in the study and that they were not exposed to any form of risk by participating in the study.

Confidentiality issues were also conveyed to the participants in that the information collected was used for research purposes only, and neither the study participant's name nor information that could identify them would be used in any publication or presentation of the study results (Appendix IV). Participation in the study was voluntary and

participants were encouraged to complete the study, however they were free to withdraw from the study without compromising their care in any way. The patients also signed the informed consent form before proceeding to fill in the questionnaire.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Results

### 4.1.1 Introduction

This study was conducted from November 2019 to January 2020 at Thika Level 5 Hospital diabetic clinic. A systematic random sampling technique was used to recruit 190 respondents for the study. A semi-structured questionnaire that was interviewer-administered was used to collect data. The interviewed participants came from Kiambu County and its environs.

### 4.1.2 Response Rate

Table 1 shows that 190 questionnaires were administered to patients who attended a diabetic clinic at Thika Level 5 Hospital. The numbers of responses that were filled were 190 (100% of the administered questionnaires). Since a response rate of above 50 % is permissible for analysis it was therefore correct to analyze data from the returned 190 questionnaires (Babbie, 2013).

## 4.2 Personal Characteristics

### 4.2.1 Social demographic characteristics of the study participants.

Figure 4.1 shows that the majority of the respondents were above 50 years old forming 60.5% of the study population. Almost three-quarters of the participants were female (69.5%). More than three-quarters of the study respondents (85%) were married.

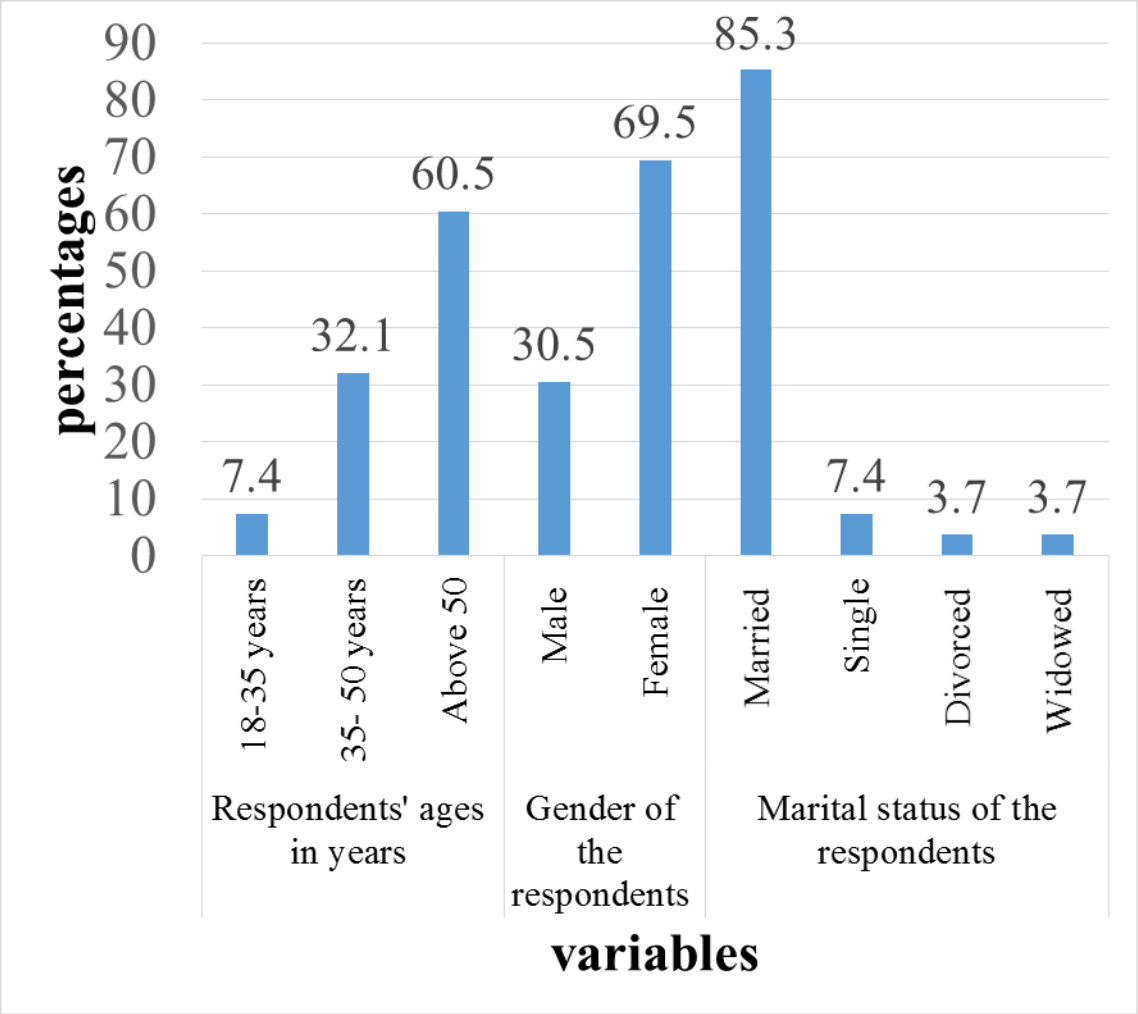


**Figure 4.1: Social Demographic Characteristics**

### 4.2.2 Social cultural characteristics

While only 13.7% believed that herbal medicine can cure diabetes, 43.2% believed that religious faith could cure diabetes (figure 4.2.).

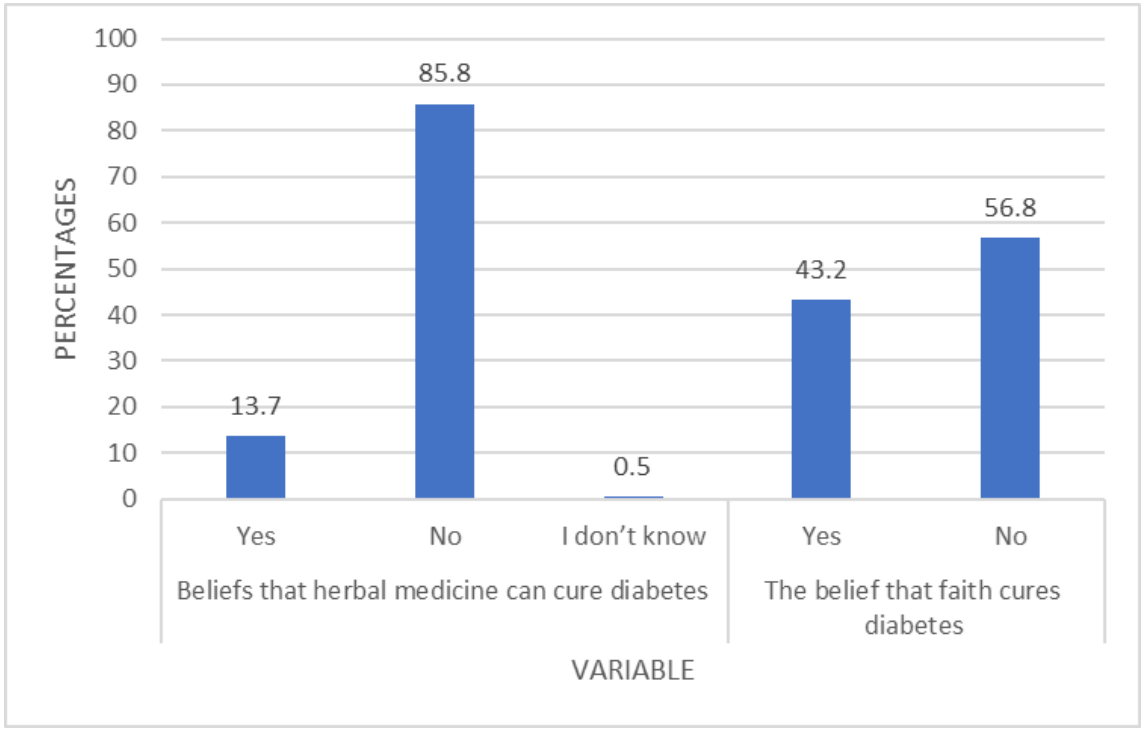


**Figure 4.2: Social-cultural Characteristics**

### 4.2.3 Economic characteristics of the study respondents

Farming was the major economic activity practiced by a majority of the participants (36.3%) and income and pension were the main source of funds for payment of medical bills (46.8%) used by the majority of the respondents (Table 4.1).

**Table 4.1: Economic Characteristics**

| Variable | Frequency(n=190) | Percentages |
|---|---|---|
| **Employment status** | | |
| Work at home | 41 | 21.6 |
| Farmer | 69 | 36.3 |
| Business person | 48 | 25.3 |
| Formally employed | 32 | 16.8 |
| **Source of funds for payment of medical bills** | | |
| Income/pension | 89 | 46.8 |
| Friends and family support | 54 | 28.4 |
| Saved money | 43 | 22.6 |
| Selling property | 4 | 2.1 |

### 4.2.4 Clinical characteristics of the participants

The majority of the participants (30%) had lived with diabetes for more than 11 years since diagnosis. More than half of the participants suffered from cardiovascular diseases, in addition to diabetes (52.1%). However, a substantial percentage, (30%) did not have any diabetes-related complications. The majority (55.3%) were on oral antidiabetic agents, with only 25.8% using insulin. On the other hand, 68% did not have a glucometer for self-glucose monitoring. Those on both insulin and oral antidiabetic agents were 18% while respondents who were on exclusively diet therapy were 1.1%. (Table 4.2).

**Table 4.2: Clinical characteristics of the study participants**

| Variable | Frequency (N=190) | Percentage |
|---|---|---|
| **Duration since diagnosis with diabetes** | | |
| 0-2 years | 46 | 24.2 |
| 3-5 years | 48 | 25.3 |
| 6-8 years | 21 | 11.1 |
| 9-11 years | 18 | 9.5 |
| More than 11 years | 57 | 30.0 |
| **Diabetes-related complications** | | |
| Cardiovascular diseases | 99 | 52.1 |
| Visual Impairment | 8 | 4.2 |
| Amputations | 3 | 1.6 |
| None | 57 | 30.0 |
| More than one condition | 23 | 12.1 |
| **Type of Treatment** | | |
| Insulin | 49 | 25.8 |
| oral antidiabetic agents | 105 | 55.3 |
| Insulin and oral antidiabetic agents | 34 | 17.9 |
| Diet | 2 | 1.1 |
| **Does the patient have a glucometer?** | | |
| Yes | 62 | 32.6 |
| No | 128 | 67.4 |

### 4.3 Knowledge level on diabetic self-care practices as assessed by the Spoken Knowledge in Low Literacy in Diabetes Questionnaire (SKILLD)

The participants were relatively knowledgeable with about three-quarters (77%) having scored 50% and above in each of the measurable knowledge aspects. Moreover, the mean score of the overall knowledge score on diabetes self-care practices was 55.14% with a standard deviation of 3.4.

From Table 4.3, more than three-quarters (77.4%) of the respondents had adequate knowledge of the appropriate diet for a person living with T2DM. Although more than half (63.2%) were able to recall at least 2 clinical signs and symptoms of hyperglycemia, more than half of the study participants (51.6%) were unable to recall at least 2 signs and

symptoms of hypoglycemia. In fact, 55.8% of the patients did not know how to deal with hypoglycemia complications. Conversely, when they were given signs and symptoms of hypoglycemia and asked what they normally do when they experience them, 61.2% of them reported that they either rested or ate any form of sugar.

The majority of the patients acknowledged that a person living with T2DM should check their feet for complications daily (66.8%). In addition, more than half (68.4 %) of the study population knew the importance of wearing flat and closed shoes (table 5). When participants were asked whether eye check-ups at least once annually were important, 56.3% were in agreement. On the other hand, about a third (62.6%) of the participants did not know the recommended frequency of blood glucose level testing. The majority of the respondents showed adequate knowledge of normal random blood glucose levels. However, 54.3% and 76.4% were not aware of the normal fasting blood glucose level and the existence of the HbAIc blood sugar test, respectively. A third (63.7 %) of the respondents were able to recall at least 2 complications of uncontrolled diabetes.

## Table 4.3: Knowledge level of diabetic self-care practices

| Variable | Frequency (n=190) | Percentage |
|---|---|---|
| **Knowledge on diet** | | |
| Have knowledge | 147 | 77.4 |
| limited knowledge | 43 | 22.6 |
| **Knowledge of hyperglycemia signs and symptoms** | | |
| Have knowledge | 120 | 63.2 |
| Have limited knowledge | 71 | 36.8 |
| **Knowledge of hypoglycemia signs and symptoms** | | |
| Have knowledge | 89 | 46.8 |
| Have limited knowledge | 101 | 53.2 |
| **Knowledge of the management of hypoglycemia** | | |
| Have knowledge | 84 | 44.2 |
| Have limited knowledge | 106 | 55.8 |
| **Frequency of foot care** | | |
| Knowledgeable | 127 | 66.8 |
| Have limited knowledge | 63 | 33.2 |
| **Knowledge of the importance of foot care** | | |
| Have knowledge | 130 | 68.4 |
| Have limited knowledge | 60 | 31.6 |
| **Knowledge of eye care** | | |
| Have knowledge | 107 | 56.3 |
| Have limited knowledge | 83 | 43.7 |
| **Knowledge of the frequency of blood sugar test** | | |
| Knowledgeable | 71 | 37.4 |
| Have limited knowledge | 119 | 62.6 |
| **Knowledge of the frequency of blood sugar test** | | |
| Knowledgeable | 104 | 54.7 |
| Have limited knowledge | 86 | 45.3 |
| **Knowledge of Fasting blood sugar levels** | | |
| Knowledgeable | 85 | 44.7 |
| Have limited knowledge | 105 | 54.3 |
| **Knowledge on HBA1C** | | |
| Knowledgeable | 43 | 23.6 |
| Have limited knowledge | 147 | 76.4 |
| **Knowledge of the frequency of exercises** | | |
| Knowledgeable | 99 | 52.1 |
| Have limited knowledge | 91 | 47.9 |
| **Knowledge of long-term complications associated with uncontrolled diabetes** | | |
| Knowledgeable | 121 | 63.7 |
| do not have knowledge | 69 | 36.3 |

### 4.4 Self-care practices as assessed by the Summary of Diabetes Self-Care Activities Questionnaire (SDSCA)

The mean level of proficiency in self-care practices was 7.7 with a range of scores of between 1 and 14. In the study, the respondents were asked to recall the number of days they practices specific recommended self-care practices for the week before the day of the interview. From Table 4.4, 35.8% of the respondents followed a specific diet plan. The respondents presented good adherence to medication as 90.4% and 88.9% of the respondents had 100% adherence to oral antidiabetic agents and insulin, respectively.

Concerning foot care, the mean number of days when patients checked their feet for infections at least once a day the previous week was 4.4 days (Table 4.4). Slightly about one-third (27.9%) checked their feet at least once a day. Two-thirds 67.4%) of the respondents reported wearing flat and closed shoes during the previous week and the mean number of days when patients wore flat and closed shoes was 1.7 days. Additionally, more than three-quarters of the respondents (81.1%) dried in between their toes. The mean number of days where the patients dried in between their toes was 6 days.

A very small proportion (2.4%) of the study population smoked cigarettes. On the other hand, more than half of the respondents (62.6%) did not monitor their blood sugar levels at all in the previous week. Only 32.6% had a glucometer at home with the rest checking their blood glucose in the nearby pharmacy and health care centers.

**Table 4.4: Self-care practices as assessed by The Summary of Diabetes Self-Care Activities Questionnaire (SDSCA)**

| Self-Care Practice | Frequency of respondents who adhered to the self-care practice | percentage of respondents who adhered to the self-care practice | Mean | SD |
|---|---|---|---|---|
| Diet plan | 68 | 35.8 | 3.7 0 | 3.2 |
| Adherence to insulin use | 85 | 90.4 | 6.5 | 1.6 |
| Adherence to anti-diabetic drug use | 144 | 88.9 | 6.5 | 1.7 |
| Feet check once a day | 53 | 27.9 | 4.4 | 3.2 |
| Use flat closed shoes | 128 | 67.4 | 1.7 | 2.8 |
| Dried between toes after washing | 154 | 81.1 | 6.0 | 1.2 |
| Usual exercise of at least 30min | 121 | 63.7 | 4.9 | 2.9 |
| specific exercise other than usual exercises | 41 | 21.6 | 0.9 | 2.1 |
| Blood sugar monitoring at least once in the previous week | 71 | 37.4 | 1.0 | 1.8 |

### 4.4.1 Medication adherence as assessed by the Modified Morisky Medication adherence scale

Only 14% and 13.6% reported sometimes forgetting to take oral antidiabetic agents and use insulin. On the other hand, only 16.3% acknowledged that they stopped using insulin and oral antidiabetic agents the moment they felt better (Table 4.5).

**Table 4.5: Medical adherence as assessed by the modified Morisky medication adherence scale**

| Variable | Frequency | Percentage |
|---|---|---|
| **Number of respondents who sometimes forgets to take oral antidiabetic agents n=145** | | |
| Yes | 20 | 14 |
| No | 125 | 86 |
| **Number of respondents who sometimes forgets to use insulin (n=103)** | | |
| Yes | 14 | 13.6 |
| No | 89 | 86.4 |
| **Number of respondents who stop using insulin and oral antidiabetic agents the moment they feel better (n=190)** | | |
| Yes | 31 | 16.3 |
| No | 159 | 83.7 |

## 4.5 Association between a person's characteristics and the knowledge level of diabetes self-care practices

Regression was used to test if age and duration since diagnosis with T2DM carries a significant impact on the knowledge level of self-care practices among people living with T2DM. Age significantly predicted knowledge level of self-care practices F (1,189) =6.279.p=0.013 which indicates that the age of a person can play a significant role in shaping the knowledge level of self-care practices b=-0.180, p=0.013. These results clearly direct the negative effect of age, moreover, the $R^2$=0.032 depicts that the model explains 3.2% of the variance in knowledge level on self-care practices. The duration the respondents had lived with the disease since they were diagnosed was regressed against the knowledge level of self-care practices. The results indicated that duration since diagnosis with the disease significantly predicted the knowledge level of self-care practices F (1, 189) =4.943. p=0.027 which indicates that duration since diagnosis can play a significant role in shaping the knowledge level of self-care practices (b=.16, p=.027). These results clearly direct the positive effect of duration since diagnosis with T2DM on the knowledge level of self-care practices, moreover, the $R^2$=0.026 depicts that the model explains 2.6% of the variance in the knowledge level of self-care practices.

**Table 4.6: Regression analysis on the relationship between age and duration since diagnosis on knowledge of self-care practices**

| Hypothesis | Regression height | Beta coefficient | $R^2$ | f | p-value | Hypothesis supported |
|---|---|---|---|---|---|---|
| $H_0$ | A → dks | -.180 | 0.032 | 6.279 | 0.01 | No |
| $H_0$ | dsd → dks | .16 | 0.026 | 4.943 | 0.02 | No |

a-Age, dsd-duration since diagnosis, dks-diabetes knowledge score

The chi-square test was used to determine the associations between knowledge of diabetes self-care practices (as assessed by the Spoken Knowledge in Low Literacy in Diabetes Questionnaire (SKILLD)) and demographic characteristics, economic factors, and clinical factors (Table 4.7). Statistically significant associations were found between knowledge of diabetes self-care practices and education level, ($p$ = 0.007), and employment status, ($p$ = 0.011). On the other hand, there were no statistically significant associations between knowledge of diabetes self-care practices and gender, ($p$ =0 .113), marital status, ($p$ = 0.16), and belief that religious faith and herbal medicine would cure diabetes, ($p$ = 0.73).

**Table 4.7: Association between sociodemographic characteristics on knowledge of self-care practices**

| Characteristic | Knowledge level (*percentages*) | | | $\chi^2$ |
|---|---|---|---|---|
| | Low | Moderate | High | |
| **Gender** | | | | **$\chi^2$ (2, N=190) = 4.36, *p* =0.11)** |
| Male | 12.1 | 44.8 | 43.1 | |
| Female | 20.5 | 50.8 | 28.9 | |
| **Marital status** | | | | **$\chi^2$ (6, N=190) = 9.24, *p* = 0.16)** |
| Married | 18.5 | 50.6 | 30.9 | |
| Single | 0 | 42.9 | 57.1 | |
| Divorced | 28.6 | 28.6 | 42.9 | |
| Widowed | 28.6 | 42.9 | 28.6 | |
| Education level | | | | $\chi^2$ (6, N=190) = 17.86, *p* = 0.007) |
| non-formal education | 32.1 | 53.6 | 14.3 | |
| primary school | 20.7 | 50 | 29.3 | |
| secondary school | 11.3 | 49.1 | 39.6 | |
| tertiary school | 0 | 35.3 | 64.7 | |
| **The belief that religious faith and herbal medicine would cure diabetes** | | | | **$\chi^2$ (4, N=190) = 2.01, *p* = 0.733)** |
| Yes | 13.4 | 46.3 | 40.2 | |
| No | 21.3 | 50.9 | 27.8 | |
| Employment status | | | | $\chi^2$ (6, N=190) = 16.66, *p* = 0.01 |
| work at home | 24.4 | 48.8 | 26.8 | |
| Farmer | 17.4 | 58 | 24.6 | |
| business person | 18.8 | 50 | 31.3 | |
| formally employed | 9.4 | 28.1 | 62.5 | |
| **Presence of comorbidities** | | | | **$\chi^2$ (8, N=190) = 12.12, *p* = 0.14** |
| Cardiovascular | 17.2 | 45.5 | 37.4 | |
| visual impairment | 37.5 | 50 | 12.5 | |
| Amputations | 0 | 66.7 | 33.3 | |
| None | 12.3 | 61.4 | 26.3 | |
| more than one condition | 30.4 | 30.4 | 39.1 | |

## 4.6 Association between of person's characteristics and adherence to recommended diabetes self-care practices amongst people living with T2DM

Table 10, Regression analysis was used to test if age carries a significant impact on adherence score of diabetes self-care practices. Age significantly predicted adherence score to self-care practices f (1,189) =4.963, p=0.027 which indicates that the age of a person can play a significant role in shaping the adherence level to self-care practices b=-0.160, p=0.027. These results clearly direct the negative effect of age, moreover, the $R^2$=0.026 depicts that the model explains 2.6% of the variance in adherence score of self-care practices. Duration since diagnosis did not significantly predict the adherence score of self-care practices f (1,189) =0.352, p=.554 which indicates that duration since

diagnosis cannot play a significant role in shaping the adherence score of self-care practices (b=-.043, p=.027).

**Table 4.8: Regression analysis on the relationship between age and duration since diagnosis with adherence to diabetes self-care practices**

| Hypothesis | Regression height | Beta coefficient | $R^2$ | f | p-value | Hypothesis supported |
|---|---|---|---|---|---|---|
| $H_0$ | A → adss | -.16 | 0.026 | 4.963 | .027 | No |
| $H_0$ | dsd → adss | -.043 | 0.002 | 0.352 | .554 | Yes |

A-age, dsd-duration since diagnosis, and adherence to diabetes self-care practices

Chi-square was used to test the association between adherence to recommended diabetes self-care practices, as assessed by the summary of diabetes self-care activities questionnaire (SDSCA) and demographic characteristics, economic factors, and clinical. Statistically significant associations were found between adherence to recommended diabetes self-care practices and education level, ($p$ = 0.02) and, employment status ($p$ = 0.005). On the other hand, there were no statistically significant associations between knowledge of diabetes self-care practices and gender ($p$ = 0.96), marital status, ($p$ = 0.27), and belief that religious faith and herbal medicine would cure diabetes, ($p$ = 0.08). Similarly, there were no associations between the presence of co-morbidities with adherence to recommended diabetes self-care practices showed no statistical significance, ($p$ = 0.59).

**Table 4.9: Influence of person's characteristics on adherence to recommended diabetes self-care practices**

| Characteristic | Adherence to self-care practices (percentages) | | | $X^2$ |
|---|---|---|---|---|
| | Low | Moderate | High | |
| **Gender** | | | | **$\chi^2$ (2, N=190) =** |
| Male | 3.4 | 77.6 | 19.0 | **0.08, *p* = .96** |
| Female | 3.8 | 75.8 | 20.5 | |
| Marital status | | | | $\chi^2$ (6, N=190) = |
| Married | 3.1 | 79 | 17.9 | 7.72, *p* = .27 |
| Single | 7.1 | 57.1 | 35.7 | |
| Divorced | 14.3 | 42.9 | 42.9 | |
| Widowed | 0.0 | 85.7 | 14.3 | |
| Education level | | | | $\chi^2$ (6, N=190) = |
| non-formal education | 7.1 | 82.1 | 10.7 | 15.62, *p* = .02 |
| primary school | 4.3 | 82.6 | 13.0 | |
| secondary school | 0.0 | 67.9 | 32.1 | |
| tertiary school | 5.9 | 58.8 | 35.3 | |
| **The belief that religious faith and herbal medicine would cure diabetes,** | | | | **$\chi^2$ (2, N=190) =** |
| Yes | 4.9 | 68.3 | 26.8 | **5.01, *p* = .08** |
| No | 2.8 | 82.4 | 14.8 | |
| **Employment status** | | | | **$\chi^2$ (1, N=190) =** |
| work at home | 7.3 | 73.2 | 19.5 | **3.83, *p* = .005)** |
| Farmer | 2.9 | 82.6 | 14.5 | |
| business person | 4.2 | 77.1 | 18.8 | |
| formally employed | 0.0 | 65.6 | 34.4 | |
| **Presence of diabetes comorbidities,** | | | | **$\chi^2$ (8, N=190) =** |
| Cardiovascular | 4.0 | 79.8 | 16.2 | **8.41, *p* = .39** |
| visual impairment | 12.5 | 62.5 | 25.0 | |
| Amputations | 0 | 33.3 | 66.7 | |
| None | 3.5 | 77.2 | 19.3 | |
| More than one condition | 0.0 | 69.6 | 30.4 | |

## 4.7 Correlation between knowledge of diabetes self-care practices, social support status, and adherence to self-care practices

As indicated in Table 11, Pearson correlation analysis results indicated that the relationship between the level of adherence to diabetes self-care practices and knowledge

of diabetes self-care practices was positive, weak in strength, and statistically significant r (188) =0.37, p=0.0001. On the other hand, the correlation between the level of adherence to diabetes self-care practices and the patient's level of social support score was negative, weak in strength, and not statistically significant r (188) =-0.004, p=.96.

**Table 4.10: Relationship between knowledge of diabetes self-care practices level, social support status, and adherence to self-care practices**

| Correlations | knowledge level of the patient | patients' level of adherence | Social support |
|---|---|---|---|
| knowledge level of the patient | 1 | | |
| Patient's level of adherence | .367** | 1 | |
| Social support | | -.004 | 1 |

*Note*. **. Correlation is significant at the 0.01 level (2-tailed).

## 4.8 Discussion

### 4.8.1 The social demographic characteristics

According to Kenya National Diabetes Educators Manual (2015), type 2 diabetes occurs most often in middle-aged and older people who are above 45 years old (MOH, 2015). This explains this study's results where more than half of the study population was more than 50 years old. However, the results were different from a study conducted at Kenyatta National Hospital where a majority of the study respondents were aged between the age of 18 and 50 years (Mlale, 2016). The difference would have been a result of the differences in the location of the two hospitals since a majority of the patients visiting Thika Level 5 Hospital come from neighboring rural areas characterized by an aged population as opposed to Kenyatta National Hospital diabetic clinic which is located in an urban environment characterized by a young population.

The study also found that females formed the majority of the study population (70%). This conforms to the postulation that female has better health-seeking behavior as compared to males (Choo, *et al.,* 2015).

### 4.8.2 Knowledge level of diabetes self-care practices

The participants were relatively knowledgeable with about three-quarters (77%) having scored 50% and above in each of the measurable knowledge aspects. Moreover, the mean score of the overall knowledge score on diabetes self-care practices was 55.14% with a standard deviation of 3.4. The findings conform with results from other studies conducted in Ethiopia, Iran, India, and Nigeria which revealed that the majority of the respondents had a moderate level of knowledge of diabetes self-care practices respectively (Abebe, *et al.*, 2012), (Amiri, *et al.*, 2016), (Eunyoung & Suh, 2018), (Sabo, Moh'd, & Emenike, 2019). However, according to Zowgar et al., knowledge of diabetes among people living with T2DM is better than what was documented in this study in many developed nations, (Zowgar, Siddiqui, & Alattas, 2018).

More than three-quarters of the patients demonstrated a moderate level of knowledge of what a person living with T2DM should eat and avoid eating. The results were similar to those of two similar studies done by Lamis and others (2015) and Olatona and others (Lamis, et al., 2015), (Olatona, Airede, & Aderibigbe, 2019).

More than half (63%) of the respondents had knowledge of long-term complications associated with uncontrolled T2DM. Similar studies conducted by Nyamu et al. in 2017 in Kenya found similar findings with 61% of the study respondents reporting having adequate knowledge of diabetes-related complications (Nyamu, et al., 2017). A similar study conducted in Nigeria reported good knowledge of clinical manifestations and complications of diabetes among the participants (Iloh & Collins, 2017). Contrary results were however reported in a similar study which reported that there was inadequate

(54.1%) knowledge of T2DM-associated complications among individuals living with T2DM (Afaya, Bam, & Azongo, 2020).

Foot care techniques were well known by a majority of the patients (67%) and almost three-quarters (68%) of the participants were aware of the importance of foot care for a patient with T2DM. Similar results were witnessed in similar studies conducted in India and North China (Missiriya, 2016), (Huimin, Xiaocheng, & Jingmin, 2022), (Li, Guo, Lou, Fang, & Shen, 2014). However, in Kenya, different research findings were reported from two studies which reported that the level of knowledge on T2DM foot care among the participants was low (Muoki, 2017), (Kones, 2016). In the current study, the highest proportion of people had lived with the disease for more than 11 years (Table 4.2) which could explain the higher level of knowledge on foot care as living with the disease for a longer time has been known to positively influence the knowledge level of diabetes self-care practices (Kones, 2016).

The majority of people living with diabetes particularly those from low and middle-income countries tend to go to eye care services only when the eye condition becomes sight-threatening or when there is a sudden deterioration of vision (IDF, 2019). In the current study, only 56.3% of the population was aware that a patient living with T2DM should have an eye checkup at least once a year. Similar results were reported in studies done in Asian countries which revealed that the knowledge of the use of eye care services among people living with diabetes was low (Wang, Ding, & He, 2010). In Africa, despite the high prevalence of diabetic retinopathy, a study done in Ethiopia reported that the knowledge of the use of eye care services among people living with diabetes was low (Vela, Samson, & Zunzunegui, 2012). Furthermore, a study conducted in Kenya reported that the proportion of people with knowledge of eye care was also low (Mwangi, Macleod, & Gichuhi, 2017). On the other hand, Studies done in first-world countries such as the United States of America, Europe, and Turkey showed that the proportion of the knowledge on use of eye care services for people with diabetes ranged from 30 to 91.3% (Ehrlich, Ndukwe, & Solway, 2019).

Knowledge deficits were apparent in hypoglycemia signs and symptoms as more than half (53.2%) did not know the signs and symptoms of hypoglycemia. This imposes a significant challenge as 25.8% and 17.9% of the study participants were on insulin and insulin and oral antidiabetic agents treatments respectively (Table 4.5) which puts them at more risk of hypoglycemia and death if they would not correctly, timely, identified and managed hypoglycemia (Chali, Salih, & Abate, 2018) . Omari et al., (2020) also found similar results where a significant proportion of patients gave non-specific signs and symptoms of hypoglycemia (Omari, et al., 2020). Lack of emphasis on the signs and symptoms of both hypoglycemia and hyperglycemia could have been the cause of the lack of distinction between the two complications of diabetes (Atak, 2015).

A significant knowledge deficit was also observed in the blood sugar monitoring as more than half (62.6%) of the population had limited knowledge of the frequency of blood sugar testing. Self-glucose monitoring among people living with T2DM is vital as it enables them to determine whether their glycemic goals have been attained as well as monitor their response to the various therapies used in the treatment and management of diabetes (Mukeshimana, *et al*., 2015). A cross-sectional, community-based study conducted in India found that 24.1% of patients possessed adequate knowledge of self-blood glucose monitoring whereas 75.8% of patients were not aware and not following the steps of self-monitoring properly (Krishnan & Thirunavukkarasu, 2016). However, a study conducted in Pakistan indicated that seventy (70%) study participants had average knowledge regarding blood glucose monitoring (Karad, et al., 2019).

HbA1c is a significant indicator of long-term glycemic control with the ability to show the cumulative glycemic history of the preceding two to three months. The test not only provides a reliable measure of chronic hyperglycemia but also correlates well with the risk of long-term diabetes complications (Ekhzaimy, *et al*., 2016). Knowledge of targets of the HBA1c test was determined and only 22.6% were aware of the targets. The current study results agree with those of two studies done by Idongeist et al. and Bowen et al. that indicated that, although the knowledge level of self-care was high, knowledge of specific

aspects such as glycosylated hemoglobin (HbA1c) performed relatively poorly (Idongesit, Adibe, Okonta, & Chinwe, 2014), (Bowen, et al., 2016) .

### 4.8.3 Self-care practices as assessed by The Summary of Diabetes Self-Care Activities Questionnaire (SDSCA)

The study indicated a low adherence to the recommended self-care practices among people living with T2DM. The results hence indicate that there are few respondents comforted with the recommended diabetes guidelines on self-care practices by people living with T2DM proposed by the International Diabetes Federation (IDF, 2004) .

The current results however agree with the results from similar studies in Kenya, which reported poor practice of self-care practices among people living with T2DM, (Maina et al., 2010) ; (Lugaya et al., 2017); & (Ndirangu, 2019), (Mlale, 2016). Different results were however found in other studies for instance 39.2% of the study population had high self-care behavior in a study in Ethiopia (Ayele, *et al.*, 2012). The study results show that adherence to diabetes self-care practices is still suboptimal and there is still a mile ahead to go in as much as adherence to diabetes self-care practices is concerned.

Adherence to recommended meal plans/dietary schemes and being physically active can keep blood glucose levels, blood pressure, and cholesterol levels within optimum ranges. It has been established that non-adherence to recommend diet would lead to life-threatening complications in individuals with diabetes (Tirfie, et al., 2020).In this study, a high proportion (77.4%) of the study population displayed adequate knowledge of diet therapy. However, only 35.8% of the study population followed a specific diet plan. Similar results were reported in similar studies done in Ethiopia, India, and Botswana, (Mohammed & Sharew, 2019), (Parajuli, et al., 2014) (Adewale, et al., 2013), (Alhaik, et al., 2019).

Sensory neuropathy results in a reduction of sensation making the foot more prone to trauma which leads to skin breakdown and foot ulcer formation (Acharya, *et al.*, 2020).

However, these complications can be curbed in a diabetic foot with proper preventive measures and prophylaxis care which includes timely screening, patient education, and treatment (Rosenbaum, et al., 2013). This study found only 27.9% of the study population checked their feet at least once a day in the previous week. In addition, 32.6 % of the respondents did not ware flat closed shoes in the previous week. Comparable results were reported from retrospective research by Desalu and others who found that only 10.2% engaged themselves in good foot care practices while 68.8% were ignorant of what to do when they noticed any unusual occurrence between their toes and less than half of the study participants consistently inspected their feet (Desalu, e*t al*.,2011). Similar results were reported by Kones (2016) where foot self-care behavior was at a poor level overall, especially when it comes to performing daily foot-checking and shoe-checking before wearing shoes (Kones, 2016).

Studies have established that regular physical exercise is effective not only in improving glycemia by promoting insulin secretion and lowering insulin resistance but also in reducing the risk of cardiovascular disease and obesity in patients with Type 2 Diabetes (Han, et al., 2019). A large number of randomized controlled trials have demonstrated that exercise can help regulate the glycolipid metabolism disorder in people living with T2DM effectively, which is advantageous to better control the progression of diabetes (Thent, Das, & Henry, 2013).

In the current study, only 67.4% of the study participants had at least 30 minutes of daily physical exercise the previous week. Similar results were reported from a comparative study which indicated that 54.8% of the study population had at least 30 minutes of physical activity daily (Formosa, 2016). The study results however are different from study findings from two similar research studies which reported a very low (7.3%) level of adherence to the recommended physical exercises (Monnier, *et al.,* 2016), (Mukeshimana, et al., 2015).

Patient self-glucose monitoring may help with self-management and medication adjustment, particularly in individuals taking insulin. Also, it has an important role in monitoring the effectiveness and safety of treatment in many persons living with T2DM especially those on intensive insulin regimens (IDF, 2017). From our study results, it was evident that self-monitoring of blood sugar levels among the respondents was poor. In fact, more than half of the respondents (62.6%) did not monitor their blood sugar levels even once in the previous week. This would have been a result of a lack of a glucometer machine as only 32.6% had a glucometer at home. Others depended on nearby health centers for glucose monitoring which is a bit expensive. ADA (2013) in a similar study reported that only 24.1% of the study population occasionally (once or less a month) monitored their sugar levels to adjust their diets. However, a study done in France indicated otherwise as 27.7% were found to monitor sugar levels once or twice a day to test dietary assessment while 36.2% tested thrice or more times a day (Mukeshimana, *et al.,* 2015). The disparity would have been because of variations in the social-economic status of the study populations.

This study established that overall awareness of self-care practices was moderate, but a majority of the study participants failed to follow the recommended self-care practices. Likewise, Katajisto and others indicated that although knowledge is a significant contributing factor to behavior change, it is not sufficient on its own to enact behavior change (Katajisto, *et al.,* 2019). It is therefore important to note that not only are improvements needed regarding patients' awareness and availability of diabetes education classes in diabetes clinics, but also educational sessions should change to improve their effectiveness, sustainability, and scalability (Klein, Jackson, & Street, 2013).

Studies have demonstrated that integrating theories of behavior change into educational interventions, including psychosocial concepts such as patient-centered care, self-efficacy, and empowerment, may assist in strengthening the relationship between diabetes education and self-care management and practices (Hai, *et al*., 2019).

### 4.8.4 Associations between knowledge of diabetes self-care practices and demographic characteristics, economic factors, and clinical factors

Regression test results reported that duration since diagnosis with the disease significantly predicted the knowledge level of self-care practices F (1, 189) =4.943. p=0.027. This study's findings were supported by similar results from similar studies which indicated that duration since diagnosis with diabetes was statistically associated with self-care knowledge of diabetes, (Al-Qazaz, et al., 2011) (Abdo & Mohamed, 2010) and (Idongesit, Adibe, Okonta, & Chinwe, 2014).

A bivariate regression analysis between knowledge of diabetes self-care practices and age significantly predicted knowledge level of self-care practices where a negative effect of age on knowledge level was reported. Similar results were indicated in similar studies which reported a significant association between age and knowledge on diabetes self-care practices, (Gesare, 2016), (Formosa & Muscat, 2016) and (Corriere, Rooparinesingh, & Kalyani, 2013).

Young people tend to have more knowledge of self-care practices, good cognitive function, are more likely to retain what they were taught, and fewer hindering factors to effective self-care practices compared to their old counterparts (Adibe, et al., 2009). Therefore, this means that older people are at a higher risk of having very limited knowledge of diabetes self-care practices than young people it is hence important to improve the knowledge of people living with T2DM with a special focus on the aged patients

Knowledge of diabetes self-care practices seemed to increase with the level of education ($p$ = <0.01) where patients with a tertiary level of education were more knowledgeable than their counterparts. Similarly, employment status showed a statistically significant association with the level of knowledge of diabetes self-care practices where respondents were formally employed and were more knowledgeable than those who were not formally

employed (p = 0.011). Consistent findings were reported in similar studies where both educational status and employment status shaped the knowledge level of diabetes self-care practices, (Eshetie, et al., 2016), (Glasgow, et al., 2001) and (Formosa, 2016). This was expected as knowledge is attained through education and formally employed individuals have been found to have a higher educational status which has been found to translate to more increased knowledge of diabetes self-care practices.

### 4.8.4 Associations between social-demographic, economic, and clinical factors influencing adherence to diabetic self-management practices

Poor self-care has been associated with poor glycemic control among the majority of people living with T2DM, which leads to multiple complications, co-morbidities, and death (Foss, et al., 2016). Effective diabetes management should have a patient-centered model that puts the patient and their household members at the center of care in partnership with the health care professionals (Debrah, Godfrey, & Ritah, 2020).

Age significantly predicted adherence score to self-care practices f (1,189) =4.963, p=0.027 where adherence seemed to decrease with age b=-0.160, p=0.027. Young people tend to put into action knowledge of the recommended diabetes self-care practices, have a good cognitive function, are more likely to retain what they were taught, and have fewer hindering factors to effective self-care practices than their old counterparts (Adibe, *et al*., 2009). Similar results were indicated in a study done in Kenya where middle-aged patients were seen to adhere to self-care practices including regular medical checkups (Gesare,2016). This puts old people living with diabetes at a higher risk of diabetes comorbidities as diabetes-related complications such as peripheral vascular disease, heart disease, and stroke have been found to be prevalent among older adults with diabetes (Corriere, Rooparinesingh, & Kalyani, 2013).

Respondents with low education status have been reported to have low self-management behavior, low self-efficacy, and low continuity of care (Amiri, *et al*., 2016). This study

recorded similar findings since there was strong evidence indicating that the level of adherence to diabetes self-care practices increased with a rise in educational level ($p$ = 0.01). It is therefore important to note that measures to improve literacy levels would be cost-effective to reduce diabetic morbidity and mortality (Aryal, *et al.*, 2015).

Employment status reported a statistically significant association with level adherence to self-care practices (p=0.005). This could be related to the level of education as it was obvious that the majority of individuals formally employed had higher educational levels as compared to farmers and housewives. Furthermore, low socioeconomic status is associated with limited access to education, information, and transportation, which are necessary drivers to required necessary services including medications (Mayberry & Osborn, 2012). Respondents with lower education status have been reported to have low self-management behavior, lower self-efficacy, and lower continuity of care (Ghannadi, et al., 2016). These findings were consistent with other studies from United Arab Emirates (UAE) and Bangladesh (Islam, et al., 2015), (Guatam, Bhatta, & Aryal, 2015). It is therefore important for health workers to restructure their health education message to suit the unique needs of each individual.

These study findings stimulate discourse about what is critical to improving self-care practices in this high-risk population. It is hence important to not only advocate for improvements regarding patient awareness and availability of diabetes education classes in diabetic clinics but also to emphasize that educational sessions should also undergo changes to improve their scalability, effectiveness, and sustainability translating to better behavioral and health outcomes among the older population.

### 4.8.5 Association between knowledge level and Proficiency in self-care practices

The ability to retain the knowledge and apply it to a real-life situation is reported to improve behavioral change among patients (Grant, 2016) . Even though knowledge alone is insufficient to bring about the behavior changes essential for sufficient self-

management in patients living with diabetes, studies have shown that intensive diabetes education and care management can improve patient outcomes, glycemic control, and the quality of life of the patient (Formosa, 2016) . These findings were confirmed in our study as a weak positive correlation between knowledge level of diabetes self-care practices and adherence indicated that an increase in knowledge raised the level of adherence to diabetes self-care practices.

# CHAPTER FIVE

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## 5.1 Conclusions

The first objective was to determine the level of knowledge on self-care practices and the level of adherence to self-care practices among people living with T2DM at Thika Level 5 Hospital. From our findings, the majority of the respondents had a moderate level of knowledge of diabetes self-care. Knowledge deficit was evident in, awareness of hypoglycemia signs and symptoms, frequency of blood sugar tests, the normal levels for fasting blood sugar levels, and awareness of the existence of HbAIc tests. Under the same objective, it was also concluded that the level of adherence of the majority of the respondents was moderate. Areas that showed a low level of proficiency included, adherence to a diabetic diet plan, foot care, and blood glucose monitoring.

The second objective assessed the influence of social-demographic, social-cultural, economic, and clinical factors on the level of knowledge of diabetes self-care practices among people living with T2DM at Thika Level 5 Hospital.

The research also concluded that the factors that were significantly associated with the level of knowledge of diabetes self-care practices among people living with T2DM included, the duration since diagnosis, the age of the patient, the education level, and the employment status of the patient. Factors that did not show any static significance with the knowledge level of diabetes self-care practices included, gender, marital status, cultural and religious beliefs, and presence of comorbidities.

The third objective determined the influence of social-demographic, social-cultural, economic, and clinical factors on adherence to recommended diabetes self-care practices among people living with T2DM at the Thika Level 5 Hospital. According to the results of the statistical test done on the variables, it was concluded that the age of the persons

living with diabetes type 2, their educational level, and their employment status influenced their level of adherence to diabetes self-care practices. Factors that barely influenced the level of adherence to diabetes self-care practices included gender, marital status, cultural and religious beliefs, the duration they had lived with the disease, and the presence of comorbidities.

The fourth objective established the relationship between knowledge of self-care and the level of adherence to self-care-practice among people living with T2DM at Thika Level 5 Hospital. It was concluded that even though the majority of the respondents had a moderate level of awareness of diabetes self-care practices, this failed to lead to full adherence to self-care practices for diabetes self-care since there was a weak positive correlation between knowledge levels of diabetes self-care practices.

From the study findings, we can conclude that the management of diabetes requires a comprehensive approach where patients should be enriched by all stakeholders with knowledge, training, motivation, and support.

### 5.2 Recommendations

Based on the findings, we would recommend that the patients equip themselves with adequate knowledge and skills that would help them make informed choices while practicing self-care. This would include making an effort to enrich themselves often with knowledge and skills from reliable sources. This may improve their knowledge level as reinforcement of self-care practices from the health care providers would enhance their knowledge retention and practice of the acquired knowledge.

From the findings under objective two and objective three which showed the influence of some individual characteristics on both knowledge level and adherence to diabetes self-care practices, we would suggest that the patients should make an effort to understand their individual unique needs. This would enable them to prioritize the areas that they need improvement. This would include acquiring knowledge from sources that meets

their unique individual needs such as from qualified healthcare professionals which would decrease confusion and doubt on the right knowledge and practice of self-care.

The knowledge of diabetes self-care practices did not have a strong correlation with adherence to diabetes self-care practices. We would recommend that the patients should own up self-care. This could be achieved by the patients learning through a patient-centered model where they are left to learn, acquire knowledge on a self-paced approach, and also be left to apply the acquired knowledge into practice on their own. This would be best achieved by the patients equipping themselves with adequate knowledge and skills that would help them make informed choices while practicing self-care. We would also recommend that healthcare providers apply a patient-centered biopsychosocial model of care as it has been proven to be effective while offering a pedagogical approach to education to the patients. This includes meeting the needs of the patients at the patient level by dealing with and handling the patient's unique needs individually and not as a group.

In addition, more research is warranted to explore patients' perceptions and attitudes toward the effectiveness of their self-care management so that resources for diabetes education can be tailored according to patient's needs.

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# APPENDICES

## Appendix I: Work Plan

| Activity | Inputs | Time Frame | Responsible Person | Anticipated Outputs | Progress Reporting |
|---|---|---|---|---|---|
| Development of the proposal | Researcher | Jan-May 2019 | Researcher | Developed proposal | completed |
| Application of JKUAT ethical Approval | Application letter to ethical review team | June-Oct 2019 | Researcher | Ethical Approval from JKUAT ethical review | Completed |
| Application of NACOSTI research License | Application letter to NACOTI | Oct-Nov 2019 | Researcher | Research License | Completed |
| Data collection | Researcher, research assistants, questionnaires, Stationery | Dec-Jan 2019 | Researcher Research assistants | Well collected data | Completed |
| Data analysis | Researcher, SPSS software | Feb-April 2020 | Researcher | Conversion of data into meaningful form | Completed |
| Results Interpretation | Researcher | May-June 2020 | Researcher | Graphs, frequency Tables, pie charts | Completed |
| Formulation discussions conclusions and recommendations | Researcher | July-Oct 2020 | Researcher& academic supervisors | Conclusions recommendations | Completed |
| Manuscript development and publication | Researcher | Oct-Dec 2020 | Researcher & academic supervisors | Publication | Completed |
| Thesis development | Researcher | Feb-2021-Dec 2021 | Researcher& academic supervisors | Complete thesis | Completed |
| Thesis submission | Letter for intent to submit thesis | Jan-July 2022 | Researcher | Letter of Approval to submit thesis | Completed |
| Defense and graduation. | Approved thesis Presentation/thesis defense | June-Nov 2023 | Researcher | Final bonded hard copies of thesis | Completed |

**Appendix II: Budget**

| Items | Units | Rate/ unit | Total (Ksh) |
|---|---|---|---|
| **Personnel** | | | |
| Research assistant | 6 | 22,400 | 152,400 |
| Supervisor | 1 | 25,400 | 25,400 |
| **Transport** | | | |
| Research assistant | 1 | 3,000 | 3,000 |
| Researcher | 6 | 3,000 | 18,000 |
| **Materials, services & Expendables** | | | |
| Questionnaire | 250 | 20 | 5,000 |
| Pens | 20 | 20 | 400 |
| Training | 10 | 2000 | 20,000 |
| Overhead costs | | | 204,200 |
| Contingencies | | | 20,000 |
| **Total** | | | **224,200** |

**Appendix III: Questionnaire**

| | |
|---|---|
| Form serial number | |
| **Date** | |

**Part one: social demographic characteristics**

**1.** How old are you?

2. What is your gender?

M F

**3.** Tick your education level? (tick the appropriate answer)

Non- formal education

Primary school

Secondary school

Tertiary level

4. What is your place of worship?

| | |
|---|---|
| Mosque | |
| Church | |
| Temple | |
| Any other –specify | |

5. What is your marital status?

| | |
|---|---|
| Married | |
| Single | |
| Divorced | |

| | |
|---|---|
| Widowed | |

**Section two: clinical characteristics**

a) What is the duration since you were diagnosed with diabetes?

| | |
|---|---|
| 0-2 years | |
| 3-5 years | |
| 6-8 years | |
| 9-11 years | |
| More than 11 years | |

b) What other condition are you suffering from apart from diabetes

| | |
|---|---|
| cardiovascular diseases | |
| visual impairment | |
| Amputations | |
| Kidney diseases | |

| | |
|---|---|
| Insulin injection only | |
| Diabetic pills | |
| Both insulin and diabetic pills | |

| | |
|---|---|
| From income/pension | |
| Diet only | |
| From friends and family support | |
| | |
| From saved money | |
| By selling property, such as furniture and animals | |

c) Are you currently receiving any of the following treatment of advice prescribes by a health care professional. Tick where appropriate

**Part 3: cultural and socioeconomic and factors**

a) Do you believe herbalists or witchdoctors can cure diabetes?

| | |
|---|---|
| Yes | |
| No | |
| I don't know | |

b) Your employment status? Tick where appropriate

| | |
|---|---|
| I work at home (house wife) | |
| I am a farmer | |
| Self-employed (business person ) | |
| Formally employed | |

a) How have you been paying for medical services?

a) Does someone from your family take care of you because of your ill health without being paid for it?

| | |
|---|---|
| Yes | |
| No | |

**Part 4. Social support questions**

Do you have someone else to:

| Activity | Yes | No |
|---|---|---|
| Cook meals for you that fit your meal plan | | |
| Help you test your blood glucose an keep track of the testing results | | |
| Help out when you give yourself shots and remind you when to take the shots | | |
| Exercises with you and reminds you to exercise | | |
| Available to listen to your concerns and worries about your diabetes care | | |
| Help you out to manage hypoglycemia | | |
| Helps me take care of my feet | | |

**Part 5: Spoken Knowledge in Low Literacy Patients with diabetes scale/ Knowledge on Recommended Self-Care practices**.

1. What did your health care giver advice you on diet?

   Have adequate knowledge

   Have inadequate knowledge

   Have no knowledge

2. **Do you believe you are t**he most important member of the health care team to help manage your blood glucose levels?

   Yes

   No

If No why?

I have control of my actions

I don't know what to do

3. How do you feel when your blood sugar is higher than normal? Needs at least 2

   *(Polyuria, polydipsia, polyphagia, blurred vison, drowsiness and fatigue)*

4. How do you feel when blood sugar is low? Need at least 2

   *(Hunger, nervousness, mood swings, irritability, confusion, sweaty, fast heart rate)*

5. What should you do if your sugar is too low?

   Have knowledge

   Do not have knowledge

   *(Accept any general answer that involves raising of blood glucose level)*

6. Can diabetes cause loss of feeling in your hands, fingers and feet?

   Yes

   No

7. How often should a person with diabetes check his or her feet?

   Once a day

   Once a week

   Once a month

   *(Accept daily)*

8. Why is feet examinations important for a person with diabetes?

*(Accept very general answer –prevention of morbidity, immunological consequences of diabetes)*

9. Why is it important to protect your feet?

   Have knowledge

   Have no knowledge

   *(Cuts and wounds on person suffering diabetes heal more slowly)*

10. How often should you see your eye doctor and why is it important?

    *Seen at least yearly –manage retinopathy, blindness*

11. How many times did your health care giver recommend you to test your blood sugar levels?

    Once per week

    Once per month

    Occasionally

12. Why is self- monitoring of glucose important?

    Have knowledge

    Do not have knowledge

    (*Enables me to monitor and react to changes in my blood glucose levels; it allows me to integrate my diabetes into the life style I want to live.)*

13. What is the normal random blood sugar? /when you wake up in the morning, before you eat anything or taken your medicine what should it be?

-range ( )

-I don't know ( )

*Accept the range between 3.8-6.6 moll/l*

14. What is the normal fasting blood sugar? /when you wake up in the morning, before you eat anything or taken your medicine what should it be?
15. What is the normal HBAIc or average blood sugar test?

    I don't know ( )

    Range ( )

    *Accept either 6% or below 7%*

16. How many time per week should a person with diabetes exercise and for how long?/ How many time per week and for how long?

    Answer ( )

    I don't know ( )
17. What are some of long term complications of uncontrolled diabetes? Needs at least two

    *Blurred vision, blindness, amputations, kidney disease, impotence, cardiovascular diseases.*

**Part 6: Compliance to the recommended self-care practices**

**Diet:**

1. Dou you have an eating plan?

   Yes

   No

2. If Yes how many days in the past seven days have you followed you're eating plan?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. Which of the last seven days did you eat fat rich food such as red meat and full dairy products?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

4. Which of the last seven days did you eat at least 5 servings of vegetables?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Medications:**

1. Which of the past days did you forget your insulin shots?

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. Which of the past 7 days did you take your recommended diabetic pills?

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Foot Care:**

1. On which of the last SEVEN DAYS did you check your feet?

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. On which of the last SEVEN DAYS did you wear flat closed shoes?

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. On which of the past 7 days did you dry between your toes after washing?

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Smoking**

1. Do you smoke?

| | |
|---|---|
| Yes | No |

**Exercise**

1. On which of the last seven days did you have at least 30 minutes continuous physical activity including walking?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. On which of the last 7 days did you participate in a specific exercise session other than what you do as part of your work?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**3. If you don't exercise, what prevents you from exercising?**

| |
|---|
| I don't have time |

| |
|---|
| 2 I don’t have money to go to the gym |
| 3 My family/ society does not encourage me to exercise |
| 4 I don’t know which exercises to do |
| 5 I exercise |
| 6 I fear exercising |
| 7 I have a medical condition that prevents me |

**Blood glucose monitoring:**

1. Do you have a blood glucometer?

| | |
|---|---|
| Yes | |
| No | |

2. If not tick the appropriate place where do you normally check your blood glucose levels?

| | |
|---|---|
| Hospital | |
| Pharmacy | |
| Other(specify) | |

3. Which of the last seven days did you check your blood sugar levels?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Point morisky adherence scale**

1. Dou you ever forget to take your diabetic pills?

   Yes

   No
2. Do you have problems remembering to use your insulin?

Yes

No

3. When you feel better, do you sometimes stop injecting yourself with insulin or oral diabetic pills?

   Yes

   No

4. What action do you take when you experience the following: nervous, suddenly feel shaky or hungry?

| | |
|---|---|
| I don't know what to do | |
| I rest | |
| I eat any form of sugar | |
| I take more insulin or diabetic pills | |
| Other (specify) | |

**Appendix IV: Consent form**

My name is Eunice Gathoni Masters Student in Food Science and Nutrition from JKUAT. You are invited to take part in research about knowledge and self-care practices among people living Type 2 diabetes mellitus. You are a potential participant because you are a patient attending the Diabetic clinic at Thika Level 5 Hospital. I kindly ask that you read this form before agreeing to be in the research. If you cannot read, you can request the researcher or a member of hospital staff to read it to you.

**Purpose**

The purpose of the research is to assess your level of awareness of diabetes self-care, self-care practices, socioeconomic and cultural factors that affect your diabetes management.

**Procedures**

If you agree to be in this research, and sign this consent form, I or my assistant will describe the questions you will be asked including their purpose. The questions should take only 20 - 30 minutes of your time.

**Risks and Benefits**

There are no direct benefits to you of the study. The risk level of this research is considered to be less than minimal.

**Confidentiality** The records of this study will be kept private. Anything you tell us will remain confidential. In any sort of report of the study, we will not include any information that will make it possible to identify you. We are not asking for your name, address, or phone number. Your name and other identifying information will not be kept with this survey. The surveys will be kept in a locked file; only the researchers for this study will have access to the records.

**Voluntary nature of study**

Your decision whether or not to participate will not prejudice your future relations with Thika Level 5 Hospital, Kenya Medical Research Institute, Jomo Kenyatta University of Agriculture and Technology and staff helping with this study. If you do not wish to take part or you do not want to answer some of the questions, you do not have to give us a reason. Even if you sign the consent form, you are free to stop at any time. You do not need to complete it if you feel uncomfortable doing it.

**Consent**

I have read the above information and understand that this survey is voluntary and I may stop at any time. I consent to participate in the study. _____ Signature of participant Date _____ Signature of researcher/ research assistant Date

Thank you for your time.

## Appendix V: Ethical Review from JKUAT review committee

**JOMO KENYATTA UNIVERSITY**
**OF**
**AGRICULTURE AND TECHNOLOGY**
P. O. Box 62000-00200 Nairobi, Kenya Tel 0675870225 OR Extn 3209
Institutional Ethics Review Committee

October 4th, 2019 **REF: JKU/2/4/896B**

Eunice Gathoni,
AGF-321-1180/2018,
School of Food Science and Nutrition.

Dear Ms. Gathoni,

**RE: KNOWLEDGE AND SELF-CARE PRACTICES AMONG TYPE 2 DIABETIC PATIENTS-A CASE STUDY OF THIKA LEVEL 5 HOSPITAL, KENYA**

The JKUAT Institutional Ethics Review Committee has reviewed your responses to issues raised regarding your application to conduct the above mentioned study with you as the Principal Investigator.

The is to inform you that the IERC has approved your protocol. The approval period is from October 4th 2019 to October 4th 2020 and is subject to compliance with the following requirements:

a) Only approved documents (informed consent, study instruments, study protocol, etc.) will be used.
b) All changes (amendments, deviations, violations, etc.) must be submitted for review and approval by the JKUAT IERC before implementation.
c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the IERC immediately.
d) Any changes, anticipated or otherwise that may increase the risks to or affect the welfare of study participants and others or affect the integrity of the study must be reported immediately.
e) Should you require an extension of the approval period, kindly submit a request for extension 60 days prior to the expiry of the current approval period and attach supporting documentation.
f) Clearance for export of data or specimens must be obtained from the JKUAT IERC as well as the relevant government agencies for each consignment for export.
g) The IERC requires a copy of the final report for record to reduce chances for duplication of similar studies.

Should you require clarification, kindly contact the JKUAT IERC Secretariat.

Yours Sincerely,

**Dr. Patrick Mbindyo**
**SECRETARY, IERC**

INSTITUTIONAL ETHICS REVIEW COMMITTEE
04 OCT 2019
APPROVED
P.O. Box 62000-00200 NAIROBI
www.jkuat.ac.ke

## Appendix VI: NACOSTI research License

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 355678

Date of Issue: 26/November/2019

RESEARCH LICENSE

This is to Certify that Ms.. EUNICE WAMUCII of Jomo Kenyatta University of Agriculture and Technology, has been licensed to conduct research in Kiambu on the topic: KNOWLEDGE AND SELF-CARE PRACTICES AMONG TYPE 2 DIABETIC PATIENTS-A CASE STUDY OF THIKA LEVEL 5 HOSPITAL, KENYA for the period ending : 26/November/2020.

License No: NACOSTI/P/19/2056

355678

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

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