SELF-MANAGEMENT PRACTICES AMONG CHILDREN PRESENTING WITH TYPE 1 DIABETES ATTENDING SELECTED HEALTH FACILITIES IN NAIROBI CITY COUNTY, KENYA

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DECLARATION

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

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DEDICATION

I dedicate this work to my beloved family for the moral and financial support.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

ADA - American Diabetes Association

CDiC - Changing Diabetes in Children

CVD - cardiovascular diseases

DCCT - Diabetes Control and Complications Trials

DM - Diabetes Mellitus

DMI - Diabetes Management and Information Centre

GDM - Gestational Diabetes Mellitus

GFR - Glomerular Filtration Rate

HbA1c - Glycated Haemoglobin

IDF - International Diabetes Federation

IFG - Impaired Fasting Glucose

IGT - Impaired Glucose Tolerance

ISPAD - International Society for Pediatric and Adolescent Diabetes

KUERC - Kenyatta University Ethic Review Committee

MODY - Maturity Onset Diabetes in the Young

NCDs - Non-Communicable Diseases

OGTT - Oral glucose tolerance test

PETCA - Paediatric Endocrine and Diabetes Centre in Africa

SMBG - Self Monitoring of Blood Glucose

SPSS - Statistical Package for Social Sciences

T1D - Type 1 Diabetes

T2D - Type 2 Diabetes

WHO - World Health Organization

OPERATIONAL DEFINITION OF TERMS

Adherence: The magnitude in which an individual conforms with agreed recommendations on medical or health advice (WHO,2003).

Adolescence: The period of transition and maturation between childhood and adulthood often spanning from 10-19 years of age (WHO).

Adolescent: Any person between the ages of 10 and 19 years of life (WHO).

Child: Any human being under the age of 18 years (UNconvention,1989).

Clinic: A schedule of appointments normally held on a regular basis at health facilities (IMCI Guidelines, MOH.Kenya,2016).

Diabetes mellitus: A long-term medical disorder caused by inadequate from production of insulin by the pancreas, or by the ineffectiveness the insulin produced (Medical Dictionary).

Glycated Haemoglobin: Haemoglobin to which glucose is bound (WHO,2011).

Insulin: A hormone generated in the pancreas which enables glucose absorption into the body's cells for transformation into the energy essential for muscle and tissue functionality (Medical Dictionary).

Pancreas: A gland organ located beneath the lower part of the stomach responsible to produce insulin (Medical Dictionary).

Primary caregiver: The person or persons who hold primary responsibility for the daily care, protection and supervision of a child (UNICEF,2022).

Self-management: The dynamic relationship between health practices and associated practices that patients and caregivers engage in to effectively manage a chronic illness.

ABSTRACT

Diabetes is a prevalent non-communicable disease (NCD) with a significant burden in low and middle-income Countries (LMICs). Diabetes is rising globally, with an estimated 589 million individuals having diabetes in 2024 and 853 million by 2050. In sub-Saharan Africa, 25 million adults have been diagnosed with diabetes, with a prevalence rate of 4.2%. Approximately 813,300 adults in Kenya currently suffer from diabetes with projections of 1.8 million increase by 2050. Estimates suggest that 9,500 children in Africa and 5,575 in Kenya have type 1 diabetes. Most children with T1D in the region die undiagnosed at clinical onset. Self-management is necessary for effective treatment and clinical outcomes, as well as reducing healthcare utilization and costs. This study aimed to evaluate self-management practices among children presenting with T1D using an analytical cross-sectional design. The researcher obtained qualitative and quantitative data through a researcher-administered questionnaire, focused group discussions, and interviews with key informants who were the primary caregivers and health service providers. The principal investigator entered the data into Excel for management and then conducted a cleaning and verification process to ensure its accuracy and reliability. This process included performing descriptive statistical analysis, which involved calculating frequencies, percentages, means, and standard deviations. The cleaned data was then transferred for analysis purposes; the researcher employed version 23 of the Statistical Package for Social Sciences (SPSS). The study investigated the socio-demographic and economic profiles of children with type 1 diabetes, their level of knowledge regarding self-management practices, and the self-management practices carried out by these respondents and explored the relationship between socio-demographic and economic factors, knowledge levels, and self-management practices among children with T1D. The study involved children with T1D aged between 8 and 18 years in Nairobi City County, Kenya, and attained a 94.9% response rate. Most of the respondents were girls (65.6%), with a median age of 14.67 years and a standard deviation of 3; most lived in low-income residences and had completed primary education, while most caregivers were self-employed. While 95.9% of the respondents recognized self-management practices, further probing revealed that only 3.3% had adequate knowledge about coping strategies and 13.7% understood medication adherence. In practice,67.4% had medication adherence, and 53.4% monitored their blood glucose daily. However, a smaller proportion engaged in healthy problem-solving (29.9%) and physical activity (43.4%). Positive correlations were identified between self-management practices and factors influencing them, including the age, education, and knowledge levels of children, along with the employment and marital status of their primary caregivers. The findings indicated a need for comprehensive, focused strategies to address knowledge gaps and overcome challenges that hinder children from effectively carrying out self-management practices. There is a need for targeted education, support systems, and individualized interventions among the children to improve the way they manage their diabetes.

CHAPTER ONE: INTRODUCTION

1.1 Background information

'Diabetes mellitus' is a medical disorder characterized by high levels of glucose in the blood due to insufficient production or ineffective use of insulin by the body (WHO, 2021). This condition disrupts carbohydrate, fat, and protein metabolism, leading to hyperglycemia and potential long-term damage to the body systems (Libman *et al.*, 2022). This damage can lead to incapacitating complications, hence diminished life expectancy (Mayer-Davis *et al.*, 2018).

Diabetes is rising globally, with an estimated 589 million individuals having diabetes in 2024 and 853 million by 2050. In sub-Saharan Africa, 25 million adults have been diagnosed with diabetes, with a prevalence rate of 4.2%. Approximately 813,300 adults in Kenya currently suffer from diabetes, and projections indicate that this figure will rise to 1.8 million by 2050. Estimates suggest that 9,500 children in Africa and 5,575 in Kenya have type 1 diabetes. Most children with T1D in the region die undiagnosed at clinical onset (IDF, 2024). The population in developing countries increasingly exhibits unhealthy diets, obesity, and sedentary lifestyles (WHO, 2022). Diabetes complications can lead to severe morbidity and mortality. The essential principle in preventing such complications is achieving as close to normal glycemic control as possible through intensive education and treatment after diagnosis (Abraham *et al.*, 2022).

Achieving optimal treatment goals for diabetes necessitates ongoing and committed self-management (ADA, 2022). Promoting self-management among children and adolescents with diabetes presents distinct challenges for them, their parents or caregivers, families, healthcare providers, and communities due to evolving needs as

they grow (Phelan *et al*., 2018). Self-management has mainly been focused on T2D, in which the cost of illness and burden on care have been evident (IDF, 2021). However, the economic costs of illness and care as well as quality of life in children are equally burdensome. Therefore, implementing self-management practices among children and adolescents may prevent or reduce complications and costs as the children and adolescents transition into adulthood (Lindholm *et al*., 2022). Children and adolescents with T1D must live with their condition even when in reasonable control. Diabetes management requires a complex balance of medication, diet, exercise, and regular blood glucose monitoring to achieve near-normal glucose control (De *Wit et al*., 2022). The study will be essential to young people with diabetes and their households as they manage the condition and its health consequences. Self-management has a critical role in preventing various complications associated with diabetes, as well as enhancing health outcomes and overall standard of living. Effective self-management is essential for optimal physical and psychological outcomes in children and adolescents with T1D. However, there is a shortage of comprehensive information on the specific methods they engage to carry out these practices (Ella *et* al., 2019).

1.2 Problem Statement

In Kenya, studies on self-management have primarily concentrated on adults diagnosed with type 2 diabetes (T2D), with little or not much attention given to children and adolescents living with type 1 diabetes (T1D) (DMI, 2022). Most studies concerning children and adolescents with Type 2 Diabetes (T2D) or Type 1 Diabetes (T1D) have predominantly been conducted in developed nations, resulting in the inadequacy of context-specific information from Kenya to guide interventions. There

is limited research on how children and adolescents in Kenya manage Type 1 Diabetes (T1D) and the factors that associate with their self-management behaviors.

Critical gaps exist among the children and adolescents in areas such as knowledge, age-appropriate education, and psychosocial support. Furthermore, there is Inadequate documentation exists regarding how children and adolescents carry out self-management practices, which limits their ability to tailor interventions to their real-life experiences and challenges.

To address this gap, the study was designed to investigate the knowledge of specific self-management practices, how they are carried out, and the factors influencing them among the children and adolescents with T1D in Kenya. The study findings aimed to inform the development of strategies that are context-appropriate, age-specific, and practical to improve glycemic control, reduce complications, and enhance the overall quality of life for children and adolescents.

1.3 Justification of the study

The rising prevalence of type 1 diabetes in children and adolescents requires prompt and effective initiatives to improve their health and well-being. Self-management skills are crucial in managing their condition; hence, integrating it into the pediatric care model can significantly improve their health outcomes. Early interventions such as self-management practices reduce serious consequences that may result in complications. Structured education and skills strengthen their independence and self-confidence, resulting in enhanced psychosocial outcomes and resilience. Such behavior significantly leads to healthier adults and reduces the healthcare system burden, due to long-term healthcare expenditure caused by hospitalizations, emergency care visits, and needs for expensive medical interventions. Understanding

the current model of self-management practices in children and adolescents is critical for guiding evidence-based programming and developing individualized initiatives.

1.4 Significance of the Study

Self-management is a crucial component of contemporary therapy for diabetes mellitus. The recommended strategy for enhancing glycemic control includes behavior modification, medication, and monitoring an individual's glucose levels in the blood. (DiMeglio *et al.,* 2018). For optimal diabetes-related management, it is crucial that young people diagnosed with type 1 diabetes (T1D) actively and efficiently involve themselves in managing and addressing their condition. To accomplish this, it is essential for young people with diabetes to be equipped with adequate knowledge and skills that allow them to make well-informed choices regarding changes in their behavior and adjustments in their treatment. Such knowledge will enable them to effectively incorporate self-management practices into their daily routines. Continuous diabetes education can provide individuals with essential abilities, comprehension, and motivation to alter, adjust, and sustain healthy behaviors and positive mindsets toward self-care (Phelan *et al*., 2018). In this situation, self-management practices serve as helpful tools for people with diabetes to understand their condition, especially how daily activities like exercise, diet, stress, and medications affect their blood sugar levels, health outcomes, and overall well-being.

Effective self-management practices can provide significant benefits in diabetes education and treatment while also offering valuable support to improve diabetes management. This process acts as a tool for providing objective feedback on how daily behavior, special circumstances, and medication affect glucose levels. Individuals are commissioned to make the appropriate changes, and the healthcare

professionals are empowered to offer individual customized advice about lifestyle adjustments and medication for reducing blood glucose (Sarah *et al*., 2022). This study provided some insights into using self-management practices as a tool for diabetes management. There is a need to advocate for its use by patients and healthcare professionals in Kenya as part of routine diabetes care.

1.5 Research Questions

1. What are the socio-demographic and economic characteristics of the children and adolescents who have been diagnosed with T1D in Nairobi City County, Kenya?
2. What is the extent of self-management knowledge among children and adolescents diagnosed with type 1 diabetes (T1D)?
3. How do children and adolescents engage in self-management practices?
4. What are the differential correlations between socio-demographic and economic factors and knowledge of self-management practices among children and adolescents with type 1 diabetes (T1D) in Nairobi City County, Kenya?

1.6 The study objectives

1.6.1 Broad objective

The objective of the study was to investigate the self-management practices adopted by children and adolescents diagnosed with type 1 diabetes in Nairobi City County, Kenya.

1.6.2 Specific objectives

1. To establish the socio-demographic and economic profiles of children and adolescents with type 1 diabetes (T1D) who seek medical care in Nairobi City County, Kenya.
2. To determine the level of knowledge on self-management practices among the children and adolescents with T1D in Nairobi City County, Kenya.
3. To establish self-management practices by children and adolescents presenting with T1D in Nairobi City County, Kenya.
4. To analyze the differential correlation between the socio-demographic and economic factors, knowledge, and self-management practices of respondents with T1D in Nairobi City County, Kenya.

1.7 Null Hypothesis

H01: There is no significant association between differentiated socio-demographic and economic factors, knowledge, and self-management practices among children and adolescents with type 1 diabetes (T1D) in Nairobi City County, Kenya.

1.8 Limitations and delimitations of the study

1.8.1 Limitations

1. The self-management practices could have been assessed over a much longer period to determine their potential effects on blood glucose control.
2. The study design only looked at data from one point in time, which made it hard to see how self-management practices changed over time or to prove a direct link between these practices and blood sugar control.

3. The study was conducted in selected health facilities within Nairobi City County, potentially restricting the applicability of the findings to other areas and health facilities throughout Kenya.

1.8.2 Delimitations

1. The study was focused on children and adolescents with type 1 diabetes, excluding those with type 2 diabetes.
2. Only selected health facilities within Nairobi City County conducted the research, with no participation from other counties in Kenya.

1.9 Conceptual Framework

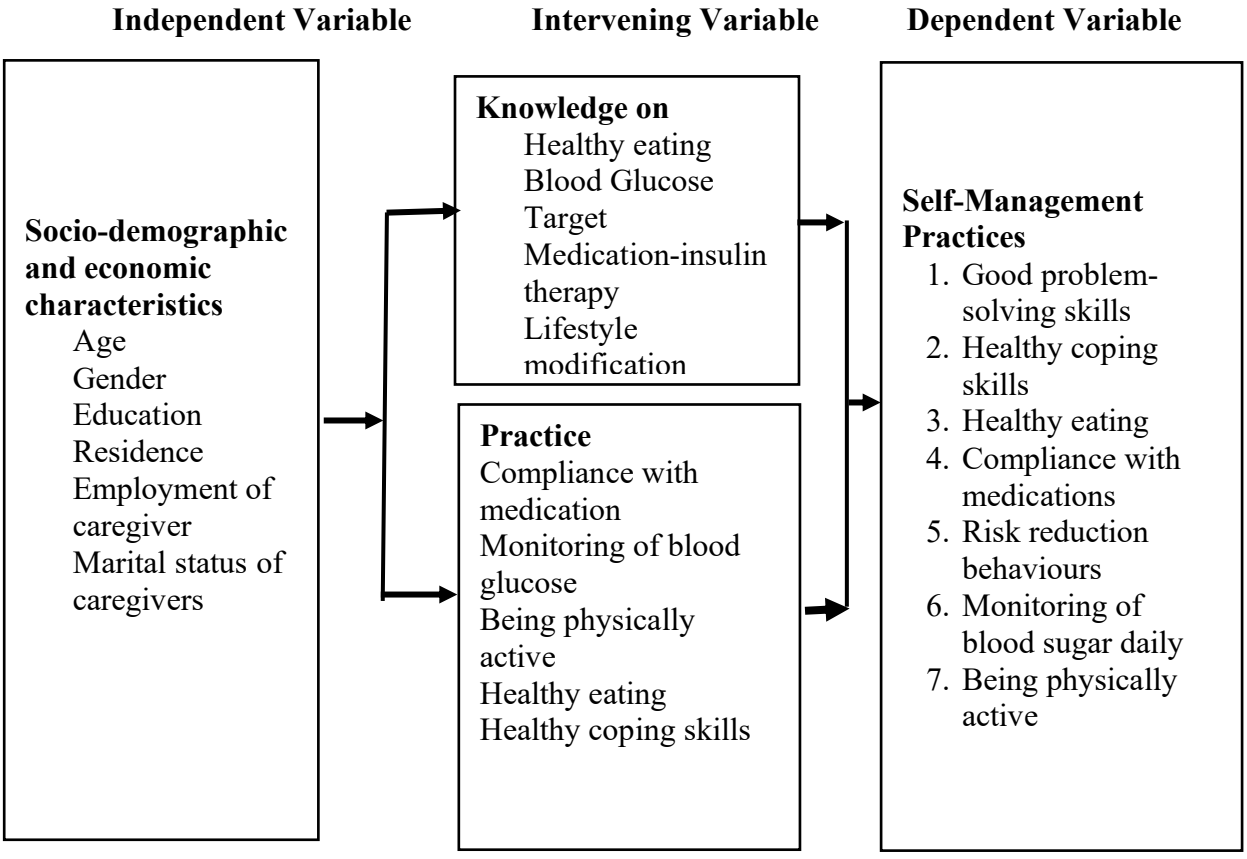

Figure 1.1: Conceptual Framework

Source: Adapted and amended according to (American Association of Diabetes Educators,2020) in accordance with the objectives of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Historical Background

2.1.1 Type 1 Diabetes

Type 1 diabetes is defined by long-term immune-mediated destruction of pancreatic β-cells, resulting in either partial or, more frequently, complete insulin insufficiency. Type 1 diabetes is mostly caused by immune system breakdown of these cells. According to (Mayer-Davis *et al*.,2018), symptoms become apparent after 90% of the β-cells are eliminated.

Type 1 diabetes often develops suddenly, and it is associated with the following signs and symptoms: abnormal thirst, frequent urination, tiredness, dry mouth, weight loss, hunger, infections, slow-healing wounds, and blurred vision. We use blood glucose measurements and symptoms to determine the diagnosis.

The diagnostic criteria consist of a blood sugar level of 11.1 mmol/L or higher or a fasting blood sugar level of 7.0 mmol/L or higher. If you suspect diabetes, you can confirm the diagnosis with several tests. OGTT or HbA1c tests are valid options. An institution that follows established protocols for the DCCT assay should conduct the tests. If the initial test findings contradict, an additional test confirms the diabetes diagnosis. Notably, a less than 6.5% value does not necessarily exclude diabetes diagnosis. (IDF, 2021). Individual Individuals diagnosed with type 1 diabetes can lead healthy lives by following a daily regimen that includes insulin administration, closely monitoring their condition, maintaining an optimal diet, and regularly engaging in physical activity. The rate of incidence of type 1 diabetes (T1D) is progressively rising on an annual basis. The variables contributing to this rise are currently unknown but could perhaps be attributed to alterations in environmental risk factors, maternal events, dietary patterns during early life, or viral infections (Libman *et al., 2022*).

2.1.2 Type 2 Diabetes

Type 2 diabetes (T2D) accounts for over 90% of all diabetes cases (IDF, 2021). While still prevalent in adults, it is now becoming more common in children and teenagers. In the context of type 2 diabetes (T2D), elevated blood sugar levels occur owing to insulin resistance, which is characterized by the cells in the body exhibiting an inadequate response to insulin (Libman *et al*., 2022). Due to insulin resistance, the hormone becomes ineffective, and this triggers a rise in insulin production. Over time, pancreatic beta cells may fail to meet demand due to inadequate insulin production. The body can produce insufficient insulin, or insulin produced may be ineffective, leading to blood glucose buildup. Individuals diagnosed with type 2 diabetes (T2D) may remain ignorant of their illness for a long time, as signs may take years to become apparent. Meanwhile, the body sustains harm due to excessive amounts of glucose in the blood. Many people are diagnosed only when diabetes-related complications become apparent (IDF, 2021). Although the exact causes of T2D are still unknown, several essential risk factors exist. These include overweight and obesity; additional factors that can heighten the probability of acquiring diabetes include poor diet, family history, physical inactivity, ethnicity, age, and poor maternal nutrition (ISPAD, 2022).

2.2 Epidemiology of type 1 diabetes mellitus

Studies indicate that it accounts for about 5–10% of those with diabetes. This condition is a result of the loss of beta cells in the pancreas, which is triggered by an immunological reaction known as autoimmunity (Mayer-Davis *et al*., 2018). The cause of type 1 diabetes is complex and involves multiple factors. Nevertheless, the precise contributions of genetic predisposition, the immune system, factors in the environment, and beta cells to the disease development remain unclear (Libman *et al*., 2022). Serological markers and diabetes-associated autoantibodies like GAD, IA2,

IAA, and ZnT8 signify the existence of beta cell autoimmunity. Antibody levels vary according to age, with children exhibiting a higher prevalence of IAA and ZnT8 (Mayer-Davis *et al*., 2018).

2.2.1 Incidence and Prevalence of TID

The occurrence and frequency of type one diabetes in individuals aged 0–19 years is becoming more apparent in most nations that have been studied. However, there is limited evidence to suggest that this increase has begun or ceased in certain high-income nations (Besser *et al*., 2022). The environmental changes are associated with the rapid increase over time (IDF, 2021). The worldwide incidence of young individuals diagnosed with type 1 diabetes has shown an increase from 3 to 4 % (Bratina *et al*., 2018). The incidence rates are used to calculate prevalence estimates by applying the United Nations population figures for each country to derive estimates of the total number of new and existing cases (IDF, 2021).

2.2.2 Challenges in T1D

Therapy with insulin is crucial for the management of type 1 diabetes and is necessary to sustain life (ADA, 2022). T1D requires an organized self-management approach that encompasses insulin administration, blood glucose monitoring, exercise, and eating healthy. Access to self-care tools, such as self-management education and insulin, is limited in many countries, especially those with low-income families. Children with diabetes experience significant problems, a decreased standard of living, and early mortality (IDF, 2021).

Many young people are unable to emotionally manage their disease. Diabetes may limit social relationships and can result in stigma and discrimination. These factors could potentially affect their academic achievement. The daily needs of a young individual with diabetes, combined with the exorbitant expenses of treatment and

monitoring equipment, place a severe financial and emotional strain on the whole family. (IDF, 2021).

2.2.3 Acute Complications among T1D

Individuals with diabetes in nations that are developing are at a greater risk of experiencing complications compared to those in developed nations.

2.2.3.1 Hypoglycemia

Hypoglycemia is characterized by a decrease in blood glucose levels. There is no universally applicable numerical definition for all patients and conditions, although it may indicate a risk to the patient's well-being (Abraham *et al*., 2018). The presence of recurring and severe hypoglycemia restricts the ability to achieve ideal glycemic control and causes significant anxiety and emotional distress for both patients and their loved ones. Hypoglycemia in children with T1D can lead to several negative consequences, such as decreased focus, potentially dangerous symptoms, and disruptions in behavior. Intense and persistent hypoglycemia, particularly when occurring during sleep, can lead to a state of unconsciousness, convulsions, and potentially fatal consequences (Bratina *et al.,* 2018).

Severe hypoglycemia can result in adverse psychosocial consequences and trigger detrimental compensatory responses. The fear of experiencing low blood sugar levels, particularly during the night, is a major source of anxiety and stress. This fear often hinders the young individuals with T1D from participating in their regular or everyday activities as routine (Abraham e*t al*., 2018).

2.2.3.2 Ketoacidosis

Diabetic ketoacidosis (DKA) causes a deficit in circulating insulin, leading to elevated levels of the counter-regulatory hormones, such as catecholamines, glucagon, cortisol, and growth hormone. Consequently, there is catabolism of fat for energy, resulting in

chemicals (ketones) accumulating in the blood and urine. DKA mostly is caused by the sudden development of diabetes, inability to administer insulin injections, disruption of insulin delivery in children, or insufficient care of an infection. Diabetic Ketoacidosis (DKA) is the most severe acute consequence of diabetes (Glaser *et al.,* 2022).

DKA is a potentially fatal condition that can be avoided with preventive measures. Individuals with type 1 diabetes(T1D) have a higher vulnerability to DKA compared to those with type 2 diabetes (T2D); however, individuals with T2D are equally at-risk during episodes of acute illness. Insufficient healthcare availability impacts both adults and young individuals with T1D in areas with poor resources, resulting in an increased likelihood of developing diabetic ketoacidosis during diagnosis. Diabetic ketoacidosis (DKA), a potentially fatal complication characterized by the buildup of toxins in the body, is more likely to arise when symptoms of type 1 diabetes (T1D) are not identified (Wolfsdorf *et al.,* 2018).

The diagnosis of DKA relies on the presence of three key factors: elevated blood glucose, the presence of ketones in the blood, and metabolic acidosis. However, it is important to note that the criteria used to define DKA may differ between nations and research studies. The diagnostic criteria for DKA are the presence of hyperglycemia, indicated by a blood glucose level exceeding 11.0 11.0mmol/L (200.0 mg/dL). Venous pH refers to the level of acidity in the blood. A value below 7.3 or a low serum bicarbonate level might indicate the presence of a potential health problem. The blood contains 18.0 mmol/L of ketones, accompanied by either ketonemia or ketonuria (Glaser *et al*., 2022).

2.2.4 Chronic complications

These encompass both micro- and macrovascular complications. Microvascular issues include retinopathy, nephropathy, and neuropathy, while macrovascular disorders impact the larger blood vessels. Uncontrolled diabetes results in kidney failure and high blood pressure owing to diabetic kidney disease, as well as vision problems and blindness caused by retinopathy due to diabetes (Zhang *et al*.,2020). Peripheral neuropathy can result in symptoms such as discomfort, abnormal sensations (paraesthesia), and muscle weakness. On the other hand, autonomic neuropathy can induce postural hypotension, gastroparesis, diarrhoea, bladder weakness, and erectile dysfunction (Pop-Busui *et al*.2022). Macrovascular disease can lead to the emergence of cardiovascular disease, peripheral vascular disease, and stroke.

Although diabetes-related cardiovascular problems are uncommon in children and teenagers, they may experience early physiological and anatomical abnormalities a few years after the disease begins. Nevertheless, rigorous education and therapy can lead to prevention and slow down the onset and development of complications. Diabetic adolescents have a higher likelihood of developing retinopathy, a condition that can result in vision loss. This includes both serious non-proliferative retinopathy and proliferative retinopathy, which is more common in adolescents compared to adults. Nevertheless, those who get diabetes during adolescence face a greater risk of vascular problems in comparison to those who develop diabetes after puberty. Among individuals with diabetes of the same duration, the prevalence of retinopathy and high albumin excretion rate tends to rise with advancing age and the onset of puberty. Longitudinal studies suggest that being diagnosed with type 1 diabetes at a younger age, especially before puberty, is linked to a longer duration without complications

such as retinopathy and nephropathy. Nevertheless, the condition can swiftly advance, particularly in patients with inadequate glycemic control. Therefore, it is essential to give high importance to the early detection of diabetic retinopathy and modifiable risk factors throughout adolescence (Donaghue *et al*., 2018).

2.2.5 Diabetic Retinopathy

Non-proliferative retinopathy is a condition that is characterized by the presence of tiny blood vessels, retinal bleeding (both in the outer and inner layers of the retina), cotton wool spots caused by reduced blood flow and tissue damage, leakage of protein and lipid resulting in the formation of hard exudates, venular dilatation and tortuosity, and intraretinal microvascular abnormalities (IRMAs)(American Academy of Ophthamology,2024).

The mild and moderate levels do not pose a threat to eyesight and may not necessarily advance to a more catastrophic phase. Severe non-proliferative retinopathy is marked by blocked blood vessels, more bleeding in the retina, intraretinal microvascular abnormalities (IRMAs), small bulges in the blood vessels called microaneurysms, major issues with the veins, and less blood flow that causes tissue damage and cotton wool patches in the retinal nerve fibers. Proliferative diabetes-related retinopathy (PDR) is defined by the development of new blood vessels on the back surface of the retina and the vitreous. These blood arteries have the potential to rupture, resulting in bleeding into the vitreoretinal region, which can lead to vision impairment (Lee *et al*.,2024).

Diabetic macular oedema/maculopathy is when the retina swells due to small bulges in blood vessels (microaneurysms) and poor blood vessel function. Adolescents diagnosed with diabetes have a higher probability of developing severe diabetic retinopathy or macular oedema, which can progress rapidly in those with poor blood

sugar control. Therefore, it is essential to screen adolescents to detect early signs of retinopathy caused by diabetes and focus on changing factors that increase the risk. Enhanced regulation of blood sugar can potentially result in the reversal of retinopathy. The implementation of regular screenings for diabetic retinopathy has led to a decrease in individuals who have become blind because of diabetes (ADA,2023). Although there may be an initial deterioration of diabetic retinopathy when blood sugar control improves, as observed in the DCCT study, this does not result in severe loss of vision. Over a period, intense therapy continues to be more efficacious than regular therapy. The early worsening of diabetic retinopathy was lessened by getting blood sugar levels under control in patients who were not getting enough insulin and were not growing properly (Donaghue *et al*., 2018).

2.2.6 Diabetic Nephropathy

Diabetic nephropathy is characterized by the presence of chronic albuminuria of above 300mg per 24 hours or proteinuria exceeding 500 mg per 24 hours. High blood pressure and a reduced rate of glomerular filtration (GFR) frequently accompany it (ADA,2022).

Individuals diagnosed with type 1 diabetes experience progressive changes in the kidney's functioning and framework, which can be classified into five distinct stages. The initial phase is distinguished by an increase in the size of the glomeruli, excessive blood flow, and an enhanced filtration rate. The second phase includes small changes in the kidney's structure, marked by higher levels of albumin in the urine that are still considered normal. In the third phase, there is an increase in albumin excretion, exceeding normal levels. This leads to an albumin excretion ratee (AER) ranging from 30 to 300mg/24h or 20 to 200 µg/min in a 24-hour urine collection, suggesting the beginning of albuminuria. Stage 3 may advance to stage 4, characterized by overt

proteinuria (AER greater than 200 μg per min or larger than 300 mg per 24 hours). If left untreated, this progression leads to stage 5, which is end-stage renal disease (ESRD). While advanced forms of kidney disease, such as ESRD or noticeable protein in urine, are uncommon in children and teenagers with type 1 diabetes, there are initial kidney changes in structure and function that often develop shortly after diagnosis and often worsen during puberty (Govindan *et al.,*2024).

After several years, individuals with diabetes may develop end-stage renal failure. This condition can only be managed through kidney transplantation or dialysis. Diabetic nephropathy is a major contributor to morbidity and mortality in young individuals who have type 1 diabetes. However, the latest research has revealed that individuals with type 1 diabetes who do not have diabetic nephropathy have similar mortality rates to the general population. However, patients with abnormal urinary albumin excretion rates have significantly higher mortality rates. Early diagnosis and prompt treatment of hypertension in young individuals and adults with diabetes is crucial to prevent end-stage renal failure caused by diabetic nephropathy (Donaghue *et al*., 2018).

2.2.7 Diabetic Neuropathy

Diabetes mellitus is known to have deleterious effects on the nervous system, leading to peripheral neuropathy, which is characterized by damage to the somatic and autonomic peripheral nerves. This condition has a reported prevalence of less than 10% and as high as 27% in the youth population, with the incidence rates seemingly rising. Given the potentially debilitating nature of diabetic neuropathy, we must take measures to mitigate its effects and prevent its occurrence, especially in high-risk individuals. Diabetic neuropathy is correlated with blood sugar control and duration

of diabetes. Polyneuropathy results from severe injury to all motor, sensory, peripheral, and autonomic nerve fibers (Simoneau *et al*,2018).

Patients frequently report experiencing numbness, tingling, burning feelings, and sensations of paraesthesia in their hands and feet, which may develop into persistent pain. The evaluation of peripheral neuropathy involves a thorough physical examination, which encompasses various clinical testing. These tests analyze the function of small nerve fibers by measuring temperature or the ability to feel pinprick and the function of large nerve fibers by assessing perception of vibration and gentle touch (Donaghue *et al*., 2018).

Autonomic neuropathy gradually and progressively damages the cardiovascular (CV), urogenital (UG), and gastrointestinal (GI) systems. Autonomic dysfunction often presents with subclinical symptoms during childhood and adolescence; however, overt autonomic neuropathy is uncommon. Typically, these symptoms emerge shortly after diabetes diagnosis and may intensify during puberty. The afflicted system directs the manifestation of symptoms and the conduct of investigations. Autonomic neuropathy may result in symptoms such as vomiting, postural hypotension, bladder paresis, diarrhoea, and irregular sweating. Cardiovascular autonomic neuropathy typically manifests with cardiac symptoms, including postural hypotension and alterations in heart rate. The gradual decrease in heart rate variability can increase the likelihood of experiencing severe hypoglycemia, which is linked to poor awareness of low blood sugar levels. Abnormal cardiovascular responses and extended QT intervals have been associated with a higher probability of sudden death.

Additional signs encompass those linked to diabetic digestive distress, such as delayed emptying of the stomach, nausea, vomiting after eating, and belching, as well as those

pertaining to lower gastrointestinal disorders such as abdominal pain, diarrhoea, and faecal incontinence (NIDDK,2021).

The urogenital system exhibits symptoms such as bladder paresis, which can lead to hesitancy, longer intervals between urinating, incomplete emptying of the bladder, and urine retention. Erectile dysfunction is a rare occurrence in young persons; however, it is conceivable. Additional symptoms of autonomic neuropathy include anomalies in sweating abnormalities, typically seen in a decrease in sweating, which can advance to a complete absence of sweating (anhidrosis), as well as alterations in the way pupils respond to changes in light and darkness. While clinical signs of nervous system dysfunction are rare in children, researchers have found subclinical symptoms, such as notable cardiac nerve damage detectable through heart rate variability investigations, in young persons with T1D (Donaghue *et al*., 2018).

2.2.8 Macrovascular Disease

Diabetic individuals have a greater susceptibility to acquiring cardiovascular disease (CVD) in comparison to non-diabetic individuals. In diabetic patients, hypertension has a more significant impact on CVD. Atherosclerosis, the thickening and hardening of arteries, can begin in childhood, as shown by carotid and aortic thickness. There is a significant association between inadequate regulation of blood sugar levels and the presence of a silent coronary artery disease and other cardiovascular diseases. (Gow *et al.,*2022).

Cholesterol is an essential factor contributing to the development and advancement of coronary artery disease. While well-managed type 1 diabetes (T1D) does not have a substantial effect on blood lipid levels, sophisticated lipoprotein subclass assays can detect atherogenic characteristics. Inadequate management of blood sugar levels is

associated with a lipoprotein profile that has a greater tendency to promote the development of atherosclerosis (O'Brien *et al.,*2021).

Increased lipids are linked to a higher probability of heart disease and central obesity in both T1D and T2D. Individuals with T1D are susceptible to developing hypercholesterolemia. Diabetes can cause alterations in the functioning of the blood vessels in the body's peripheral regions and the heart. Individuals in the age group of children and adolescents who have been diagnosed with type 1 diabetes typically have impaired peripheral vascular function due to early onset endothelial dysfunction, which is a precursor to atherosclerosis. In conclusion, when diabetes management is optimized, complications become less common (Donaghue *et al*., 2018).

2.3 Self-Management Among T1D

Self-management is the ability a person acquires to manage their condition. Self-management refers to the activities a person with a chronic disease engages in to safeguard and promote their health. The process includes monitoring symptom management, understanding the illness's impact on functioning, emotions, and relationships, as well as adhering to treatment schedules (De Wit *et al*., 2022). Successful self-management requires understanding the condition, the treatment, and the action required. This process includes modifications in behavior, acquisition of problem-solving abilities, and strategies for managing conditions that become increasingly difficult. Information about the disease, education, and training must be vital to the self-management approach, including medication administration and dietary and physical activity requirements (Lindholm *et al.,* 2022).

The key strategies for self-management that are particular to diabetes care involve maintaining a balance between food, physical activity, and medications. Additionally, it is important to regularly monitor blood glucose levels and set objectives that are

customized to meet individual needs; here are some essential things to know about managing diabetes: how to apply sick day rules when ill or going into the hospital, how to understand the condition and the care expected, as well as the management of acute complications such as hypoglycemia and hyperglycemia. (Shah *et al.,* 2022). Self-management of diabetes support and education helps people learn how to manage their diabetes and maintain healthy habits to manage their condition. (De Wit *et al*., 2022)

2.3.1 Importance of diabetes self-management among T1D

Self-management constitutes around 95 percent of diabetes management. Living with diabetes entails the integration of the condition into one's daily routine. After receiving a diagnosis of diabetes, an individual's life remains unchanged (De Wit *et al*., 2022).

Facilitating self-management among individuals with chronic conditions can result in favorable outcomes, including a decrease in the number of visits to primary care facilities, reduced appointments to outpatient departments and emergency rooms, and shorter hospital stays; improved communication between professionals and patients; a healthier lifestyle; improved symptom management can result in decreased pain, stress, anxiety, depression, and fatigue; enhanced well-being; improved ability to cope with challenges; better living standards; and improved health status. Additionally, it can contribute to a better understanding of one's condition, increased independence, and higher levels of patient satisfaction (Lindholm *et al., 2022*).

Most individuals living with diabetes strive to maintain a self-sustaining, resilient, and dynamic lifestyle, and they should access widely available support to achieve it.

Nevertheless, self-management does not necessitate individuals handling all tasks independently; it encompasses the involvement of healthcare professionals, peers, and

family members who offer appropriate and individual support. People with diabetes make daily decisions about their diet, exercise, reactions to certain situations or stresses, and their medication regimens (De Wit *et al*., 2022).

2.3.2 Factors influencing the diabetes self-management among T1D

Factors influencing diabetes self-management include the following:

2.3.2.1 Self-monitoring of blood glucose (SMBG)

Self-care remains the foundation of diabetes management. All people involved in diabetes care should aim to support SMBG as a component of an overall self-management approach. SMBG and insulin administration are considered essential for daily management of diabetes. SMBG enables the collection of blood glucose data at various times throughout the day, facilitating the prompt identification of high levels. (Dimeglio et al., 2018)

2.3.2.2 Influences of different cultures on self-management of diabetes mellitus

Getting an understanding of the influence of culture on healthcare practices may enhance the outcomes of diabetes management. Incorporating cultural structures into diabetes care particularly tailored to ethnic groups can lead to increased patient satisfaction (De Wit *et al*., 2022).

2.3.2.3 Social support for the self-management of diabetes mellitus

Social support is a person's sense that assistance is available when required. This support can come from different sources, such as friends, family members, and physicians. The individual's self-confidence and behaviors linked to diabetes treatment are influenced by the perception of social support (De Wit et al., 2022).

2.3.2.4 Knowledge level of the patient

Increased knowledge of diabetes care has been linked to engaging in practices such as medication compliance, healthy dietary choices, exercise, blood glucose monitoring, and foot care.

Every child and adolescent is entitled to get a thorough and well-organized education from experts, which should enable them and their families to efficiently manage their diabetes (Guo et al., 2020).

2.3.2.5 Self-efficacy

A young person's capacity to participate in diabetes self-management activities may be influenced by their self-efficacy, which is their confidence in carrying out diabetes self-care. (De Wit et al., 2022)

2.3.3 Obstacles to the self-management of T1D

2.3.3.1 The dynamic and chronic nature of diabetes

The diabetic condition is characterized by its dynamic and chronic nature. Managing diabetes requires addressing multiple self-management needs, which may necessitate adjustments due to environmental changes. The ongoing necessity to modify self-management practices highlighted specific areas where improvements could be made to better meet health requirements. (Adu et al., 2019)

2.3.3.2 Financial Burden

The cost of some diabetes medical tests and treatments can be a financial barrier. Health insurance may not cover the expenses associated with some medical tests and diabetic supplies, such as the glycosylated hemoglobin (HbA1c) test and continuous glucose monitoring. This can result in a financial burden for individuals (Adu *et al.*, 2019).

2.3.3.3 Health Information

Successfully managing diabetes involves addressing patient, healthcare team, and environmental factors. (De Wit *et al.,* 2022)

2.3.3.4 Knowledge level of the patient

Knowledge about diabetes is imperative for appropriately managing the condition. Research investigating the barriers to self-management in diabetes ranks inadequate knowledge as a prominent barrier. Proficiency in diabetes management has been associated with adherence to medication, dietary patterns, physical exercise, monitoring blood glucose levels, and foot care. Individuals with low literacy levels typically have a lack of comprehension of their disease, which may result in an inability to acquire the appropriate advanced self-care abilities for optimal glycemic management (Siminerio *et al.,* 2014).

2.3.3.5 Motivation and other psychological factors

Motivation is often considered a significant obstacle to effectively managing diabetes. The health care team provides extrinsic motivation. Nevertheless, intrinsic motivation is crucial in actively managing diabetes. Researchers have observed that depression adversely affects individuals' self-care practices. Symptoms such as diminished interest, reduced decision-making ability, and exhaustion are likely to hinder proper self-management of diabetes (Gregory *et al.*, 2022). Young individuals with diabetes experience higher incidences of sadness, anxiety, emotional distress, and eating problems as compared to their peers without diabetes. Individuals who consistently struggle to regulate their metabolism and experience repeated episodes of diabetic ketoacidosis (DKA) are more prone to underlying psychosocial issues or psychiatric disorders than those who can maintain good metabolic control. Despite methodological limitations being noted, substantial evidence supports the

effectiveness of psychosocial interventions. However, the impact of glycemic outcomes remains inconsistent (De Wit *et al*., 2022).

2.4 Self-management support among T1D

Self-management support is a logical intervention that necessitates the active participation of patients in self-monitoring and decision-making. Self-management assistance encompasses self-care education, which is a crucial component of diabetes management within the Critical Care Model. Self-management education extends beyond the provision of instructional disease-specific knowledge (De Wit *et al*., 2022). The practice of self-management empowers individuals with diabetes to take charge of their own health. Self-management support is commonly delivered through disease management programs, which involve patient reminders and help individuals properly control their condition. Rigid research (Gregory et al., 2022) supports this approach.

Supported self-management gives people the confidence and skills to manage their diabetes better. The provision of high-quality knowledge and skills, structured capacity-building programs, planning for care, and peer support are all essential components strategy aimed at assisting individuals with chronic. Several multidimensional behaviors characterize self-management. Key diabetic self-management behaviors include adhering to a prescribed diet, taking prescribed medications, regularly monitoring blood glucose levels, proper foot care, and engaging in physical activity. These behaviors are crucial for attaining optimal glycemic control and are associated with a reduction in diabetes complications. Additionally, it has advanced by means of establishing objectives, selecting and absorbing knowledge, evaluating it, making decisions, acting, and reflecting about self (De Wit et al., 2022).

2.5 Literature Review Summary

The key to successful diabetes management depends heavily on everyone's education, knowledge, and diabetes self-management skills. T1D is an escalating issue, particularly in developing countries. Many studies are carried out in developed countries; the limited data available in Kenya as well as in Africa on type 1 diabetes mellitus covers sub-population groups other than children. The study aims to address the scarcity of data on the socio-demographic and economic profiles, the level of knowledge on self-management practices, the actual self-management practices carried out, and the relationship between the socio-demographic and economic factors, along with the knowledge levels, and how these influence self-management practices among children and adolescents with T1D in Kenya.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

The chapter outlines the methodologies used in the research. The study examines the study design, location, study variables, target population, sample frame, sampling processes, data collection, data analysis, and ethical considerations.

3.2 The Study Design

The study was an analytical cross-sectional design with a combination of both quantitative and qualitative data collection methods. This was efficient to measure the association between variables as well as identify trends, hence informing future interventions.

3.3 The Study Area

The study was carried out in Nairobi City County, which serves as the largest and most populated city in Kenya, located in South-Central Kenya at coordinates 1°17′S 36°49′E. The city and its surrounding area form the Nairobi City County. Nairobi is about 140 kilometers (87 miles) south of the Equator and has an estimated population of around 5 million, making it the 14th largest city in Africa. The county has well-established CDiC clinics, which were purposively selected, as shown in Figure 3.1.

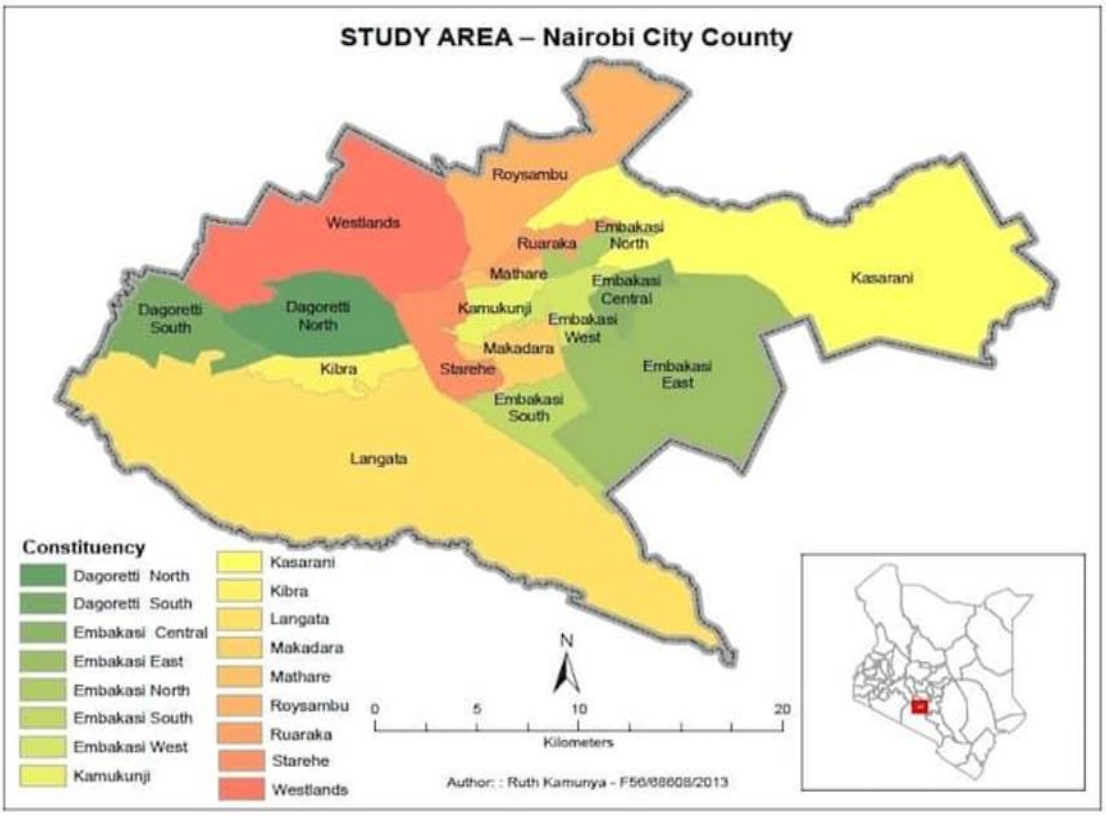

Figure 3.1: Nairobi City County Map

3.4 Study Variables

3.4.1 Independent variables

The study examined children's, adolescents', and caregivers' demographic and socioeconomic characteristics and knowledge. This was measured using age-appropriate structured questionnaires developed by the Ministry of Health and adapted to suit the respondents.

3.4.2 Intervening variables

The intervening variables used in the study included knowledge on healthy eating, blood glucose targets, medication especially insulin therapy and lifestyle modification, as well as the practices which included compliance with medication, monitoring blood glucose, eating healthy, being physically active and healthy coping skills.

3.4.3 Dependent variables

The study focused on measuring optimal self-management practices as its dependent variable. These included good problem-solving skills, healthy coping skills, healthy eating, medication compliance, risk reduction behaviors, daily blood sugar monitoring, and physical activity. A composite score was computed by summing the individual scores from each of the seven components.The standard self-management tool developed by the American Association of Diabetes Educators was adapted to measure the dependent variables.

3.5 The Study Population

The study sample consisted of male and female participants between the ages of 8 and 18 who had been diagnosed with type 1 diabetes and sought medical care at selected health facilities integrating Changing Diabetes in Children program in Nairobi City County, Kenya. It also included healthcare providers, facility in-charges and coordinators, and primary caregivers for children and adolescents.

3.6 Sampling techniques and determination of sample size

3.6.1 Sampling Techniques

Since the researcher intended to work with a representative sample, Nairobi City County was purposively selected, and all Changing Diabetes in Children (CDiC) clinics were identified then the sample was distributed proportionately among the clinics in the county. This ensured proportional representation of participant from each facility. The researcher used a simple random sampling method to select the children and adolescents for interviews.

3.6.2 Sample size determination

The sample size for the children interviewed was established using Cochran's (1977) formula, which is based on the percentage approach. The initial step involved utilizing the Simple Random Sample size (SRS) formula: $n = (z^2\ p\ q)/e^2$. In this formula, n represents the sample size, z is equal to 1.96 for a 95% confidence level, p is set to 0.5, q is calculated as (1 – p) (where p and q represent the probabilities of success and failure, respectively), and e is set to 0.05 to achieve a +/- 5% degree of precision on an absolute scale, which is the default value. By plugging in the parameter values into the given formula, the resulting value of n was calculated to be 384.16 using the equation n = (1.962 X 0.5 X 0.5 X 0.5X0.5)/0.052. Due to the limited and fixed size of the study population, the researcher employed the correction to the formula for an infinite population. The equation is provided as:

The formula for calculating the new sample size, denoted as x, is given by x = n / (1 + (n - 1) / N).

Let's define the following variables: - x: The new sample size—n: the computed sample size, which is 384.16 in this case; N: the population of children attending the CDiC.

Which was 420.

The revised sample size was calculated using the formula x = 384.16 / (1+ (384.16 – 1) / 420), resulting in a value of 201. A 10% insurance factor was applied to this amount to compensate for the non-responses.

The final sample size was therefore 201+10%=221.

3.6.3 Sampling Frame

The researcher did a reconnaissance study, establishing that Nairobi City County had two active CDiC clinics listed in Table 3.1. TheThese clinics are established: Ngaira

Health Centre and the Diabetes Management and Information Centre (DMI).e number in Ngaira Health Centre was 133, and that of DMI was 287, totalling 420. Proportion to sample was used to allocate the sample size of 221 per facility; thus, Ngaira had 70 while DMI had 151. From hospital records, out of the total of 420, 273 (65%) were female, while 147(35%) were male. Proportion to sample size was used to allocate the sample size of 221 per sex. Thus, 144 were female, while 77 were male who were considered for the study.

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Table 3.1: Sampling Frame

	Name of CDiC CLINIC	**Population**	**Sample**
1	Ngaira Health Centre	133	70
2	Diabetic Management and Information Centre (DMI)	287	151
	Total	420	221

Sources: clinic records as of June 2022

3.6.4 Inclusion Criteria

The following was the inclusion criteria:

1. Those children and adolescents between the ages of 8 and 18 years who gave assent to participate and who had T1D, residing in Nairobi City County.

2. CDiC coordinators and healthcare providers who provided care for the children and adolescents with T1D in Nairobi City County.
3. Principal/primary caregivers for the children and adolescents with T1D who gave consent in Nairobi City County.

3.6.5 Exclusion Criteria

1. Those children and adolescents with T1D within the age of 8-18 years were critically ill at the time of data collection.
2. CDiC coordinators and healthcare providers who were not directly involved in the care of children and adolescents with T1D during the study period.
3. Those children and adolescents with T1D whose caregivers did not provide informed consent or those children and adolescents who declined assent to participate in the study.

3.7 Construction of research instruments

Three data collection instruments were used.

3.7.1 Semi-structured questionnaires

The semi-structured questionnaires were reviewed and adapted from the Ministry of Health, Kenya, stepwise survey questionnaire (2015).

3.7.2 Key Informant Interview (KII)

The study selected key informants (KIs) who were relevant to the research. These were people considered to have distinctive skills or professional backgrounds related to the issue that was being evaluated; they were knowledgeable about the study and included the principal caregivers, CDiC coordinators, and healthcare providers trained in diabetes management. A total of 10 key informants were to be interviewed from DMI and Ngaira. The key informants were evaluated or interviewed individually.

3.7.3 Focused Group Discussion (FGD)

The purposive sampling led to the selection of FGD participants. The selection criterion was determined by the intervention's areas of focus, which encompassed insulin therapy, healthy eating, exercise, and factors influencing effective self-management practices. More focus was placed on obstacles to the implementation of effective self-management practices. A total of 4 FGDs were carried out; each involved 8 to 12 participants.

3.8 Validity, pretesting, and reliability of research instruments

The questionnaires and data collection instruments were adopted from the Ministry of Health stepwise survey and designed based on established literature; they were reviewed and well-validated for accuracy and relevance according to the study objectives. Pretesting: We carried out the pretesting of the instruments in the neighboring county, Kiambu County, and corrected any identified issues or ambiguities in the questionnaire before conducting the main study. Identified issues or ambiguities in the questionnaire were corrected before conducting the main study. Reliability was achieved by using standardized procedures during data collection, and internal consistency was calculated using Cronbach's alpha.

3.9 Data collection techniques

These were approaches used to gather information from respondents for analysis or decision-making purposes. The data collection technique was chosen based on the target population, available resources, and ethical considerations.

Surveys were conducted using researcher-administered semi-structured questionnaires with the children and adolescents for gathering quantitative data. Key informant interviews were conducted where the researcher directly communicated

with the healthcare providers and coordinators using structured, predetermined questions to gather qualitative data and in-depth insights. Facilitated focus group discussions with different cohorts, such as the children and adolescents, healthcare providers, and primary caregivers, were done where the participants shared their views and generated qualitative data and perspectives. Content analysis was systematically applied by analyzing and interpreting the content.

Each data collection technique had distinct advantages and disadvantages. mixed-method approach yielded a more comprehensive understanding of the research topic.

3.9.1 Recruitment of Research Assistants (RAs)

Research assistants were identified and recruited. These people were familiar with the pediatric diabetes management and catchment areas in the county, were fluent in both English and Kiswahili, and had attained a tertiary level of education.

3.9.2 Training of Research Assistants (RAs)

They were trained for two (2) days by the principal investigator to ensure consistency, accuracy, and ethical consideration throughout the data collection process. Training covered the study objectives, discussion of all survey tools, and interviewing techniques, including handling of ethical issues such as confidentiality and informed consent and assent as well as correct administration of data collection tools. Mock and role-play sessions were conducted to enhance practical understanding and ensure they were fully prepared for fieldwork.

The researchers introduced themselves to the study participants and instructed them, the participants, that participating in the study was voluntary and that there was no victimization by participating in the study. Confidentiality was also assured. The researchers then gave the participants the informed consent form in the presence of the parents/guardians/principal caregivers, who signed, and immediately started the

interview. The interviewer (research assistant) asked questions in English, interpreted them according to the participant's preference, and filled in the questionnaire. Data collection was carried out at DMI and Ngaira health facilities, this was done after patients were attended by the clinicians during their regular clinic appointments,

3.10 Data management and analysis

3.10.1 Quantitative Data Management and Analysis

The process of data processing and analysis involved editing questionnaires, transferring data to Microsoft Excel, verifying accuracy and consistency, and transferring the information to SPSS version 23.0 for processing. Descriptive statistics were calculated using frequencies, percentages, means, and standard deviations, and inferential statistics were used. The respondents were subjected to assessment tools adapted from the American Association of Diabetes Educators to assess their current practices. The null hypothesis was tested using chi-square(x^2) statistic, degrees of freedom (df), and p-values. A significance level ($p < 0.05$) was used to determine statistical significance. If the p-value obtained from the chi-square test was less than 0.05, the null hypothesis was rejected, indicating a significance of the association between each practice and the variables.

3.10.2 Qualitative Data Management and Analysis

The qualitative data were obtained from key informant interviews and focus group discussions and were analyzed using thematic content analysis. Audio recordings and field notes were transcribed, and transcripts were read as well as coding done. Analysis involved data reduction, display, conclusion formulation, and verification. This involved choosing, streamlining, concentrating, summarizing, and converting information from written field notes or transcriptions. A framework analysis approach was used, involving five key stages: familiarization with the data, establishment of a

thematic framework, indexing, charting, mapping, and interpretation. This approach ensured the data was analyzed in a structured, transparent and meaningful way.

3.10.3 Data Presentation

After the analysis, data was presented through narratives, guided by evaluation objectives, integrating both qualitative and quantitative data. The results from qualitative analysis complemented those from quantitative analysis, enhancing triangulation with information from the household survey.

Self-management practices among children and adolescents with type 1 diabetes were determined by combining the ratings of statements assessing self-management practices. To construct a composite score, the self-management behaviors were examined by summing the variable rating statements that assessed the self-management practices and then dividing by the number of variables to generate a composite score. The composite score was further classified into "self-management practiced" or "self-management not practiced," based on whether the scores were lower or higher than the average score.

The level of analysis involved a bivalent analysis using the Chi-square and Fisher exact tests. For Fisher exact, the objective was to assess the influence of several factors on self-management practices, specifically in cases where the sample size was less than 5.

3.11 Minimization of Errors and Biases

3.11.1 Minimization of errors

Prior testing of the data collection tools to improve both the reliability and precision of the responses. Before they participated in data collection, the research assistants received training in interviewing techniques as well as the use of the semi-structured tools, which helped maintain consistency in data collection.

3.11.2 Minimization of Biases

This was done during the training of research assistants on interviewing techniques to avoid leading questions and maintain neutrality, thus minimizing interviewer bias. A random sampling technique was used to reduce selection bias, and confidentiality of the information provided was emphasized to the study participants.

3.12 Logistical and ethical considerations

The research proposal was approved by Kenyatta University Graduate School, received ethical clearance from Kenyatta University Ethics and Review Committee (KUERC), and granted permission to conduct the study by the National Council for Science, Technology, and Innovation. Also sought permission from Nairobi City County, the department of health, and heads of respective health facilities. The study involved informed consent from principal caregivers and mature minors above 15years and assent from children above ten years old and adolescents below 15 years after they had received the essential information and reached a decision freely, without coercion, undue influence, inducement, or intimidation. Confidentiality and privacy were ensured through anonymous questionnaire coding and removing all patients' identifiers as well as computer password protection. Community members were informed about this study through chiefs' barazas and relevant health clinics. The study was conducted without coercion, undue influence, inducement, or intimidation. The participants were informed that the research had no risks involved and that there was no direct benefit to individual respondents, but ultimately, the findings were to be used to improve diabetes care programs in Kenya.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter covers the study's findings on self-management practices among children and adolescents with type 1 diabetes from selected facilities with established Changing Diabetes in Children (CDiC) Clinics in Nairobi City County, Kenya. It comprises a comprehensive analysis, translation, and elucidation of the data, objectives, and research questions.

4.2 The response rate among study participants

The response rate was 94.6, where 137 females and 72 males responded. The results were derived from data obtained from questionnaires administered to a representative population of 209 (94.6%) children and adolescents at the study location and consultative discussions using 9 out of 10 key informant (KI) interviews (response rate of 90%) and 4 focus group discussions (100% response rate). The overall response rate was 94.9%; the chapter was organized as follows: Socio-demographic profiles and economic characteristics among the children and adolescents who had T1D, Knowledge of self-management practices among the children and adolescents who had T1D Self-management practices carried out by children and adolescents who had T1D, Relationship between socio-demographic profiles, economic characteristics, and knowledge with self-management practices among children and adolescents who had T1D.

4.3 Socio-demographic and economic profiles of the participants

The average age of the participants was 14.67, with a standard deviation of ±3.153. Females comprised most of the respondents, 65.6%. Most of the respondents' highest level of education attained was primary level at 43.7%, followed by those who had attained pre-primary level at 28.1%. Most respondents resided in the lower class at 46.2%, followed by informal residence at 39.4%. Most primary caregivers, 58.4%, were self-employed, followed by government employees, 18.6%. Also, the percentage of primary caregivers who were currently married was 73.8%, and the rest were either never married, separated, or widowed. Most of the respondents had an average of 2 siblings below 18 years. The socio-demographic and economic profiles of the children and adolescents who had T1D in the study area were established and may influence the T1D management and access to care as shown on table 4.1

Table 4.1: Socio-demographic and economic profiles of the children and adolescents presenting with Type 1 Diabetes in Nairobi City County

N=209	**n**	**%**	
Variable	**Frequency**	**Percentage**	**Mean(SD) (where applicable)**
Sex*			
Male	72	34.4	
Female	137	**65.6**	
Age *			
<10 years	20	9.5	14.67±3.153
10-15 years	78	37.1	
>15years	111	**53.4**	
Highest level of education attained/completed. *			
Pre-primary	73	34.8	
primary	119	**57.0**	
secondary	17	8.1	
Settlements /Residence**			
Informal	82	39.4	
Lower class	97	**46.2**	
Middle class	30	14.5	
Marital status of caregiver***			
Never married	6	3.2	
Married	154	**73.8**	
Separated	14	6.8	
Widowed	35	16.6	
Employment of caregiver***			
Civil servant	39	18.6	
Private sector employee	23	10.9	
Self-employed	122	**58.4**	
Unemployed	25	12.2	
Under 18 living in the household**			
None	26	12.7	**2.03±1.291**
1	41	19.5	
2	78	**37.1**	
3	43	20.4	
4	7	3.6	
5	14	6.8	

*- Children and adolescents (primary subject)
**-Both primary subject and caregiver
***-Caregiver

4.4 Knowledge of self-management practices among children and adolescents with TID

This section provides the findings regarding the level of knowledge on self-management practices among the respondents. Table 4.2 shows how the respondents indicated they could identify with the majority of 95.9%; however, when probed further and asked about specific self-management practices, only 61.8% could identify physical activities. However, the majority could not identify specific self-management practices, with only 45.8% identifying healthy eating practices, 30.7% identifying blood glucose targets, 13.7% identifying medication compliance, and 3.3% identifying healthy coping skills. When further prompted on these aspects, only 64.3% were knowledgeable on aspects of medication compliance, with only 43.0% knowing aspects of healthy eating, 46.2% knowing aspects of blood glucose target goals, and 34.8% being knowledgeable on healthy coping skills.

Table 4.2: Knowledge of self-management practices among children and Adolescents with Type 1 Diabetes in Nairobi City County

N=209	**Able identity**	**Not able identify**
Aware of the self-management practice of T1D	200 (95.9)	9 (4.1)
Able to identify healthy eating practices	96 (45.8)	113 (54.2)
Able to identify Blood glucose target goals	64 (30.7)	145 (69.3)
Able to identify Physical activity	129 (61.8)	80(38.2)
Able to identify Medication compliance	29 (13.7)	180 (86.3)
Able to identify Healthy coping skills	7 (3.3)	202 (96.7)
	Knowledgeable	Not knowledgeable
Aspects of healthy eating	90 (43.0%)	119 (57.0)
Aspects of blood glucose target goals	97(46.2)	112 (53.8)
Aspects of medication compliance	134 (64.3)	75 (35.7)
Aspects of healthy coping skills	73 (34.8)	136(65.2)

4.4.1 Consumption of healthy diet

According to figure 4.1, respondents' report indicated that 40% consumed on average 2-4 servings of fruits daily, whereas the majority, 60%, consumed less than two servings daily. Only 26% consumed 3-5 servings of vegetables daily, and the majority, 74%, consumed less than three servings daily. Ninety three percent of the respondents used vegetable oil to cook food in their households. This enabled the researcher to evaluate the level of knowledge on self-management practices among the children and adolescents with T1D in the study area.

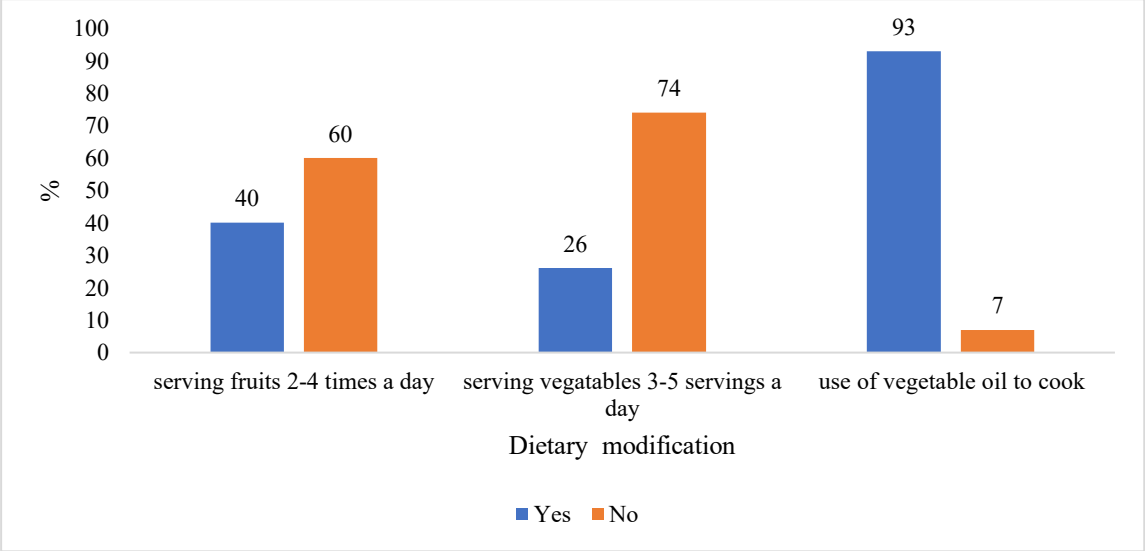

Figure 4.1: Consumption of a healthy diet by children in Nairobi City County using the Food Diversity Scorecards

4.5 Self-management practices carried out by children and adolescents presenting with T1D in the study area

This section provides the findings on self-management practices carried out by the respondents. Table 4.3 indicated that only 67.4% were compliant with medications,65.6% could practice risk-reduction behaviors, and 53.4% could monitor their blood sugar daily. Whereas 22.2% of the respondents had good problem-solving

skills,29.9% had healthy coping skills,46.2% could practice healthy eating, and 43.4% were physically active.

In summary, the findings indicated that most children and adolescents with T1D engaged in various self-management practices. The researcher established the Self-management practices carried out by children and adolescents presenting with T1D in the study area.

Table 4.3: Self-management practices among the children and adolescents presenting with Type 1 Diabetes (n/%) in Nairobi City County

	N=209					
	Self-management practice (n/%)					
Variable	**No**	**Yes**	**Total**	**χ 2**	**df**	**p-value**
Good problem-solving skills	110 (67.4)	53(32.6)	163 (77.8)	26.268	1	**<0.001**
No	12 (26.5)	34(73.5)	46(22.2)			
Yes						
Healthy coping skills						
No	109(74.2)	38(25.8)	147(70.1)	53.473	1	**<0.001***
Yes	13(21.2)	49(78.8)	62(29.9)			
Healthy eating						
No	92(82.4)	20(17.6)	112(53.8)	61.026	1	**<0.001***
Yes	30(30.4)	68(69.6)	97(46.2)			
Compliant with medications	50(73.6)	18 (26.4)	68 (32.6)	10.208	1	**<0.001***
No	72(51.0)	69 (49.0)	141(67.4)			
Yes						
Risk reduction behaviours	55(76.3)	17 (23.7)	72(34.4)	15.350	1	**<0.001***
No	67 (49.0)	70(51.0)	137(65.6)			
Yes						
Monitoring of blood sugar daily	68(72.8)	29 (30.4)	97(46.6)	16.564	1	**<0.001***
No	51 (45.8)	61 (54.2)	112(53.4)			
Yes						
Being physically active						
No	84(71.2)	34(28.8)	118 (56.6)	19.490	1	**<0.001***
Yes	38(41.7)	53(58.3)	91(43.4)			

*Significant results in bold at alpha of <0.05; df=degree of freedom

4.6 The differential correlation between the socio-demographic and economic factors, knowledge and self-management practices of respondents with T1D in Nairobi City County, Kenya

This section provides findings regarding the differential correlation between respondents' socio-demographic and economic factors, knowledge, and self-management practices among the children and adolescents with T1D in the study area.

4.6.1 Socio-demographic and economic factors associated with Self-Management Practices among Children and Adolescents with Type 1 Diabetes

Table 4.4 presents the distribution of gender, age, education level, marital and employment status of the primary caregivers and their influence on self-management practices. Fisher's exact test was employed to analyze the age and marital status data. The statistical analysis revealed a p-value of less than 0.001 ($P < 0.001$), providing compelling evidence against the null hypothesis.

A direct correlation was observed between the age, educational attainment, marital and employment status of the primary caregivers, and their self-management practices. Nevertheless, there is limited data to indicate that these characteristics significantly influence the self-management practices among children with type 1 diabetes (T1D).

The critical informant guide provided the following information:

> *"... Children over the age ten years struggle to maintain self-management practices, which hinders effective self-management practices..." or that "...the younger children are transitioning from the care by the primary caregivers, which leads to ineffective self-management practices...*

Table 4.4: The differential association between respondents' socio-demographic, economic, and knowledge with self-management practices among children and adolescents diagnosed with Type 1 Diabetes in Nairobi City County

Variable	**N=209**		χ **2**	**df**	**p-value**
	Self-management practice (n/%)				
	No	**Yes**			
Sex					
Male	43(60.1)	28 (39.5)	0.221	1	0.638
Female	78 (57.1)	59 (42.8)			
Age					
<10 years	20 (95.1)	1(4.8)	Fisher exact		
10-15 years	51 (65.9)	26 (34.1)	(**P<0.001**) *		
>15years	52 (46.6)	59 (53.4)			
The highest level of education attained					
Pre-Primary	50 (68.8)	23(31.2)	6.954	2	0.031
Primary	60 (50.8)	59 (49.2)			
secondary	11 (66.7)	6 (33.3)			
Residence					
Informal	45 (55.2)	37 (44.8)	5.428	2	0.066
Lower class	63 (65.7)	33 (34.3)			
Middle class	14 (43.8)	17 (56.3)			
Marital status					
Never married	0 (0)	8 (100)			
Married	105 (68.7)	48 (31.3)	Fisher exact **(p<0.001)***		
Separated	4 (26.7)	11 (73.3)			
Widowed	12 (36.1)	21 (63.9)			
Employment of caregiver					
Civil servant	27(68.2)	13 (31.7)	29.751	3	**<0.001***
Private sector employee	7 (29.2)	16 (70.8)			
employed					
Unemployed	83 (68.2)	38 (31.8)			
	6 (22.2)	19 (77.8)			

*Significant results in bold at alpha of <0.05; df=degree of freedom

4.6.2 Association between knowledge and self-management practices among children and adolescents with T1D

Table 4.5 The self-management behaviors of children with type 1 diabetes were assessed by computing a composite score. The composite score was obtained by summing the scores of questions that assessed individuals' knowledge of self-management practices and then dividing by the number of variables. The composite score was thereafter classified as either "knowledgeable" or "not knowledgeable," based on whether the results were below or above the mean levels.

One participant in the focus group discussion (FGDs) recognized that possessing a strong understanding and aptitude for problem-solving was highly beneficial for effectively managing their individual issues.

> *"I understand the significance of various meals, their types, dietary choices, and appropriate portions is crucial. Furthermore, I comprehend how my body reacts in hypo or hyper situations, and how I resolve them has been crucial in effectively managing my diabetes," said the patient. [participant 4, FGD 1]*

Two informants reported that maintaining a similar diet may affect them differently.

> *"It is a constantly changing disease. What may be effective today may not be effective tomorrow. You may be able to eat something one day and be fine, but if you eat the same thing the next day, it can have a completely different effect on you. Therefore, you cannot simply rely on a single approach and assume everything will be fine."*

Whereas another respondent from the FGD describes weariness due to diabetes being a chronic condition, it necessitates continuous self-management.

"It is exhausting to have to think about my diabetes all the time. It is not like I can take a break from it. Occasionally, my blood glucose levels fluctuate excessively, either reaching abnormally high or low levels. While adhering to all recommended measures. It can be frustrating and overwhelming. Sometimes, I wish I could have a break from it." (Respondent 3, FGD 4.)

The assessment of knowledge using the Spoken Knowledge in Low Literacy in Diabetes (SKILLD) tool revealed a significant understanding of issues such as optimal healthy eating, achieving blood glucose targets, adhering to medication, and adopting effective coping skills.

Table 4.5: Association between knowledge and self-management practices among children and adolescents with Type 1 Diabetes in Nairobi City County

	N=209				
	Self-management practice (n/%)				
Variable	**No**	**Yes**	**χ 2**	**df**	**p-value**
Knowledge evaluated using The Spoken Knowledge in Low Literacy in Diabetes (SKILLD) Questionnaire.					
Healthy eating					
knowledgeable	95(81.5)	22(18.5)	61.936	1	**<0.001***
not knowledgeable	27(28.9)	65 (71.1)			
Blood glucose target goals					
knowledgeable	93 (62.8)	55(37.2)	4.321	1	0.038
not knowledgeable	29 (47.7)	32 (52.3)			
Medication compliance			7.839	1	0.005
knowledgeable	113(62.0)	69(38.0)			
not knowledgeable	9 (34.5)	18 (65.5)			
Healthy coping skills					
knowledgeable	122(60.3)	81(39.7)	Fisher (**p<0.001**) *		
not knowledgeable	0 (0)	6(100)			
Physical activity			2.305	1	0.129
knowledgeable	55(64.4)	30(35.6)			
not knowledgeable	67 (54.2)	57 (45.8)			

*Significant results in bold at alpha of <0.05; df=degree of freedom

Table 4.6 indicated that the knowledge of spontaneous response was significant in physical activity, daily blood sugar monitoring, and current insulin use.

The critical informant guide and focus group discussions also reported as follows:

> *"Children are likely to remember when they see and relate to what they practice rather than asking what practice they carry out …"*

or that

> *"…they are more likely to be influenced by the pictures than when asked to remember how they carry out the practices…"*

Also, the respondent indicated that

> *"Following my diagnosis, I refrained from taking insulin injections. I consumed traditional herbs that my parents bought me, with the belief that they would lower my blood glucose level. I took them for a week, nevertheless, the attempt was unsuccessful, prompting me to seek medical assistance once more. Following a consultation with a medical professional, I have commenced a regular regimen of administering insulin injections." (Participant 6, FGD2)*

Another respondent indicated.

> *"I felt uncomfortable and embarrassed when performing diabetes mellitus self-management practices such as blood glucose monitoring or taking insulin injections in public places." (participant 8, FGD 4)*

Table 4.6: Knowledge on self-management practices among children and Adolescents with Type 1 Diabetes in Nairobi City County

Variable	**N=209 Self-management practice (n/%)**		**$\chi 2$**	**df**	**p-value**
	No	**Yes**			
Spontaneous Response to Knowledge					
Healthy eating					
knowledgeable	64(54.0)	55(46.0)	2.338	1	0.126
not knowledgeable	58(64.2)	32 (35.8)			
Blood glucose target goals					
knowledgeable	69(61.3)	44(38.7)	0.938	1	0.342
not knowledgeable	53(54.7)	43 (45.1)			
Medication compliance					
knowledgeable, not knowledgeable	43(57)	32(43)	0.100	1	0.751
	79 (59.2)	55 (40.8)			
Healthy coping skills,					
knowledgeable	41(55.8)	32(44.2)	0.311	1	0.577
not knowledgeable	80 (59.7)	54 (40.3)			
Practices					
Physical activity of over 60 minutes					
Yes					
No	38(41.7)	53(58.3)	19.490	1	**< 0.001***
	84 (71.2)	34 (28.8)			
Monitoring of blood sugar daily					
Yes			16.564	1	**<0.001***
No	51(45.8)	61(54.2)			
	71 (72.8)	26 (27.2)			
Currently using insulin					
Yes	101 (54.3)	85 (45.7)	Fisher		**(p<0.001) ***
No	21 (91.7)	2 (8.3)			

Significant results in bold at alpha of 0.05; df=degree of freedom

The significant parameters above five were further subjected to regression analysis-multinominal regression.

On table 4.7, a direct correlation was observed between self-management score and the employment status of the primary caregiver (civil servant=0.001, private employed=0.033, self-employed=0.000), identification of healthy eating (No=0.000),

physical activity (No=0.040) and monitoring of blood sugar daily (No=0.003). There was a weak association between self-management score and education level (primary level=0.070 and secondary level=0.059), as well as identification of the target group's blood glucose targets (No=0.470).

The researcher successfully established a significant association between socio-demographic and economic factors, knowledge, and self-management practices among the children and adolescents with T1D in the study area. As a result, the hypothesis stating that there is no significant association between differentiated respondents' socio-demographic and economic factors, knowledge, and self-management practices among the children and adolescents with T1D in Nairobi City County, Kenya was rejected.

Table 4.7: Multinormal regression of self-management practices score parameter estimates self-management practices score.

					95% Confidence Interval for Exp(B)	
		Wald	**Sig.**	**Exp(B)**	**Lower Bound**	**Upper Bound**
Highest Education Level Attained	Pre-primary	3.274	0.070	.164	.023	1.162
	Primary	3.579	0.059	.179	.030	1.064
	Secondary	Ref.				
Employment status of primary caregiver	Civil servant	10.084	**0.001***	12.215	2.606	57.245
	Private sector employee	4.551	**0.033***	6.464	1.164	35.897
	Self-employed	15.471	**0.000***	14.360	3.807	54.172
	Unemployed	Ref.				
Identification of Healthy Eating	No	39.380	**0.000***	14.884	6.404	34.593
	Yes	Ref.				
Identification of Blood Glucose target goals	No	.523	0.470	0.708	.277	1.806
	Yes	Ref.				
Physical activity	No	4.222	**0.040***	2.236	1.038	4.817
	Yes	Ref.				
Monitoring of blood sugar daily	No	8.772	**0.003***	3.098	1.466	6.547
	Yes	Ref.				

***Significant results in bold at alpha of 0.05**

CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

The following section presents a discussion, concluding thoughts, and suggestions based on the research objectives and findings. It establishes a connection between the study's qualitative and quantitative results and interprets them using the existing literature and the researcher's observations. The analysis aligns with the study questions and objectives. Similar studies are compared to emphasize similarities and variations in outcomes.

The conclusions are derived from these discussions and aligned to the research questions and objectives, followed by recommendations from the experts in the respective area and suggestions for prospective researchers. The chapter is structured in the following manner: Demographic and socioeconomic profiles of the adolescents and children presenting with T1D, self-management practices knowledge among the children and adolescents with T1D, self-management practices executed by young people presenting with T1D, and the correlation between sociodemographic and economic factors and knowledge levels with self-management practices among children and adolescents diagnosed with T1D.

5.1 Discussions

5.1.1 Response Rate

The response rate is the ratio of participants who provided a response to the study, measured as a percentage. The study incorporated questionnaires to collect data from children and adolescents in the study area, and out of the total target population 94.6% responded, questionnaires have been used in past studies (Lund et al., 2021). The study conducted key informant interviews and achieved 90% participation as well as the study conducted focus group discussions and achieved a 100% response

rate. The use of a mixed-method approach has shown improved quality of outcome. The study used qualitative and quantitative research methods, as indicated by (Keller *et* al.,2020). The overall response rate for the study was approximately 94.9%. This indicates that many participants responded to the data collection methods used in the study, making the findings more reliable and representative of the target population (Fincham, 2008).

5.1.2 Socio-demographic and economic profiles of the children and adolescents diagnosed with T1D

From the research findings, it was indicated that there was no significant relationship between sex and self-management practices. This was also noted in another study conducted on young people that revealed no significant correlation between participants' sex and adherence to self-management (Nakhla *et al*.2017). Most of the respondents were in their adolescence, considering that their variance from the average was three years. This suggested that age being relatively consistent among respondents, the relatively homogeneous group of individuals regarding age suggested a developmental advantage in learning and adherence to self-management capability. Adolescence is a transitional age, the component of being responsible for their health while with minimal support from caregivers, as observed in another study (Delameter *et al*,2018).

The positive association between educational attainment and self-management practices shows that health education has a vital role in diabetes care. Children and adolescents with a higher level of education are likely to better understand diabetes instructions, monitor their blood sugars, and be compliant with medical therapy. This aligns with another study by (Guo *et al,*2020), who indicated that increased diabetes

knowledge enhanced adherence to self-management practices and improved glycemic outcomes.

Self-employed individuals accounted for the majority; this information provided some insight into the socioeconomic status of the primary caregivers. Studies have found that self-employed caregivers may have greater flexibility in their work schedule and may be able to provide more regular support in managing their child's diabetes. On the other hand, government employees may have more structured work schedules that could limit their ability to provide support during certain times of the day (Reidy *et al.,* 2018).

Primary caregivers facilitate self-management practices among young people diagnosed with type 1 diabetes (T1D). Primary caregivers' employment and marital status impacted their ability to support their child's self-management practices. Marriage has been correlated with an intellectual ability to seek care and provide more emotional and social support to their child, which can improve adherence to self-management practices and overall well-being. This has been observed in another study regarding emotional support for children and teenagers diagnosed with type 1 diabetes. (Delameter *et* al., 2018)

A strong correlation was noted between the children and adolescents' age and educational attainment as well as the marital and employment status of their primary caregivers and the self-management practices.

5.1.3 Knowledge of self-management practices among children and adolescents with TID

The findings of the study highlighted that there is a distinction between general awareness of diabetes self-management and in-depth knowledge of specific aspects. Respondents indicated that they could identify self-management practices in general,

although a remarkable 95.9% of respondents acknowledged the self-management practice in general, merely 45.8% could identify healthy eating practices, which indicated a knowledge gap in understanding the importance of nutrition in managing diabetes. Thirty-point seven percent could identify blood glucose target goals, which suggested a significant lack of awareness about the specific blood glucose levels they should aim for to keep their diabetes in control. Only 13.7% could identify medication compliance, a significant concern, as taking prescribed medications correctly is crucial for managing diabetes effectively. Only 3.3% of the respondents were able to identify healthy coping mechanisms that are essential for managing the emotional and psychological challenges of the condition. The low awareness highlights an area of concern. This was indicated in another study by (Owusu *et* al.,2023).

When prompted, knowledge of specific aspects showed that 43.0% of the respondents knew specific aspects of healthy eating. This improved, indicating that many individuals needed more comprehensive knowledge about optimal nutrition. Only 46.2% of the respondents knew specific blood glucose target goals. This suggested a need for comprehensive education on diabetes management and blood glucose control. 64.3% of the respondents were knowledgeable about aspects of medication compliance. This shows that more respondents know the importance of following their prescribed medication schedules when prompted. Only 34.8% of the respondents knew about healthy coping skills. This was still a meager percentage, hence the need for better support and education on healthy coping skills. Overall, respondents' report indicated that 40% consumed, on average, 2-4 servings of fruits daily, and only 26% consumed 3-5 servings of vegetables daily. This indicates a need to encourage higher vegetable and fruit intake for optimal nutrition. 93% of the respondents used vegetable oil to cook food in their households. While vegetable oil is a healthier option than

certain other types of oils, portion control and overall dietary balance are also essential for diabetes management. This was also noted in another study by (Tewahido *et* al.,2017).

The findings underscored the importance of targeted education and support programs focusing on healthy eating habits, controlling blood glucose, complying with medication regimens, engaging in physical activity, and adopting healthy coping strategies. These efforts can help bridge the knowledge gaps and improve diabetes self-management outcomes among individuals with diabetes. Additionally, promoting a healthy diet with a higher intake of vegetables can positively impact their overall health and well-being (Sherifali *et al.,*2018).

5.1.4 Self-management practices carried out by children and adolescents presenting with T1D in the researched area

The study revealed a considerable proportion of children and teenagers with Type 1 Diabetes (T1D) in the selected study area were not effectively managing their diabetes. Only 41.6% of the respondents could meet the self-management score, suggesting that most young people with T1D face challenges managing their condition. This has important implications for understanding self-management behaviors among young people with T1D in the study area. The findings revealed that a significant percentage of children with T1D in the study area were struggling with inadequate self-management practices. The low proportions of good problem-solving skills, healthy coping skills, healthy eating habits, medication compliance, risk reduction behaviors, blood sugar monitoring, and physical activity indicated that this population needed interventions and support to improve self-management practices.

Another study revealed that multiple factors contribute to the poor self-management practices, including poor socioeconomic background, insignificant dietary patterns,

puberty age, negative perspective, and lack of understanding of the condition (De Wit *et al.,*2022).

In another study, it was indicated that it's important to address self-management issues to attain the most desirable glucose levels in the blood and improve the standards of living for young individuals living with T1D (Donepudi *et* al.,2018).

Self-management strategies play a vital role in upholding regulated levels of blood sugar in children with type 1 diabetes. Monitoring their own blood glucose levels is one of the key self-management practices in T1D and is an important part of blood glucose level therapy, extensively tracking outcomes in these patients. Also helps identify episodes of hypoglycemia and hyperglycemia, aiding in their treatment, and providing guidance for adjusting insulin doses to reduce variations in blood glucose levels. These results exhibit similarity to those from previous studies (Dimeglio *et al.,*2018).

Education and support services are necessary for young individuals diagnosed with T1D and their households. Proper education about diabetes self-management, problem-solving strategies, healthy coping skills, and healthy lifestyle habits is crucial to empower children and adolescents to take charge of their condition. Additionally, involving caregivers in the process could create a supportive environment, facilitating better self-management practices.

The study demonstrated that most of the children and adolescents with T1D were struggling with optimal self-management; hence, the need for urgent targeted education, caregiver support, and involvement to improve the health outcome.

5.1.5 Association between socio-demographic and economic characteristics, knowledge and self-management practices among children and adolescents with T1D

A positive link was seen between the age and education attainment level of the children and adolescents, as well as the marital status and work status of the primary caregivers, and their self-care practices. However, there is insufficient evidence to suggest that the primary caregivers' age, education attainment, marital, and employment status have a marked influence on self-care practices among children and adolescents with type 1 diabetes (T1D). Another study indicates that participants between the ages of 10 and 14 exhibited an 80% greater adherence to diabetes self-management in comparison to those aged 15 and 18. The finding aligns with another study conducted jointly by Oxford University and Tanzania (Geneti *et* al.,2022). Also indicated in another study, adolescence is a period when glycemic control commonly deteriorates (Chiang *et* al.,2018). Also observed in another study, a combination of non-modifiable and modifiable factors, such as psychosocial and behavioral changes, causes reduced treatment adherence, treatment regimens, and decreased physical activity. Puberty, in addition to the effect of glycemic control, also increases the risk for the development of diabetic complications. (Gregory *et* al.,2022).

The level of knowledge using SKILLD indicated that it was significant for healthy eating, blood glucose target goals, medication compliance, and healthy coping skills. In contrast, the level of knowledge on spontaneous response was significant in physical activity, daily blood sugar monitoring, and insulin use; there was a positive correlation between self-management score and the employment status of the primary caregiver, identification of optimal dietary choices, regular exercise, and daily monitoring of blood glucose levels. However, there was a weak association between

self-management score and education level and identification of blood glucose targets for the target group. The association was anticipated since the primary caregiver of the respondent was employed, could afford transport to the CDiC clinic without fail, hence receiving diabetes self-management education, and hence able to practice as compared to their counterparts who could miss the appointment and skip monitoring their blood sugar daily. The study found that there was a positive association between the age and education level of the children and adolescents, the employment and marital status of the caregivers, and the self-management practices.

5.2 Conclusions

According to the study objectives, the researcher identified themes.

5.2.1 Socio-demographic and economic profiles of the children and adolescents presenting with T1D

The study found a direct link between age and education attained of children and adolescents, as well as the marital and work status of caregivers of these children and adolescents, and self-management practices of children and adolescents with type 1 diabetes (T1D). This showed that older children were likely to demonstrate better diabetes care practices as well as their caregivers were likely to direct influence diabetes management.

5.2.2 Knowledge on self-management practices among children and adolescents with TID

The study highlighted that there was general awareness of self-management practices among children and adolescents with type 1 diabetes; however, specific knowledge on key aspects such as adherence to healthy eating, medication, and coping skills was inadequate; hence, there is a need for comprehensive and targeted diabetes education.

5.2.3 Self-management practices carried out by children and adolescents presenting with T1D

The study found minimal self-management practices among children and adolescents with Type 1 Diabetes, hence need for improved problem-solving, coping, and eating habits, as well as medication compliance, risk reduction, blood sugar monitoring, and physical activity. These underscores need to strengthen individualized education and support systems.

5.2.4 Differential association between the respondents' socio-demographic and economic, knowledge and self-management practices among children and adolescents with T1D

A positive link regarding the self-management practices scores healthy eating and physical activity identification, daily blood sugar monitoring, and the primary caregiver's employment status.

In summary, while the research found positive associations between caregiver marital and employment status and self-management practices, there is insufficient evidence to conclude that primary caregivers' age, education level, marital status, and work status have a marked influence on self-management practices among children and adolescents with T1D.

5.3 Recommendations

5.3.1 Policy and Programmatic Recommendations

The study recommended the following:

1. The Ministry of Health to incorporate comprehensive, culturally and age-appropriate self-management in diabetes care and management.

2. The health care providers need to enhance self-management practices among children and adolescents with T1D and their caregivers through contextualized education and support.

5.3.2 Further Research Recommendations

A longitudinal study should explore specific factors influencing self-management practices among children and adolescents with type 1 diabetes, focusing on adolescent perspectives for deeper understanding of their unique needs and challenges.

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APPENDICES

Appendix I: Consent/ Assent Form

TITLE: SELF-MANAGEMENT PRACTICES AMONG CHILDREN AND ADOLESCENTS PRESENTING WITH TYPE 1 DIABETES MELLITUS IN SELECTED FACILITIES IN NAIROBI CITY COUNTY, KENYA

Head investigator: Ann Wanjiku Mugo

P.O. Box 10631-0400 Nairobi

Mobile number: 0720925906

E-mail: annmugok@gmail.com

Affiliations: Kenyatta University (K.U),

School of Public Health

Introduction.

This study adopts a cross-sectional design to investigate self-management practices in children diagnosed with type 1 diabetes in Nairobi City County in Kenya.

Purpose of this study

The purpose of this study is to collect data from children aged 8-18 years with type 1 diabetes in order to obtain precise projections on their self-management practices.

Dear parent/guardian/ principal caregiver.

We would like to encourage your child to take part in a study aimed at investigating self-management practices in children and adolescents with type 1 diabetes(T1D) between the ages of 8 and 18.

Participation in the study is optional; thus, we request your consent.

Your child is required to take in the study, but you have the option to decline his/her participation without providing an explanation and without facing any repercussions.

If you require any further clarifications, reach out to the principal investigator.

Researcher's statement

I Ann Wanjiku Mugo will survey self-management practices among children with T1DM aged between 8-18 years attending Changing Diabetes in Children clinics in selected facilities within Nairobi City County.

The study aims to collect data on the self-management behaviours of children and adolescents and the factors that affect these practices.

The research will be conducted at the clinic and a follow-up at the household.

Procedure

With consent from the Facility administration, a research assistant will introduce himself/herself to you and your child, ask some questions about self-management practices, and record the answers in a questionnaire. This will be done with assistance from the health care providers to ensure that there will be minimal disruption of the clinic.

Confidentiality

For privacy and confidentiality of your child no identifiable will be used in any report on this study. All original documents will be assigned unique numbers, and only the unique (coded) numbers will be used to identify all data collected from the children. The collected data will be exclusively utilized for learning purposes.

Voluntariness

Your child's involvement is totally voluntary. If you decide not to give permission, your child will not be forced to participate. The child shall be told to fill out the assent form to participate.

Benefits

Participating in this study shall not have any financial compensation. However, this research shall help us understand self-management practices among T1DM children, and adolescents which shall help policymakers better address those needs to achieve optimal health outcomes.

Certificate of Consent: parent /guardian/principal caregiver

I _____ (parent /guardian/principal caregiver) affirm that I have perused and understood the contents of the information sheet. I have received a comprehensive explanation of the study requirements and effects. I understand that I have the complete freedom to withdraw my child from the study at any time without incurring any negative consequences'. I am consenting to have my child (name)_____ enrolled for participation in this study.

Name _____(mother/father/guardian)

Signature/thumbprint _____

Name of witness_____

Signature of witness_____

Dear participant,

What does the study require from you?

I will ask you several questions about your condition. This information will not affect you in any way, as it is strictly observational. Please allow me to use the information I get from you for research purposes.

Confidentiality

The data obtained in the research is strongly confidential and intended solely for academic use. Only the investigators in the study team shall have access, and no names shall be used for report writing and publication.

Withdrawal from study

Participating in this research is completely optional. You have the liberty to discontinue your participation in the study at any point, without the need for justification or facing any adverse implications. If you have any inquiries regarding the task at hand, please do not hesitate to reach out to me using the previously mentioned contact details.

Assent for children above 8 years.

I _____ (participant) agreed to be recruited for this study. I have received a clear and comprehensive explanation of the study requirements and effects. I understand that I have the liberty to discontinue my participation in the study at any point without facing any consequences.

Participant's name_____ participant's Signature/thumbprint _____

Witness's name_____ witness's Signature _____

Appendix II : Data Collection Instruments

QUESTIONNAIRE (Adapted from Kenya Stepwise Survey,2015 Questionnaire)

My name is ANN WANJIKU MUGO, I am currently enrolled as a student at KENYATTA UNIVERSITY, where I am pursuing a master's degree in Public Health. I am conducting a study on self-management practices among children and adolescents with type 1 Diabetes Mellitus in the clinic. Your assistance will be highly appreciated.

INSTRUCTIONS: (The questionnaire is to be filled out in the presence of the parent/guardian/principal caregiver.) Please complete the questionnaire as candidly and suitably as possible by ticking (√) or writing the correct answers in the spaces provided. If you need clarification, do not hesitate to contact me as soon as possible. Mobile No. 0720925906 or 0775925906.

I hereby guarantee that the provided information will be only utilized for academic research purposes and will be handled with the highest level of confidentiality.

INTERVIEWER----------DATE----------

PARTICIPANT IDENTIFICATION NUMBER----------

Section 1: Demographic information

Question	Response		Code
Sex (as observed)	Male 1 Female 2		C1
What is the exact date on which you were born?	----/----/------- dd/mm/yy		C2
What is your age?	Years		C3
How long have you spent in school?	Years		C4
Highest level of education attained/completed?	Pre-primary	1	C5
	primary	2	
	Secondary	3	
	Refused	88	
Settlements /residence	Informal	1	C6
	Lower	2	
	Middle	3	
What is the marital status of your parent(s)/ Guardian/principal caregiver	Never married	1	C7
	Married	2	
	Separated	3	
	Widowed	4	
What is the primary employment status of your parent(s)/principal caregiver in the past 12 months?	Civil servant	1	C8
	Private sector employee	2	
	Self-employed	3	
	Unemployed	4	
	Refused	88	
What is the total number of individuals below the age of 18, including yourself, reside in your household?	Number		C9

SECTION 2: BEHAVIOURAL MEASUREMENT

Diet Diversity			
Question	Response		Code
On average, how frequently do you consume fruits throughout a week? (USE THE SHOWCARD)	Number of days Don't know	 77	D1
What is your daily fruit consumption in servings? (USE THE SHOWCARD)	Number of servings Don't know	 77	D2

On average, how many days do you eat vegetables in a week? (USE THE SHOWCARD)	Number of days Don't know	 77	D3
What is your daily consumption in servings? (USE THE SHOWCARD)	Number of servings Don't know	 77	D4
What kind of oil or fat is commonly utilized for cooking in your household? (USE THE SHOWCARD) SELECT ONLY ONE	Vegetable oil (liquid)	1	D5
	Vegetable fat (solid)	2	
	Lard or suet (animal fat)	3	
	Butter or ghee	4	
	Margarine	5	
	Palm oil	6	
	Coconut oil	7	
	Other	8	
	None in particular	9	
	Don't know	77	
What is the average number of meals per week that you consume which were not cooked at home? (Choice of meal: Breakfast, Lunch, or Dinner)	Number Don't know	 77	D6
What is the frequency of your daily meals?	Once	1	D7
	Twice	2	
	Thrice	3	
	Don't know	77	
Do you consume snacks in between meals?	Yes	1	D8
	No	2	
Do you go without a meal in a day?	Yes	1	D9
	No	2	
Physical activity			
Do you for engage at least for 10 minutes continuously walking or riding a bicycle to school /church/mosque?	Yes	1	P1
	No	2	
What is the frequency of your walking or cycling in a week?	Number of days ---------		P2

What is the duration of your walking/cycling activities?	Hours: minutes --------: ----------		P3
Is there a provision of physical exercise at the school?	Yes	1	P4
	No	2	
If the answer is yes, please provide the frequency per week?	Once	1	P5
	Twice	2	
	Thrice	3	
	Don't know	4	
How do you engage yourself at home during your free time, weekends and or holidays?	Engaging in computer-based activities	1	P6
	Viewing television	2	
	Participating in domestic tasks	3	
	Playing outside the house	4	
	Doing nothing	5	
What are your favorite games?	Indoor games	1	P7
	Outdoor games	2	
	None	3	
Lifestyle Advice			
Has a physician or other healthcare providers recommended that you engage any of the following activities over the past year?			
Avoid starting or ceasing the use of tobacco	Yes	1	L1a
	No	2	
Do not start or reduce alcohol consumption.	Yes	1	L1b
	No	2	
Consume a minimum of five servings of fruit and/or vegetables daily.	Yes	1	L1c
	No	2	
Minimize consumption of fat in your diet.	Yes	1	L1d
	No	2	
Engage in physical activity.	Yes	1	L1e
	No	2	
Walk or ride a bicycle to places	Yes	1	L1f
	No	2	
Strive to maintain optimal body weight or strive towards weight reduction	Yes	1	L1g
	No	2	

Key informant interview guide

Dear respondents,

My name is ANN WANJIKU MUGO, I am currently enrolled as a student at KENYATTA UNIVERSITY, where I am pursuing a master's degree in Public Health. I am conducting a study on self-management practices among children and adolescents with type 1 Diabetes Mellitus in the clinic. Your assistance will be highly appreciated

The research is exclusively intended for academic purposes, and the information collected will be handled with highest level of **CONFIDENTIALITY**.

Interviewer_____Date_____

Person being interviewed

_____Facility_____

1. How long have you been a healthcare provider for this facility?

Let's start by discussing your patients with T1DM diagnoses. The goal for these patients is to learn to self-manage their disease daily.

2. In your experience, how long does it typically take for these patients to be successful at this self-management?

[PROBE: taking medications correctly, making lifestyle changes, having good lab values, etc.

3. Which self-management practices do your patients seem to adhere to the most?

PROBE: Which practices are diabetes patients least likely to follow?

PROBE: How do you track whether or not your patients are following up on referrals for diabetes education and healthcare services from other healthcare providers?

4. To what extent do the individuals surrounding a patient with type 1 diabetes play a crucial role in assisting them in managing their condition? (This would be family members, teachers, friends, etc.)

PROBE: Who are the most crucial individuals providing support for that person?

PROBE: does the patient's school have a role to play?

5. What are the best ways for a person with T1DM, or their supportive people, to learn more about diabetes control?

PROBE: what are the most reliable educational resources available to patients regarding appropriate medication therapy, blood sugar testing, and related topics?

PROBE: Where are the most reliable sources of information regarding diet and other lifestyle modifications?

6. Are you familiar with any Diabetes Self-Management Training (DSMT) courses?

These are multi-session, evidence-based courses, sometimes called Diabetes Self-Management Education (DSME)

PROBE: Are you familiar with any Diabetes Support Groups?

PROBE: What do you tell patients about group support?

7. What do patients report to you about these support and educational services?

PROBE: Are these services generally available to your TIDM patients?

[e.g., adequate services are provided for the county's population, supplied at suitable times, and in easily accessible locations, etc.]

PROBE: Do you have any recommendations for enhancing them or increasing their accessibility to your patients?

8. Which areas of diabetes care do you personally feel least knowledgeable about? PROBE: What are the most efficient ways to assist healthcare providers in enhancing their training or education in this specific field?

Focus Group Discussion Guide

Dear respondents,

My name is ANN WANJIKU MUGO, I am currently enrolled as a student at KENYATTA UNIVERSITY, where I am pursuing a master's degree in Public Health. I am conducting a study on self-management practices among children and adolescents with type 1 Diabetes Mellitus in the clinic. Your assistance will be highly appreciated

The research is exclusively intended for academic purposes, and the information collected will be handled with highest level of **CONFIDENTIALITY**.

Interviewer_____Date_____

Focus Group No. _____No. of participants _____M____

Question

What self-management practice (s) do you know?

What specific aspects of the program have you found most enjoyable?

Which areas of self-management have found less enjoyable?

PROBE: What aspect of the program presented the greatest challenges?

In what way do you believe this program contributed to your child's capacity to effectively manage their condition?

What resources such as tools and methods have you discovered to be most efficient in assisting your child in managing their diabetes?

PROBE: How has this program motivated their active participation in managing their diabetes?

How has this program aided them to overcoming barriers to efficiently managing their condition?

PROBE: What methods have they acquired and employed or anticipate to employ, to deal with these challenges?

Have you shared your experiences in this program to your family members, friends, or acquaintances?

What knowledge or insights have you gained from this program, and what specific details or lessons learnt do you plan to pass on to others?

Do certain program's activities have a greater impact on maintaining their health as opposed to others?

What elements of this program have exerted the most impact on your capacity to effectively manage your condition?

PROBE: In what manner or way? How?

Out of all the issues we explored today, which one carries the highest significance for you?

Appendix III: Research Authorization

KENYATTA UNIVERSITY
GRADUATE SCHOOL

Email: dean-graduate@ku.ac.ke

Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel, 8710901 Ext. 4150

DATE: 21ST October, 2015

Our Ref: Q57/24153/2013

Director General,
National Commission for Science, Technology
and Innovation
P.O. Box 30623-00100
NAIROBI

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION ANN WANJIKU MUGO — KEG. NO.Q57/ 24155/2013

I write to introduce **Ms. Ann Wanjiku Mugo** who is a Postgraduate Student of this University She is registered for M.P.H degree programme in the **Department of Community Health**.

Ms. Mugo intends to conduct research for a M.P.H proposal entitled, **"Self-Management Practices among Children Presenting with Type 1 Diabetes Mellitus in Selected Facilities in Nairobi, City County, Kenya."**

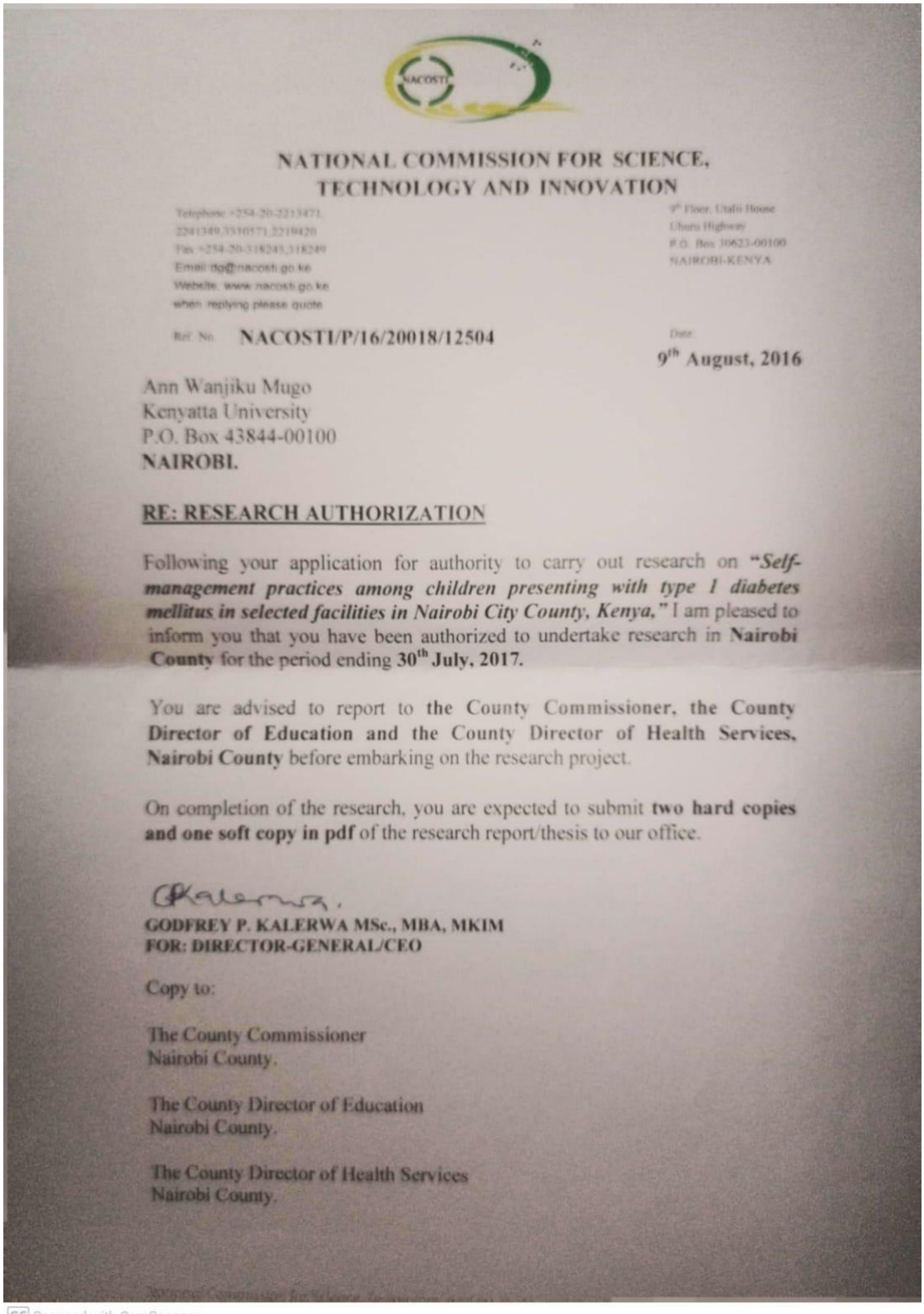
Any assistance given will be highly appreciated.

Yours Faithfully,

MRS LUCY N. MBAABU

FOR: DEAN, GRADUATE SCHOOL

Appendix IV: NACOSTI Authorization



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: +254-20-2213471, 2241349,3310571,2219420
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
when replying please quote

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

Ref. No. NACOSTI/P/16/20018/12504

Date
9th August, 2016

Ann Wanjiku Mugo
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"Self-management practices among children presenting with type 1 diabetes mellitus in selected facilities in Nairobi City County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Nairobi County** for the period ending **30th July, 2017.**

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

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

GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO

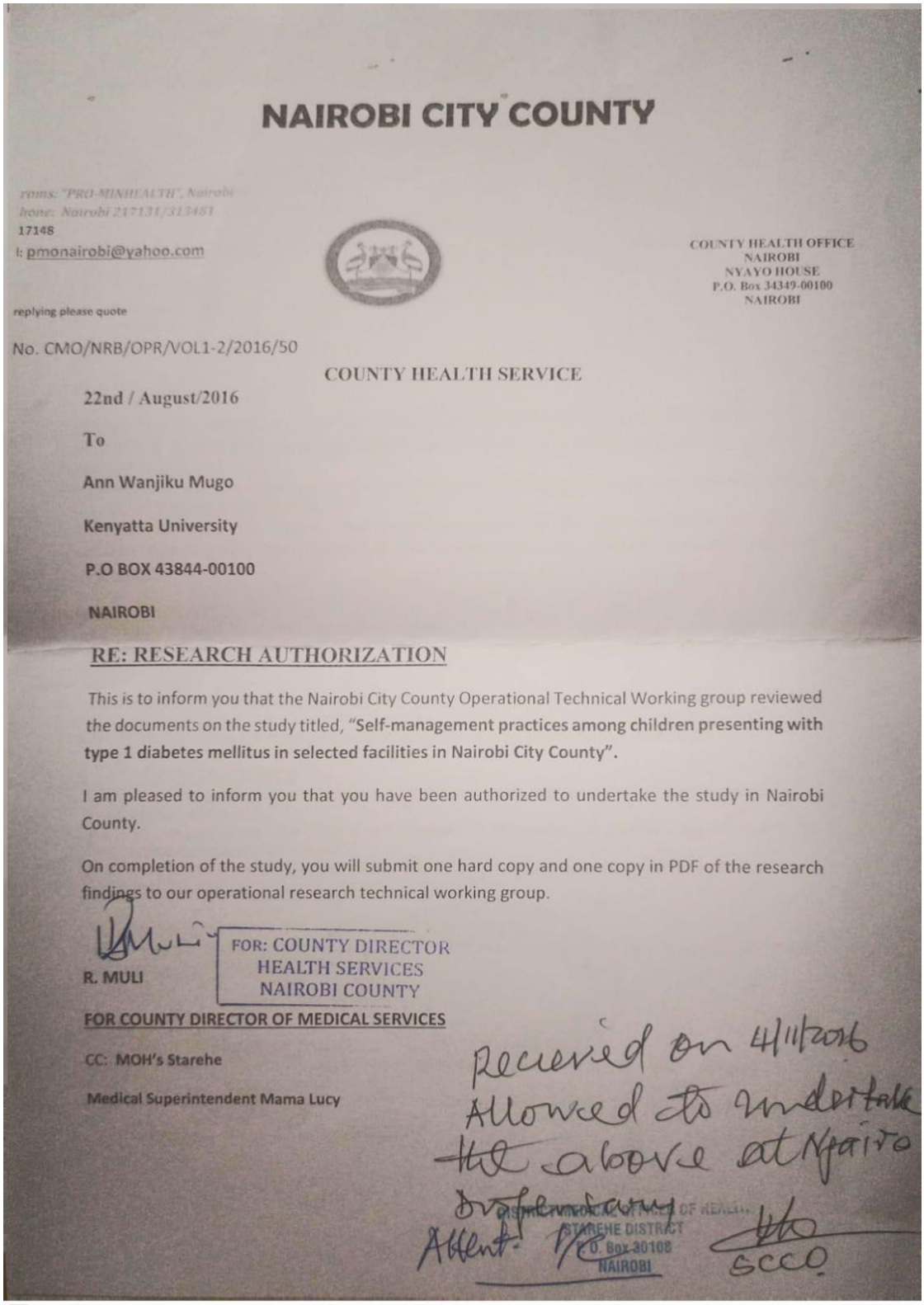
Copy to:

The County Commissioner
Nairobi County.

The County Director of Education
Nairobi County.

The County Director of Health Services
Nairobi County.

Appendix V: Research Authorization (Nairobi City County)



NAIROBI CITY COUNTY

rams: "PRO-MINHEALTH", Nairobi
hone: Nairobi 217131/313481
17148
l: pmonairobi@yahoo.com

COUNTY HEALTH OFFICE
NAIROBI
NYAYO HOUSE
P.O. Box 34349-00100
NAIROBI

replying please quote

No. CMO/NRB/OPR/VOL1-2/2016/50

COUNTY HEALTH SERVICE

22nd / August/2016

To

Ann Wanjiku Mugo

Kenyatta University

P.O BOX 43844-00100

NAIROBI

RE: RESEARCH AUTHORIZATION

This is to inform you that the Nairobi City County Operational Technical Working group reviewed the documents on the study titled, "Self-management practices among children presenting with type 1 diabetes mellitus in selected facilities in Nairobi City County".

I am pleased to inform you that you have been authorized to undertake the study in Nairobi County.

On completion of the study, you will submit one hard copy and one copy in PDF of the research findings to our operational research technical working group.

R. MULI

FOR: COUNTY DIRECTOR
HEALTH SERVICES
NAIROBI COUNTY

FOR COUNTY DIRECTOR OF MEDICAL SERVICES

CC: MOH's Starehe

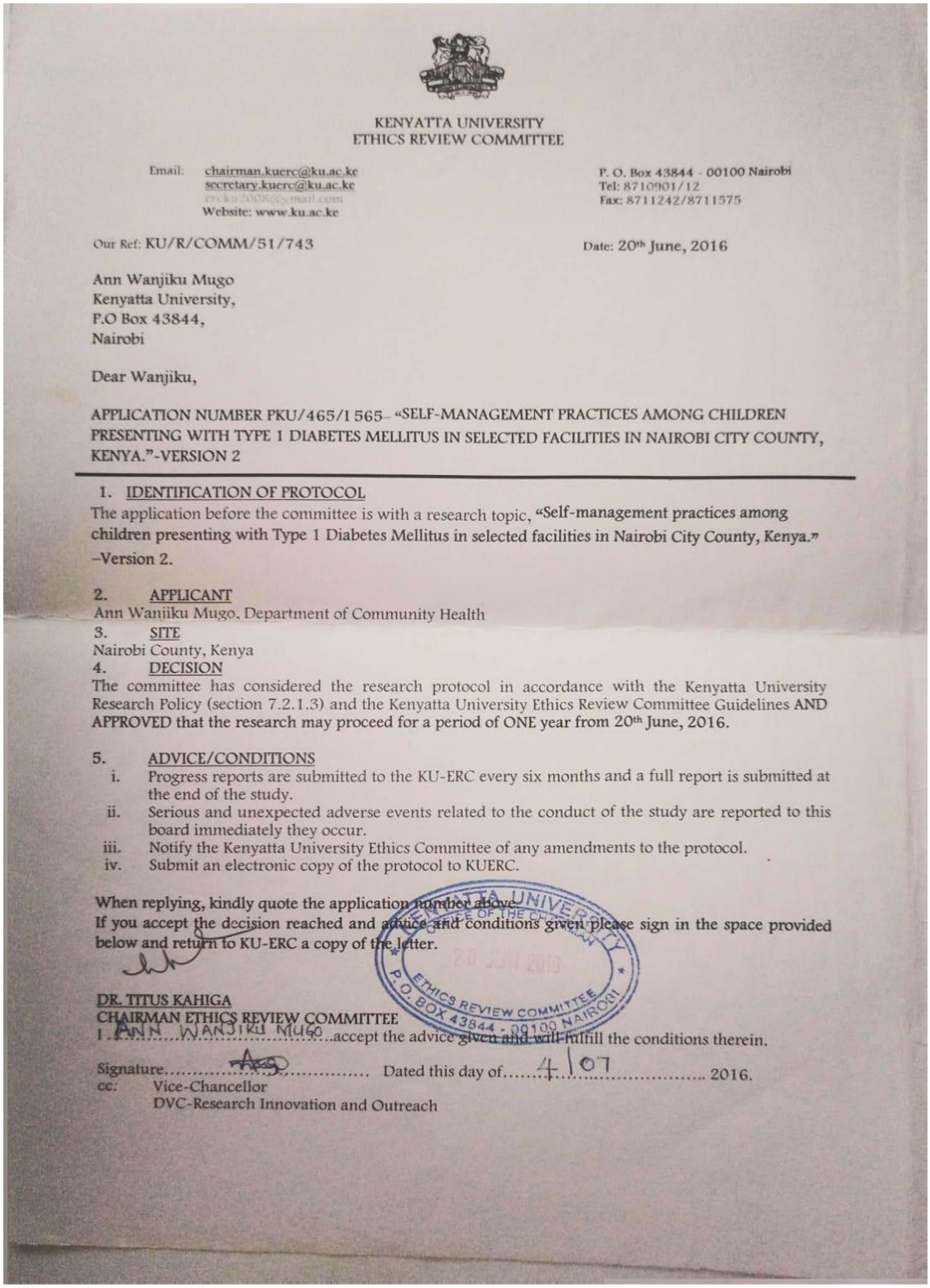
Medical Superintendent Mama Lucy

Recieved on 4/11/2016
Allowed to undertake the above at Kenyatta

STAREHE DISTRICT
P.O. Box 30108
NAIROBI

SCCO

Appendix VI: Ethics Review Committee



KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE

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

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

Our Ref: KU/R/COMM/51/743

Date: 20th June, 2016

Ann Wanjiku Mugo
Kenyatta University,
P.O Box 43844,
Nairobi

Dear Wanjiku,

APPLICATION NUMBER PKU/465/1 565– "SELF-MANAGEMENT PRACTICES AMONG CHILDREN PRESENTING WITH TYPE 1 DIABETES MELLITUS IN SELECTED FACILITIES IN NAIROBI CITY COUNTY, KENYA."-VERSION 2

1. IDENTIFICATION OF PROTOCOL

The application before the committee is with a research topic, **"Self-management practices among children presenting with Type 1 Diabetes Mellitus in selected facilities in Nairobi City County, Kenya."** –Version 2.

2. APPLICANT

Ann Wanjiku Mugo, Department of Community Health

3. SITE

Nairobi County, Kenya

4. DECISION

The committee has considered the research protocol in accordance with the Kenyatta University Research Policy (section 7.2.1.3) and the Kenyatta University Ethics Review Committee Guidelines **AND APPROVED** that the research may proceed for a period of ONE year from 20th June, 2016.

5. ADVICE/CONDITIONS

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

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

KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE P.O. BOX 43844 - 00100 NAIROBI

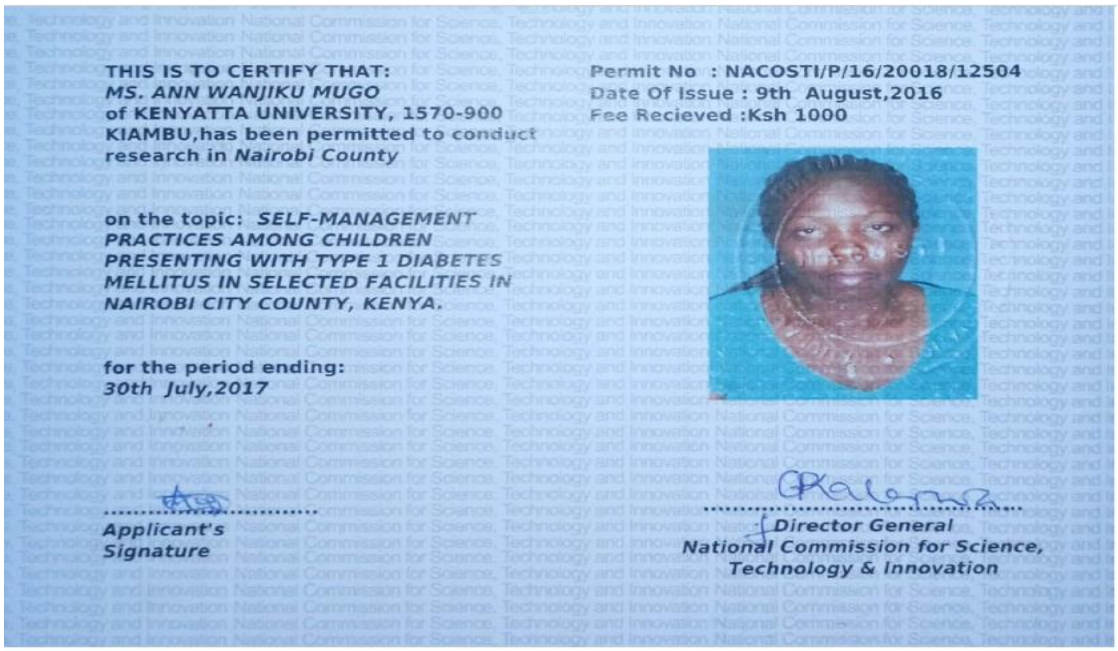
DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE

I ANN WANJIKU MUGO ..accept the advice given and will fulfill the conditions therein.

Signature..... Dated this day of..4/07..... 2016.

cc: Vice-Chancellor
DVC-Research Innovation and Outreach

Appendix VII: NACOSTI Permit



THIS IS TO CERTIFY THAT:
MS. ANN WANJIKU MUGO
of KENYATTA UNIVERSITY, 1570-900
KIAMBU,has been permitted to conduct
research in *Nairobi County*

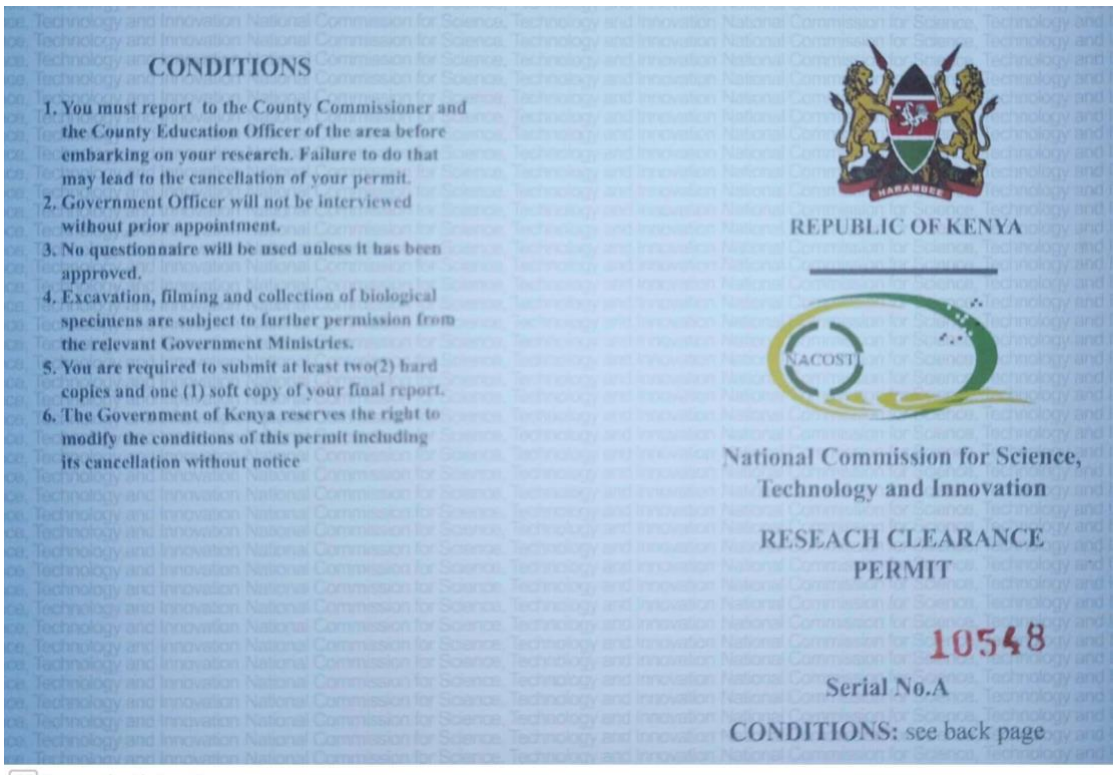
on the topic: *SELF-MANAGEMENT PRACTICES AMONG CHILDREN PRESENTING WITH TYPE 1 DIABETES MELLITUS IN SELECTED FACILITIES IN NAIROBI CITY COUNTY, KENYA.*

for the period ending:
30th July,2017

Permit No : NACOSTI/P/16/20018/12504
Date Of Issue : 9th August,2016
Fee Recieved :Ksh 1000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation



CONDITIONS

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

REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEACH CLEARANCE PERMIT

10548

Serial No.A

CONDITIONS: see back page