FACTORS THAT INFLUENCED CLINIC UTILIZATION BY DIABETES MELLITUS TYPE II PATIENTS DURING COVID-19 PANDEMIC AT KAKAMEGA COUNTY GENERAL HOSPITAL

CAROLYNE MUKHAYA MULANDA

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE CONFERMENT OF THE DEGREE OF MASTER OF SCIENCE IN HEALTH SYSTEMS MANAGEMENT AT KENYA METHODIST UNIVERSITY

SEPTEMBER 2023

DECLARATION

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

Signature _____ Date: _____
Carolyne Mukhaya Mulanda
HSM-3-2855-2/2013

Recommendation by Supervisors
We confirm that the work presented in this thesis was undertaken by the candidate under our supervision.

Signature: _____ Date: _____
Prof. Wanja Mwaura-Tenambergen
Department of Health Systems Management,
School of Health Sciences and Medicine
Kenya Methodist University

Signature: _____ Date: _____
Dr. Kezia Njoroge
Department of Health Systems Management
School of Health Sciences and Medicine
Kenya Methodist University

DEDICATION

I am dedicating this thesis to my loving husband Eliud, my daughter Valerie and my son Melvin for their unfailing patience and encouragement, and whose support remains invaluable. Above everything else, to God for providing the resilience to complete this program.

ACKNOWLEGMENT

I wish to acknowledge the following persons who have made significant contribution to the success of the entire process: My two supervisors from Kenya Methodist University- Prof. Wanja Mwaura-Tenambergen and Dr. Kezia Njoroge for the indispensable academic guidance; the KeMU Science, Ethical and Research Committee for providing the approval for the study; the National Commission for Science, Technology and Innovation for the timely facilitation of the study license; the Kakamega County General Hospital Ethical and Research Committee for issuing authorization to conduct the study at the facility; Dr. Rachel Vihenda of the Diabetes Specialty clinic Kakamega County General Hospital for enabling actual data collection at the clinic; the clinic Health Care Workers and respondents for consenting to participate in the study and making it possible to collect data and Mr. Mchidi Nebert for his support during study data analysis.

ABSTRACT

The World Health Organization (WHO) defines Health systems as organizations, people, and actions aimed to promote, restore or maintain health. The system aims to attain a balance between timely interventions for emerging diseases and continued attention to chronic ailments. During the Corona Virus Disease (COVID-19) outbreak, WHO cautioned that older individuals and those with comorbidities like diabetes were at higher risk of severe COVID-19 infection, complications, and deaths. Studies established that Health-related Quality of Life (HRQoL) was significantly different and lower at P<0.001 for the female patients with COVID-19, patients with severe disease at the intensive care units, those who had comorbidity, and those who were much older (age >60 years). Diabetes Mellitus type II (DM II) accounts for 85-89% of the global diabetes disease burden. The disruption of usual care provided to DM II patients by the pandemic guidelines fomented fears that DM II infections and resultant deaths could worsen. This study adopted a cross-sectional mixed method design to collect quantitative data corroborated by qualitative data. The study, which was anchored on the pillar of health service delivery, investigated factors that influenced utilization of Diabetes Mellitus Type II specialty clinics during the COVID-19 pandemic at Kakamega County General Hospital (KCGH). Specific objectives include the influence of individual patient characteristics, complexity of the disease factors, facility factors and COVID-19 restrictions on utilization of specialty clinics. The target population consisted of 467 DM II patients attending the KCGH diabetes specialty clinic, out of which 211 respondents were randomly sampled to provide quantitative data, while qualitative data was gathered from 6 purposely sampled healthcare providers for the Focused Group Discussion (FGD) utilizing interview guide. Ethical approval was obtained from KeMU Science, Ethical and Research Committee, a study permit from NACOSTI and permission to collect data from the KCGH provided by the hospital's Ethics and Research committee. Quantitative data were analyzed using Statistical Packages for Social Scientists (SPSS) Version 25. The Chi-square test was employed to assess the significance of associations between the outcome and independent variables, and logistic regression was used to determine the predictive odds of factors that influenced DM II clinical utilization. Qualitative data was analyzed based on study themes arising from the objectives. The study established that DM II clinic utilization was 152 (72%). Statistically significant exposure variables at p<0.05, were; age of respondent, good diet control, family support and the ease of getting medication from the patient. Further, the study established the following factors to be significant in predicting DM II clinical utilization at the multivariate level: age (β=\-0.82, OR= 0.44, p=0.029), family support (β=-1.327, OR= 0.26, p=0.005) and ease of getting medications (β=0.832, OR= 2.297, p=0.025) prediction. The study recommends: i) Policy establishment to support the activation and promotion of telemedicine for outpatient clinics, ii) Establishment of comprehensive and sustainable medical supply processes that can withstand pandemic dynamics. II) Development of patient records digitization to avert missing care data that can adversely affect care outcome, iv) Biased policy establishment cognizant of sociodemographic factors' influence on clinic utilization.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

DM II	Diabetes Mellitus type II
COVID-19	Coronavirus Disease 2019
ENT	Ear, Nose and Throat
FGD	Focused Group Discussion
HS	Health System
HSM	Health Systems Management
HRQoL	Health-related Quality of Life
KCGH	Kakamega County General Hospital
KNBS	Kenya National Bureau of Statistics
LIC	Low Income Countries
LMIC	Low- and Middle-Income Countries
MDGs	Millennium Development Goals
MOH	Ministry of Health
MCH	Maternal Child Health
MOMs	Ministry of Medical Services
NCDs	Non-communicable Diseases
NHIF	National Health Insurance Fund
IDF	International Diabetes Federation
PHC	Primary Health Care
SC	Sub- County
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2
SPSS	Statistical Package for Social Sciences
UNICEF	United Nations Children's Fund

WHO	World Health Organization

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Health systems (HS) consists of structures whose sole goal is to promote, reinstate or uphold health (World Health Organization [WHO], 2007, 2010). These structures enable resource mobilization and allocation for disease prevention and treatment to include treatment of injuries (Jamison et al., 2006). The WHO further indicates that a good HS should deliver effective, safe, quality personal and non-personal health interventions to those that need them, when and where needed, with minimum waste of resources. This is an indication that whoever needs care, whether promotive, preventive, or curative, receives it efficiently with significant consideration for quality and safety. This, it is expected, is optimal when there is interconnectivity of the six pillars of the health care system: leadership and governance, health financing, health service delivery, human resources for health, medical products and technologies, and health information system (WHO, 2007, 2010).

Health care is largely underutilized in the developing world (O'Donnell, 2007), and pandemics could make a bad situation worse. Healthcare utilization indicates the interaction by an individual with an established healthcare facility or healthcare provider (Amsah et al., 2023). According to the Kenya National Bureau of Statistics (KNBS,2023), the Kenya demographic health survey reported that in the last five years running to 2022, the recorded mortality rate for every 1000 live births stood at 41 deaths for under 5 years, 32 infant deaths and 21 neonatal deaths.

This study builds on the systems blocks interconnectivity to explore utilization of health services during unique periods and specifically during the COVID-19 pandemic. The study focused on the pillar of service delivery to establish continued use of non-emergency services by people living with non-communicable diseases, during the pandemic that involved an infectious disease.

Past pandemics have majorly been contagious, with a spiral spread within a short period of time. One of the remarkable global pandemics in human history was that of influenza - Spanish flu-that occurred in 1918, resulting in about 500 million infections and up to 100 million deaths during the three successive waves that occurred between 1918 and 1919. There was an increase from 0.5 to 24 deaths per 1000 people per year during the pandemic and about 16.5 deaths per 1000 people per year post pandemic through 1925(Andayi et al., 2019). Though there was increased healthcare facility utilization from 8.6 to 146.8 visits/1000 person per year by 1918, this was attributed to enhanced reporting health facility expansion rather than extended pandemic transmission. Literature on the outbreaks of plague in 1920 and smallpox in 1925, details how the outbreaks played a role in high reported mortality and morbidity (Andayi et al., 2019)

This study sought to determine the availability and utilization of specialty clinic services to safeguard the wellbeing of persons living with communicable diseases (NCDs) during the pandemic. Coronavirus disease 2019 (COVID-19) is an acute respiratory infection caused by Severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2). COVID- 19 was declared a public health emergency of global concern on 30th January 2020 and subsequently as a pandemic on 11th March 2020 as

the spread of the disease became unprecedented. Kenya documented the primary case of COVID-19 in March 2021 and by July 2021, there were 192,758 cases of COVID-19 with 3775 deaths (Ministry of Health [MOH], 2021). The highly contagious disease threatened to overrun an already overwhelmed health system, and there was an urgent need to protect the population living with chronic diseases from COVID-19 infection effects.

Literature indicates consistent uptake of health services with significant decline in April 2020. There was demonstration of reduction in fourth prenatal care, Hypertension and Diabetes mellitus outpatient visits (Wambua et al.,2022). In a different study that sought to determine the impact of COVID-19 on health-related quality of life (HRQoL), it was determined that HRQoL scores were lower for; female patients with COVID-19 disease, patients with severe disease, and older patients above 60 years (Poudel et al., 2021).

Diabetes Mellitus (DM) is a chronic disorder of metabolism that presents with chronic elevated blood sugar resulting from protein, fat, and carbohydrate metabolism. This is a consequence of defects in insulin secretion, action or both and calls for sustained medical care involving several risk-reduction approaches beyond blood sugar control (Kaufman, 2012). DM burden and poor health outcomes have been on the rise in many developing countries, attributed to multiple factors, among them poor disease knowledge and utilization of healthcare. The foregoing understanding calls for improved health system capacities that promote utilization of diabetes and other outpatient clinics in all seasons.

The emergence of COVID-19 promoted the realignment of Health care workers, other resources, services, and programme with WHO warning that older individuals and those with comorbidities like diabetes had higher odds of COVID-19 infection, complications, and death (Gamble et al., 2020). The diabetes population is mainly older with multiple comorbidities of obesity, chronic obstructive pulmonary disease, high blood pressure and cardiac failure, making it a vulnerable population for COVID-19 adverse outcomes (Pugliese et al., 2020). The DM II accounted for a global diabetes burden of 85-89% at the onset of the pandemic.

During this period, patients were advised by health professionals to have a 30-day insulin and medical supplies (Gamble et al., 2020). These are recommendations that would appear difficult to heed for a population of people in disadvantaged socioeconomic settings and catastrophic health expenditure made worse by the COVID-19 pandemic. For insulin-dependent diabetics, the risk of an insulin shortage or delayed delivery could be detrimental.

Due to social distancing guidelines, outpatient diabetes clinics greatly curtailed services to serve only urgent cases (Teixeira da Silva, 2020). Though COVID-19 restrictions were expected to ease over time, caution was expected to continue while visiting clinics. Considering these circumstances, most forms of audio, video or texting technology gained greater utility in communication between providers and patients. These new ways of communication became an accepted modality for conducting clinical visits, enabling those without sophisticated consumer devices like smartphones, access to health services (Assefa et al., 2021).

In the devolved health system of Kenya, policy and regulation is the role of the National MOH, (The Constitution of Kenya, 2010), while delivery is the responsibility of the 47 county HSs (MOH, 2014). Kenya's public health care delivery system is composed of four levels, and services in each of these levels are delivered by public and private facilities (MOH, 2014). At level 1, health services are mainly community while the services provided at levels 2, 3 and 4 are referrals with increasing complexity and sophistication of care. The services for diabetes mellitus are established at levels 2 to 4 facilities in earmarked specialty clinics (MOH, 2014).

At all six levels of health care, it is expected that some aspects of preventive, promotive, curative, and rehabilitative healthcare to include targeted services for DM is delivered to the public as outlined in the Kenya Essential Package for Health. Though the private health sector attempts to emulate this set up, the facilities in this category are commonly stand-alone with weak referral systems. The foregoing explains the complexity of utilizing the DM II services in a non-pandemic set up, an indication of expected disease management challenges in the face of COVID-19. The investigator sought to establish factors that influenced utilization of Diabetes Type II Specialty Clinics during COVID -19 pandemic at Kakamega County General Hospital.

1.2 Statement of the problem

Diabetes prevalence is globally estimated at 463 million, with about 4.2 million (11.3%) global deaths (Bai, et al., 2020). Real time published local data on diabetes related information remains a challenge that may affect aligned decision-making and appropriate resource allocation. In addition, DM, accounts for 618 Years of Life Lost (YLL) per 100,000 populations (D'Souza et al., 2023). Increased odds for

development of severe COVID-19 with respect to hospitalization, care at the critical care units and death among persons with DM II was determined by a study that also revealed that age was a dominant factor in predicting disease severity (Edqvist et al., 2023). It was reported that 50% of the COVID-19 mortalities had suffered Diabetes or a second NCD (Kiragu et al., 2021), with diabetes receiving premier mention. Non-clinic attendance has been associated with mortality hazard, which increases with every missed appointment. Unpublished information indicated clinic utilization had dropped from 1000 DM II patients at the Diabetes specialty clinic at KCGH by the beginning of the year 2020, to about 470 patients by July 2020. Further, the initial testing and reporting of COVID-19 was biased to counties proximal to Nairobi, with inclusion of distal and rural counties happening much later in the year 2020. The following observation informed the bias to the study. That: the estimated DM prevalence in Kakamega count was 4.5%, severe COVID-19 and deaths were reported among persons living with DM, there was an observed unpublished decline in DM clinic attendance at KCGH against literature of increased mortality hazard with every missed clinic use and, at the peak of the pandemic, Kakamega County had reported only 14 COVID-19 cases against the preceding odds. The need to establish how living with DM, the existing healthcare structures and the pandemic influenced clinic utilization for a disease with significant burden was glaring.

Table 1.1 shows the varying clinic utilization levels for a clinic with a potential of attending to over 1000 people living with DM II.

Table 1. 1

Utilization of Diabetes Specialty Clinic at KCGH on diverse periods

Year	Month	Number of patients in the Month
2019	November	No data
2020	July	No data
2020	December	259
2021	March	298
2021	July	1037
2021	December	442
2022	February	467
2022	June	533

1.3 Purpose of the Study

Service, facility, and clinic programme re-organization, has the likelihood of affecting access to routine healthcare. This study specifically sought to identify and characterize how the demand and supply factors influenced utilization of DM II specialty clinic services during the COVID-19 pandemic.

1.4 Broad Objective

The study which is anchored on the pillar of delivery of health services, examined factors that influenced utilization of DM II specialty clinics during COVID-19 pandemic at Kakamega county general hospital.

1.5 Objectives of the study

1. To determine how individual patient characteristics influenced utilization of DM II specialty clinics during COVID-19 pandemic at KCGH.
2. To assess how disease factors influenced utilization of DM II specialty clinics during COVID-19 pandemic in Kakamega County at KCGH.
3. To determine how health facility related factors influenced utilization of DM II specialty clinics during COVID-19 pandemic at KCGH.
4. To investigate how COVID-19 restrictions influenced utilization of DM II specialty clinics at KCGH.

1.6 Research Questions

i). How did individual patient characteristics influence utilization of DM II specialty clinics during COVID-19 pandemic at KCGH?

ii). How did the disease related factors influence utilization of DM II specialty clinics during COVID-19 pandemic at KCGH?

iii). How did health facility related factors influence utilization of DM II specialty clinics during COVID-19 pandemic at KCGH?

iv). How did the COVID-19 restrictions influence utilization of DM II specialty clinics at KCGH?

1.7 Justification of the Study

Though pandemic effects will normally involve a significant size of the population and therefore significant resources allocation and urgent policy reviews, policy development must start focusing on management of emerging issues. Post pandemic

analysis should generate guidelines that recognize the slow but significant burden of the existing NCDs. During the outbreak of the Ebola virus disease, it was reported that having addressed the primary needs of managing the outbreak, the resultant long-term consequences of unattended needs of other non-infectious diseases was more consequential.

The study literature review reveals information gap on quantitative evidence on the effect of COVID-19 and the global measures instituted on the provision and utilization of primary DM II service during COVID-19. Literature demonstrates biased studies on maternal well-being and infectious diseases globally, with limited studies in the resource –scarce settings in the Low – income -countries. With an estimated prevalence of 4.5% for diabetes mellitus in Kenya and the resultant substantial share of the disease burden, there is an urgent need to address management of NCDs, in this case DM. The study aimed to describe utilization of the DM II services based on patient characteristics, disease complexity, health facility factors and the disease restriction factors during the pandemic. This information is important in supporting the establishment of strategies that insulate patients with chronic conditions from experiencing severe disruption in service utilization in times of emergencies. Outbreaks of disease and other service disruption factors are an existential threat to the achievement of sustainable development goal 3. Because of the unpredictability of emerging health threats to the utilization of health care by those deemed most vulnerable, the findings of this study shall be employed to model the combination of factors that promote adherence and use these factors to predict utilization in all sets of patients that visit DM II clinics.

1.8 Limitations of the Study

This study had important challenges that could have threatened external validity. First, the study was cross-sectional and therefore unable to infer causality. Given, this study sought to uncover factors influencing clinic utilization among DMII in a health system already riddled with weak health infrastructure, the findings may not provide clear indicators of specific factors to diabetes, a threat that had the potential of generating innate health systems not specific to DMII. Further, this study relied on self-report, a weakness that did not control for reporting bias.

1.9 Delimitation of the Study

The inquiry majored on the Kakamega county excluding the rest of Kenya's 46 counties. The study population was DM II patients sampled in the study facility. Scope considered specialty clinic utilization from March 2021 to February 2022 looking at the third to fifth waves of the pandemic. Other DM II patients living in Kakamega County but outside the sampled health facility were delimited from the study.

1.10 Significance of the study

To the County Government of Kakamega, as well as the hospitals' management, the study shall contribute to the development of policies and regulations as well as improving the existing ones. The study findings also highlight the available strategic approaches like utilization of mobile telephone communication, which the county government can adapt to enhance utilization of the DM II specialty clinic.

To academics and scholars, the findings shall provide a platform and a basis for conducting further research. The study will contribute to the field of knowledge on the

effects of pandemics on existing NCDs and strategies to improve their management during such seasons. Researchers can utilize the findings as a basis for discussions on future strategies on consistent quality management of chronic diseases in the wake of pandemics.

The study will be beneficial to facility managers as it provides an opportunity for need-based evidence to enhance professional development to workers on DM, management during pandemics and emergencies.

1.11 Assumptions of the Study

First, this study assumed that the respondents were knowledgeable on factors influencing utilization of diabetes type II specialty clinics in the period of COVID-19 pandemic. Second, that the respondents were honest and gave accurate information regarding the study subject. Third, that the results obtained are generalizable to rural Counties and all public hospitals in the country.

1.12 Operational definition of terms

Access	Timely use of services according to need; an indicator that the services are physically available, appropriate, acceptable, and affordable.
Acceptability	The sensitivity of the services to the gender, age and religion which allow or disallow specific health services utilization.
Affordability	A measure of people's ability to pay for services including the cost of the foregone benefit without financial hardship.
Availability	Supply of health services and providers in a fashion that is responsive to the needs of the population, in the right place and at the right time.
Diabetes mellitus type II	A chronic medical condition characterized by hyperglycemia resulting from defective insulin secretion or action.
Demand barriers	Hurdles that hinder service utilization dependent on the service delivery, price or cost factors influencing an individual's or community's ability to use health services.
Geographic barrier	Distance and transportation obstacles to accessing a health facility.
Health facilities	The various types of healthcare institutions available.
Hyperglycemia	High blood sugar levels

Incidence	The number of new cases that develop in each period of time.
Isolation	The separation of sick people from those without a contagious disease.
Prevalence	This refers to the proportion of total diabetes Type II persons in Kakamega County Referral Hospital at the time of the study.
Quarantine	The separation and restricted movement of well persons who have been exposed to persons with COVID-19.
Self-care	Use of rest and herbal preparations without consultation with a health care provider.
Specialized DM Clinic	A clinic that is focused on providing services dedicated to the management of Diabetes Mellitus. The care providers have received targeted training.
Supply barriers	Aspects existing in the health care system that negatively influence service uptake by individuals.
Traditional care	Treatment sought from herbalist or spiritual healers.
Utilization	The level at which people make use of the specialty clinic services provided at the health facility.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter focuses on literature related to the factors that influenced utilization of DM II specialty clinics. Specifically, the chapter will outline the empirical reviews on clinic utilization during COVID-19 pandemic and other past pandemics, and finally demonstrate the conceptual framework exhibiting the relationship between the study variables.

2.2 Utilization of diabetes mellitus type II specialty clinics

After the outbreak of COVID-19 in China in late 2019 and the subsequent change to pandemic in early 2020, the disease became a clinical threat to the entire world, disrupting the organization of existing health programmes and systems. The disruption would impact management of acute illnesses and non-communicable disease (NCDs). The reorganization of human resources and those assigned to outpatient care spearheaded the prioritization of the health system in the fight against the COVI-19, while care for those with chronic illnesses was partially or totally disrupted (Apornak, 2021). One of the NCDs whose management was disrupted, yet it had significant association with the COVID-19 mortalities, was diabetes mellitus, hence the choice of the study area by the researcher.

Several studies have determined that important routine health monitoring indicators for DM II patients had decreased in the number of patients who received Hemoglobin A1c (HbA1c) testing as well as a decrease in the overall utilization of non-emergent outpatient visits (Chen et al., 2022). HbA1c is a blood test that indicates an average

glucose level for the past two to three months. The development of long-term complications is influenced by prolonged high blood sugar (hyperglycaemia) accelerated by poor control, hence the indication for regular blood sugar monitoring.

2.3 Influence of Patient characteristics on utilization of DM II specialty clinics

2.3.1 Individual factors

The study by Baruah and Kumar (2014), emphasized the importance of multidisciplinary action and teamwork in the management of the non-insulin-dependent diabetics. The study held that self -check enhances the quality and safety of treatment, hence the need for health systems that guarantee diabetics access to the basic requirements important for self-care practice. In a separate study, there was reduced utilization, including HbA1c testing and physical clinic visits among veterans with diabetes, an indication of missed opportunities to manage the chronic condition, which could be consequential (Bornstein et al., 2021). Though increased telehealth visits partially compensated for the missed in-person visits by July 2020, this does not explain how telehealth supported disease management, such as routine HbA1c measurement, among patients with diabetes, the study concluded. Furthermore, substantial geographic and racial variation in telehealth uptake is likely a premonition for future disparities in long-term clinical complications among this patient population.

2.3.2 Religious factors

The interplay between religion and health is a historical practice. The world can adopt religious practices whose effects contribute to reduction of infectious outbreaks within

communities, carefully evaluating past successes and failures to guide the future (Knight et al., 2021). Though the church was not the only source of spread, there were indications it played a role in spreading the disease by the church attendees interacting with those who were infected (Knight et al., 2021). The WHO (2020) issued guidance for religious leaders and faith - based communities in the context of COVID-19 to include frequent clean-up of worship places, maintaining a social distance of 3 feet between people, among other measures. In Kenya, around April 2020, there was closure of churches necessitated by the fear that in normal circumstances, it would not be easy to maintain social distance, a critical precautionary condition in the fight against COVID-19. The growth in Online Church services within the country, maintained the church's relevance in a world slowly being taken over by technology (Kilonzo & Omwalo, 2021). The greatest influence of religion perhaps lies in issues related to reproductive health, such as fertility control and abortion. Religion has also had an influence on certain health practices such as male/ female circumcision, willingness to donate or receive blood even in emergency cases and the belief in fate and destiny (Romdhane & Grenier, 2009).

2.3.3 Family factors

The study by Waari et al. (2018), established that dissatisfaction with family members support, was a factor found associated with poor medication adherence and clinic visits. Communication and peer identification were noted to have been strengthened during group treatment, an approach that may cause achievement of the clinical goal through, self-efficacy, better outlook toward diabetes and internal locus of control, resulting in patient empowerment (Raballo et al., 2012). Fahlén and Davidsson (2016)

conducted a study in Uganda and found that factors that affected healthcare utilization were, lack of access to medicines, healthcare, and use of alternative medicine.

2.4 Influence of complexity of the disease on utilization of DM II specialty clinics

2.4.1 Disease duration factors

The study by Abebaw et al. (2016), established that, education level, the duration of diabetes disease and knowledge about diabetes and its medications, were predictive of anti-diabetic medication adherence by patients. The study concluded that it is paramount to provide education and counselling on medication adherence for DM management. A different study aimed to investigate the potential role of health literacy in determining adherence to pharmacological, and lifestyle management in patients diagnosed with diabetes mellitus and found that health literacy was a significant predictor of adherence to medical management.

2.3.2 Disease symptoms factors

The diabetic patients require good control of blood sugar as a benefit to prevent COVID-19 transmission. The COVID-19 pandemic is comparable to other pandemics which exhibited high complication and mortality rates among people living with diabetes. Severe COVID-19 was associated with elevated blood pressure and sugar, heart and cerebrovascular diseases (Hebbard, 2021). Severe infection was also seen in children who were hospitalized or admitted to the paediatric critical Care units.

2.3.3 Regimen complexity factors

The surge in COVID-19 caused diabetologists to make treatment decisions based on low threshold evidence to keep up with the complex interaction of COVID-19 with comorbidity. An assessment of factors associated with poor adherence to clinic visits among diabetic patients in Ethiopia during the COVID-19 pandemic, established that 57% of the study participants expressed a negative effect of the pandemic on clinic follow-up visits or that the medicines were not available. Attendance to a health centre and presence of comorbidity predicted high odds of poor adherence. In conclusion, the study established that proximity to health facility and presence of medical comorbidity exhibited significant association to poor adherence to medicines (Shimels et al., 2021). In seeking to understand if adherence to medication and blood sugar control was influenced by the different medicine protocols for DM II patients, a study established that patients who knew their medication well, were more adherent to their medication than those who did not. The study further observed that post adjusted analyses revealed significant medication regiment complexity had an influence on poor blood sugar control (Ayele et al., 2019).

2.5 Influence of facility related factors on utilization of DM II specialty clinics

2.5.1 Availability of medical commodities factors

Several studies have shown that COVID-19 negatively affected the availability of medications. The study that evaluated barriers experienced by patients suffering from glaucoma during scheduled visits and medication adherence during the pandemic, determined that non-availability of medicines (54.81%) ranked as a top barrier to

treatment compliance (Subathra et al., 2021). A different observation was made on the potential of diabetics missing scheduled doctor appointments for review of medication effectiveness occasioned by the COVID -19 lock-down. Self-isolation of health workers after meeting COVID-19 infected persons further reduced the number of workers available at health facilities. The consequence may have been continuous periods of poorly managed high or low glucose levels. The study concluded that, the option of telemedicine though viable, may only be available to few individuals at private health facilities with financial capability (Tuczynska et al., 2021).

2.5.2 Hand hygiene facilities

During the pandemic, one study established the challenges faced by health facilities while attempting to separate curative from vaccination sections. It was observed that achieving adherence to physical distancing at the health facilities as recommended by the WHO was impossible in various health facilities because of infrastructural limitations. The Infection control measures in place were found to be inadequate, with few hand hygiene facilities reported in 23.5% of the 51 sites of study. Outpatient services operation, particularly maternal and child health service, were significantly disrupted by the pandemic's infection transmission prevention measures (Garg et al., 2020).

2.5.3 Stay home directive

Access to medical care is a right for every Kenyan, one which was challenged during the strain imposed on the health systems by the COVID-19 pandemic. This affected the approach to primary care for the populations. The medical professionals asked the

public to visit healthcare facilities if experiencing emergency health conditions. This generalized advice to the public may have failed to consider the significant disease burden that accompanies unattended NCDs, compounding the already vulnerable health systems (Roberton et al., 2020).

2.6 Effect of COVID-19 restrictions on utilization of DM II specialty clinics

2.6.1 Lockdown effect

In the past, studies have demonstrated that pandemics, for instance Ebola in West Africa, can overwhelm health service provision, particularly in an already stressed health systems. A study modelling the coverage of essential maternal and child health interventions in the wake of the pandemic, found an 8.3-38% increase in maternal death per month in low and middle-income countries. Mothers reported lack of transport to health facilities during curfew and restricted movement of persons (Roberton et al., 2020). This is following the pandemic restrictions applied almost in all parts of the world, and these had varied effects on different illnesses. In the UK, detrimental effects of the lock-down on glycaemic control as well as on health behaviour and a reduction in prescriptions for another comorbidity like hypertension were reported. These results mirror the finding by of Lippi et al. (2021) who established better glycaemia control among type 1 diabetic patients as opposed to DM II patients. The authors hypothesized that lockdown could have affected utilization of services.

Limiting movement of the population inside and outside a specific area, results in decreased physical activity and increased television time coupled with junk eating, which led to poor control among DM II patients. In a study carried out in India,

investigating the effects of COVID-19 Lock-down on lifestyle and other medical issues of patients with DM II, found disruption in patients' meal timings, increased snacking and change in the quality of diet; carbohydrate consumption and fat consumption increased (Ghosh et al., 2020).

2.6.1 Social distancing

The rise in telehealth visits along with mail-order pharmacy could have played a role in ensuring that the medication refills are timely managed, with zero to minimal disruption on the prescription fills (Patel et al., 2021). This modality may have provided a solution for refill services but not those that require an in-person visit. The study that reviewed the impact of telemedicine on patients with uncontrolled DM II mellitus during the COVID-19, identified significant positive influence of telemedicine care on blood glucose control among diabetics at risk during the pandemic. These study subjects were patients utilizing virtual clinics. The study demonstrated how integration of telemedicine into the diabetic clinics would minimize the in-person visits, especially where facility spaces compromised implementation of the directives on social distancing sitting arrangements (Tourkmani et al., 2021).

The study by Namukhula (2015) found that better management and control of diabetes mellitus in health projects was influenced by infrastructural readiness of the clinics. This study considered facility sitting or waiting space arrangements and the influence on clinic utilization in the face of COVID -19 threat.

2.6.2 On phone consultations

The COVID-19 pandemic situation presented an immediate reorganization of healthcare delivery processes. Virtual health applications replaced current in-person visits in response to social distancing guidelines. Several countries embraced the use of virtual clinics to provide diabetes care following preventative measures like lockdowns, rescheduling of physical appointments, and the fear by patients that they would get infected during physical clinic attendance (Tourkmani et al., 2021). The use of telecommunication or telehealth was found to be useful in delivering patient care in the face of decreased personal contacts (Monaghesh & Hajizadeh, 2020). The utility of telehealth is not new, So and Chung, (2018) had reported its utility, although in Africa setting, this area received minimal focus. A longitudinal study in Kenya revealed that mobile phones had no impact on diabetes clinic appointment (Ndwiga et al., 2019). Although the current study is focused on utilization of clinic appointments, the foregoing finding by Ndwiga could be a proxy indicator of the trust that the Kenyan populace has in the use of mobile phone in health care.

2.7 Theoretical Framework

The study is founded on Andersen's Behavioural model of health services utilization.

2.6.3 Andersen's Behavioural Model of Health Services

It has been established that other than the need-related factors, utilization of health care is also supply-induced, making it heavily reliant on the structures of the health care system. Studies on utilization of health services therefore fall under a mixed

demand-supply framework, with some studies showing utilization based on patient's social characteristics (Babitsch et al., 2012).

The behavioural model (BM) consists of several levels of both individual and contextual determinants of health services utilization. The model divides the main components of contextual characteristics, similar to the approach individual characteristics have traditionally been divided as; predisposing, enabling and need factors for individual use of health services.

Individual predisposing factors consider demographic characteristics of age and sex, social factors to include education, occupation, ethnicity and social relationships like family status, and mental factors - attitudes, values, and knowledge related to health and health services. The contextual factors predisposing individuals to the use of health services include the social composition of communities, collective and organizational values, cultural norms and political perspective.

The enabling factors consist of individual disposable income to pay for health services, the individual's health insurance and cost-sharing requirements. Organizational factors consider the means of transportation, travel time to and waiting time for health care. Factors considered at contextual level, include affluence, the rate of health insurance coverage, the relative cost of goods and services, health policies and methods of compensating providers. Organization level refers to the amount, variety, locations, structures and distribution of health services facilities and personnel. It also involves physician and hospital density, office hours, provider mix, quality management oversight, and outreach and education programs. Health policies also fall into the category of contextual enabling factors.

The needs factor, as defined by Andersen (1995), recognized the perceived need for health services (how people view general health and illness symptoms) and evaluated need (i.e., professional assessments and objective measurements of patients' health status and need for medical care). At the contextual level, there is the distinction between environmental need characteristics and population health indices. Environmental need reflects the health-related conditions of the environment – occupational, traffic, and crime-related injury and mortality rates, while Population health indices are overall measures of community health, including epidemiological indicators of mortality, morbidity, and disability.

The study objectives were derived from these factors and identified as determinants of service utilization.

2.8 Conceptual Framework

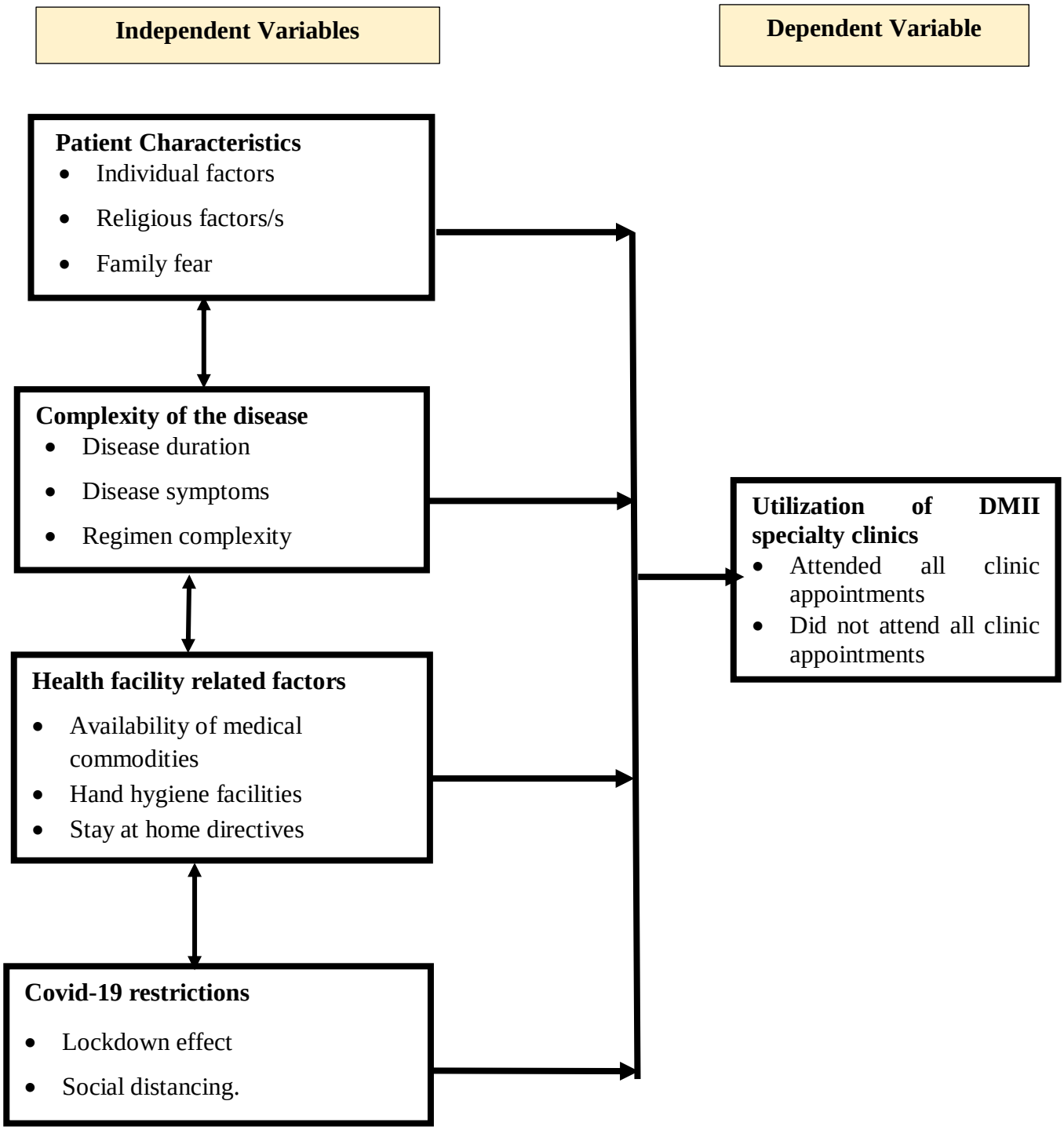
This is a graphical presentation of the relationships between study variables. The conceptual framework provides an overview of clinic adherence and helps determine the design procedures and analysis.

The expanded framework of Andersen and Newman's 1995 behavioural model has been conceptualized by the researcher to guide the organization of study variables and objectives, ultimately operationalizing the broad objective of examining factors that influenced utilization of diabetes DM II specialty clinics during COVID-19 pandemic at Kakamega county referral hospital. The enabling organizational factors have been conceptualized under the influence of facility related factors on specialty clinic utilization. The perceived and evaluated needs factor was conceptualized under the

objective of disease complexity and how it influenced clinic utilization. Andersen's predisposing factors have been conceptualized under the individual patient characteristics influence on clinic utilization. This conceptualization was then operationalized as shown in figure 2.1 to allow crystallization of the study objectives addressed through the thematic questions on the four independent variables.

Figure 2. 1

Conceptual Framework



2.9 Research Gap

The investigator reviewed studies related to factors that have had an influence on the utilization of DM II specialty clinics, but none considered firstly the COVID-19 factor and secondly a rural county in Kenya. Waari et al. (2018) conducted a study on medication adherence and factors associated with poor adherence among DM II patients on follow-up at Kenyatta National Hospital. The study was conducted before COVID-19 pandemic in an urban setup which was likely to produce results different from this study which focused on a rural county during the COVID-19 period. Further, Siddiqui et al. (2019) conducted a study with the aim of identifying barriers to therapeutic adherence, on a set of proven cases of DM II, managed by primary healthcare providers. The study focused on the primary healthcare givers and was also carried out pre- COVID-19 era. In addition, the study focused on the barriers to therapeutic adherence, while the current study aimed to determine DM II specialty clinic utilization during the COVID-19 pandemic as a gap identified during literature review.

2.10 Literature Review Summary

The chapter reviewed the theories on which the study was anchored; on Andersen and Newman's 1995 behavioral model (Babitsch et al., 2012) which guided the development of the conceptual framework. Further, the chapter reviewed the literature related to patient characteristics, complexity of the disease, health facility related factors and the pandemic and how they influenced utilization of DM II specialty clinics. Also included in this chapter, is the research gap.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the overall methods and materials used in the study. It details the study design, the target population, sampling techniques, sample size, data collection, data analysis methods and ethical underpinnings of the study.

3.2 Study Design

Research design, as defined by Kothari and Garg (2014), is the approach employed in fulfilling the purpose of a study. This study employed the cross-sectional mixed method design to collect data. The study's quantitative data questionnaire was applied for respondents living with DM II. The quantitative data provided information for descriptive and inferential purposes to provide an in-depth analysis and understanding of how individual characteristics, DM related factors facility and COVID-19 restrictions, influenced the utilization of the diabetes clinic for the participants during the period under study, in keeping with findings by Cooper and Schindler (2008). The qualitative data gathered from the focused group discussion corroborated the responses by the respondents of the quantitative data. Application of mixed method research provides more comprehensive evidence for studying the research problem unlike either on its own and permits objective predetermination resulting in data collection pertinent to the problem (Kothari & Garg, 2014).

The description of the outcome variable - clinic utilization- in this study, was the use of the specialty clinic services for all the 12 months, in which the study considered utilization to be honouring all scheduled monthly DM clinic visits during the study

period. Categorization of utilization was done for the respondents who missed out on some scheduled clinics and those who did not skip any scheduled clinic between March 2021 and February 2022.

3.3 Study location

The study was conducted in the Kakamega County (appendix VII), situated in the western region of Kenya covering an area of 3,034 km² with a population density of 515 per square Kilometre. The county constitutes 12 sub-counties, with Kakamega town as its capital and headquarters. It acts as the major centre of commerce and sports in the county. The choice of the study county was informed by it being largely a rural setting, having experienced a late start in testing the county's population for COVID-19 infection and, in view of, identified literature gap on utilization of DM and other outpatient services during the COVID-19 pandemic.

3.4 Target Population

Population defines the set of objects or events under investigation about which one wishes to make inferences (Cooper & Schindler, 2008). Additionally, Mugenda & Mugenda (2003) describe it as having some observable characteristics to which the findings of the study could be generalized. The Kenya Population and Housing Census (KNBS, 2019) reports the population of Kakamega county as 1,682,239, consisting of 806,682 males, 875,526 females and 31 intersex persons. By the time of the study, there was a time-lapse of 3 years since the census. The author therefore assumed a 5% rise in population for the period and arrived at an estimated population of 1,766,350 for the Kakamega county. With an estimated diabetes prevalence at 4.56% (MOH,

2015), the study arrived at a diabetes prevalence of 80,545 people in the county. The target population of DM II patients attending clinics at the KCGH in February 2022 stood at 467, reportedly just about 47% of the estimated population of diabetes patients at the facility.

3.5 Sample Size and Sampling Technique

3.5.1 Sample size

The minimum adequate sample size was arrived at using the following formula (Daniel, 1999):

$$n = z^2 \frac{p(1-p)}{e^2}$$

Where:

n = required sample size,

z = confidence level at 95% (standard value of 1.96),

p= estimated prevalence of utilizing diabetes mellitus clinic in Kenya (0.5).

1-p = estimated prevalence of not utilizing diabetes mellitus clinic in Kenya and;

e = the margin of error at 5% (standard value of 0.05).

n= 1.96^2 x1.96(1-1.960/$.05^{2)}$

= 3.8416(.25/.0025)

=3.8416x100

The sample size is 384 respondents. Because it is less than 1000, this sample was adjusted using the formula below (Yamane, 1973);

$$ns = \frac{n}{1+\frac{n}{N}} = ns = \frac{384}{1+\frac{384}{467}}$$

Where;

ns= new sample size.

n= sample size from Daniel's formulae calculation.

N=Study population.

The new and final sample size was 211 respondents.

Further the study used purposive sampling technique to select 6 respondents to establish a FGD.

3.5.2 Sampling technique

The study employed simple random sampling for patients attending clinics at the KCGH during the Tuesday, Wednesday and Friday clinic days using patient register to generate a sampling frame for a sample size of 211 respondents. In an instant where the selected respondent was unconsenting, the next available respondent in the randomized list was selected. This was done till the researcher achieved the desired sample size. Random sampling has been observed to minimizes the sampling error in the population (Cooper & Schindler, 2008)

The sampling of the FGD was purposively done by the researcher. The study selected 6 healthcare workers (HCW) who worked at the diabetes clinic. The FGD consisted of 1 doctor, 1 nurse, 1 pharmacist, 1 nutritionist, 1 counsellor and 1 physiotherapist. The group was selected because they; were coworkers in the same clinic, would all be available at the clinic at the same time and that they would contribute equally to the discussion. Monday, the study established, was designated as a diabetes education day

for the clinic attendants by the various professionals. It was therefore convenient for the researcher to meet all members of the FGD at the end of the education session. The researcher met with the group twice on two different Mondays. The first meeting discussed the first set of six questions from the interview guide, with the last set of questions being discussed during the second meeting. The meetings lasted on average, 2 and half hours.

3.6 Inclusion Criteria

The study included respondents who had utilized the services of the KCGH diabetes clinic pre-pandemic and during the pandemic of COVID-19 till February 2022, were above 18 years of age and that they were living with DM II.

3.7 Exclusion Criteria

The study excluded any person who; was attending a different specialty clinic within the same facility, had not been utilizing the diabetes clinic pre-pandemic, declined to provide consent for interview and was under the age of 18 years.

3.8 Research Instruments

The research selected a structured questionnaire (appendix II) for quantitative data collection which looked at five sections that included the respondents' demographics, influence of individual related characteristics, disease related factors, health facility related factors and the COVID-19 restrictions on clinic utilization. The choice of this instrument was because data collected through questionnaire is less likely to suffer from interview bias because of the standardized questions. The discussion with the

Focused Group was done by use of an interview guide (appendix III) for qualitative data collection to corroborate the quantitative information. The choice of the FGD being to elicit in-depth information.

3.9 Pretest

The researcher conducted a test re-test at the Bungoma County Hospital (BCH), which was selected because it is a rural county that exhibited near similar socio-economic and demographic characteristic to those of the Kakamega county. This county hospital was excluded from the main study. The respondents were selected randomly, with the researcher selecting a total of 21 participants to attain 10% of the sample size. Mugenda & Mugenda (2003) held that the pretest gives the researcher an opportunity to realize and correct any mistakes before the main data collection exercise kicks off. The exercise at BCH enhanced face validity, primarily on questionnaire flow, specifically in sequencing the questions.

3.10 Validity of research instrument

Content validity refers to the extent that the tool questions cover the exact content that the instrument was developed to capture. Face validity tests the general layout of the tool which represents the convenience of the questionnaire in measuring the factors the study aimed to measure, this is according to Kothari and Garg (2014). The study questionnaire was shared with the supervisors and experts in research to check content and layout validity. The corrections and guidance received were executed to promote validity and clarity of the study instrument. The validation process allowed the

researcher to establish the extent to which the questionnaire would capture the intended data.

3.11 Data Collection

The researcher first held a meeting with the clinic supervisor to make a formal introduction and discussion on the planned study that had been approved by the KCGH's ethics office. During this meeting, it was mutually agreed that data collection would happen on Tuesdays, Wednesdays, and Thursdays and the FGDs to done on Mondays. Subsequently, data collection was concluded within a period of two months. The sharing of the questionnaire would start by introduction of the researcher to the patients by the clinic supervisor. The researcher would then explain the nature of the study and how the information would be collected. Thereafter, the researcher would then issue a consent form followed by the questionnaire to the consenting participant after they had concluded the clinic visit for some or for those who were queuing to be reviewed. On average, 22 questionnaires were administered to respondents on the clinic days of Tuesday, Wednesday, and Friday after daily introduction of the researcher to the respondents by the clinic consultant. The respondents used between 15 and 20 minutes to complete a questionnaire. The researcher was present to provide clarity on any questions not well understood by respondents. About 99% of the respondents could read and write. The researcher collected the questionnaires within the same sitting and ensured completion. All interviews were conducted at the health facility.

The researcher leveraged on the availability of the HCWs during the Monday clinic, which is the education day to conduct the FGD. The discussions were held on the second and third Monday after commencing the quantitative data collection. The researcher utilized the interview guide and captured responses verbatim through voice recording and later transcribing the information. The discussions took an average of two and half hours. The researcher asked questions and allowed the first two responders to contribute. The researcher would then allow responses from the next two responders for subsequent questions to allow active participation. However, where the response was not forthcoming from the next member, then the question would be put out to the entire group.

3.12 Methods of data analysis

This process commences at the end of data gathering, terminating with data interpretation and processing. Before processing the data, the completed questionnaires were assessed for completeness. Quantitative data were first cleaned, coded, and entered into Statistical Packages for Social Scientists (SPSS Version 25) and analysed to generate descriptive and inferential statistics. Qualitative data was analysed based on the content of the responses, guided by the study objectives and questions. Excerpts from the FGDs have been reported alongside the quantitative findings after establishing convergence. Univariate analysis was used to describe the distribution of each of the variables. Bivariate analysis has been applied to investigate the strength of association between the exposure and outcome variables. Binary logistic regression was used to investigate the strength of the relationship between clinic utilization and the independent variables. Logistic regression was used because

this is a prevalent study and regression estimates can be transformed into odds ratio estimates. The level of significance was set at $p \leq 0.05$ (95% confidence interval).

3.13 Ethical Considerations in Research

The researcher obtained ethical approval from the KeMU Scientific and Ethical Review Committee (SERC), the research permit was also sought and obtained from the National Commission for Science Technology and Innovation (NACOSTI) in July, and thereafter, licence obtained from KCGH in August. The investigator obtained written consent from every respondent who was able to write, and initials for those unable to sign. All respondents were assured of confidentiality of the information they provided to the investigator, with all questionnaires being subjected to coding.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the findings and interpretation of data gathered from the study. The structured questionnaire data was analysed using SPSS Version 25 and qualitative data was thematically presented based on the content of the responses guided by study objectives. The study considered the influence of individual patient characteristics, disease factors enabling, health facility related factors and COVID-19 restriction factors on the outcome variable of DM clinic utilization during COVID-19 pandemic at KCGH. The relationship of these factors is presented using univariate, bivariate and multivariate approaches based on research objectives.

4.2. Response rate

The response rate was 211(100%) for the structured questionnaire and 6(75%) for the FGD. The study returned a high response rate because the researcher administered the questionnaires and collected them in the same meeting after ensuring their completeness.

4.3 Reliability of research instruments

A questionnaire was employed to reliability test based on facility and COVID-19 restrictions related factors that influenced DM II clinic utilization. Reliability was tested through test-retest method, where the tool was administered to the same respondents at an interval of two days at the BCH. The appropriate time period between the repeated administrations of a questionnaire is at least a week (Terwee et

al., 1999). The choice of two days' interval between the administrations of the questionnaires for this study was prompted by the prevailing pandemic conditions that had strict social distancing guidelines by MOH and, secondly, monetary reasons for both the researcher and participants in view of the challenging economic times occasioned by the pandemic.

This study measured internal consistency using Cronbach's alpha approach. This is a coefficient of reliability or consistency, evaluating how closely related a set of items are as a group. During the deployment of the tool, to reduce loss of data occasioned by conversion of ordinal data to nominal, the researcher elected to convert the responses from Likert type questions to nominal data questions that gave a dichotomous, yes/no response that was easier to analyse. The influence of the facility and COVID-19 restrictions factors was measured on a scale of nine items, shown in table 4.1. The choice of nine items was because they were identified in literature and conceptual framework. According to Cho and Kim, (2015), alpha is the best choice among all published reliability coefficients, the Cronbach alpha offers the thumb rules as follows; Excellent is >0.9, Good is >0.8, Acceptable is >0.7 and Questionable is >0.6. For this study, a reliability coefficient of 0.81 Cronbach's alpha was achieved.

Table 4. 1

Reliability Statistics Table

Reliability Statistics (n=21)	
Cronbach's Alpha	N of Items
0.807	9

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's α if Item Deleted
It was easy to get my usual supply of medicines during lockdown.	28.77	11.799	0.644	0.768
There is provision for hand washing facilities at the clinic all the time.	28.74	12.303	0.597	0.776
The facility management advised me to attend the clinic if I have an emergency.	28.57	12.194	0.700	0.766
The waiting time for service at the specialty clinic during this pandemic is long.	28.62	13.805	0.305	0.809
The number of HCW has been low compared to pre-pandemic.	28.74	14.587	0.078	0.837
The clinic has remained in operation throughout the pandemic period.	28.66	11.469	0.677	0.762
The health care workers have continued with community visits during the pandemic.	28.66	12.790	0.445	0.794
The reduced number of people allowed per vehicle prolong the waiting time for transport to the clinic.	28.86	11.600	0.513	0.789
The clinic health care workers reached out to me on phone if I miss the scheduled clinic during this pandemic.	28.65	12.242	0.633	0.772

4.4 Descriptive Statistics

Using univariate analysis, the findings have been presented in form of tables and figures as shown in the subsequent sections.

Table 4. 2

Proportion of Respondents above the Mean Age

Category	Frequency	Percentage (%)
Above 62 years	112	53.1
Below 62 years	99	46.9
Total	211	100

The study established a convergence between the quantitative and qualitative findings as follows;

> *"…Clinic attendance by the younger population is at 80% because some of them are in boarding institutions. Their clinic is on monthly basis, on the last Wednesday of the month…" (FGD\Female\01*).
>
> *"…DM in the young is still a challenge, diagnosis is still being missed because a number are in school…" (FGD \Male\04*).

The study gathered data from 211 respondents who were both female and male utilizing the DM specialty clinic. There was no record of transgender noted during data collection. Concerning age of the respondents, the study determined as shown in table 4.2, a mean age of 62 years 112(53.1%), with mode of 64 years of the participants who

utilized the clinic during the COVID-19 pandemic. During COVID-19 pandemic, the young population did not experience severe illness when compared to the older persons. This may explain the reduced clinic utilization in the younger population. Older patients in the current study may more likely have perceive DM as a severe threat to their general health and therefore the increased need for utilization of clinic care in addition to most likely living with a second comorbidity, which increases their dependence on clinical care hence increased clinic utilization. Literature confirms the finding to be partly explained by fewer competing risk in young individual (Poudel et al., 2021).

Table 4.3

Table Showing the Distribution of Gender in Relation to the Mean Age of the Respondents

Gender	Above 62 years	Below 62 years	Chi-squared value
Male	49 (64.5)	27 (35.5)	
Female	63(46.7)	72(53.3)	6.191, p=0.013

The FGD indicated that there were more reminders made to male patients in comparison to the female patients.

> *"...During this COVID-19 pandemic period, most of the calls from the clinics to the patients were reminder calls we made for no show cases. I recall there were more phone calls made to the male gender patients when compared to those made to female patients though…" (FGD \Male\ 02).*

Table 4.3 communicates study convergence where the percentage proportion of gender representation over and above the mean age, majority (63) of the respondents were female at 6,191, p=0.013. This finding maybe related to and reflects the demographic life expectancy in Kenya which currently stands at 64 and 59 years for female and male respectively (KNBS, 2023). DM has higher predominance with increasing age, particularly due to the increasing interplay among various exposomes (Wild & Foroughi, 2007). The finding further concurs with Ahn et al. (2022), who found more female (53%) to have utilized health service during the COVID-19 pandemic than the male participants. In a different study, among health care professionals, the utilization of health care pre-COVID-19 era, was found to be low among the male (Nebert et al., 2017).

Regarding the influence of the rest of the demographic characteristics on clinic utilization, the study findings are as shown in table 4.4.

Table 4.4

Socio-Demographic Characteristics of Respondents Attending DM II Specialty Clinic(n=211)

Characteristic		**Frequency (n)**	**%**
Gender	Male	76	36
	Female	135	64
	Total	**211**	**100.0**
Marital status	Married	148	70.1
	Single	11	5.2
	Widowed	48	22.7
	Separated	4	1.9
	Total	**211**	**100.0**
Religion	Christian	203	96.2
	Muslim	8	3.8
	Total	**211**	**100.0**
Highest level of education.	Primary	92	44.3
	Secondary	81	38.9
	Tertiary	35	16.8
	Total	**208**	**100.0**
Employment status	Formally employed	60	28.8
	Self employed	39	18.8
	Not employed	109	52.4
	Total	**208**	**100.0**

"…Majority of our Muslim community prefer to attend their clinics in private facilities like -- name of facility withheld- and also majority in Mumias, at the --- name of facility withheld…" (FGD \Female\ 03).

There was convergence on religion where most 203(96.2%) respondents reported professing Christian faith while the rest were Muslim. This finding elicited concerns of underutilization of the clinic by the population that is non-Christian. The discussion

revealed preference for the private clinic by Muslim faithful. The study noted the need to investigate individual and facility related factors dissuading clinic utilization of a county facility by the population that does not profess Christianity.

> *"...Because the family members also receive education on management of diabetes to include medications, the appropriate diet, blood sugar testing, foot care among others, I can say, it has had a positive influence on clinic utilization as we also involve the family members or caregivers during the education day..." (FGD\Female\06).*
>
> *"'...Effectively, there has not been significant cases of frequent hyperglycemia among the patients..." (FGD\Male\04).*

Education, like gender, confers some level of internal locus control, which can be construed to give patients the latitude of intentional non-adherence because such a patient knows the consequence of non-adherence. Education plays a major role in cognitive understanding of a disease plus its complex treatment, as seen in diabetes. During the COVID-19 pandemic, this study found that most 116(55.8%) respondents had at least high school education. As indicated in table 4.2, the majority 112(53.1%) of the respondents were aged above 62 years. This study established greater clinic utilization by the duality of participants who were older, with higher education level (beyond primary level). The study agrees with pre-pandemic literature which found education level, diabetes disease duration, knowledge, and its medication to have significant association with antidiabetic medication adherence of patients (Abebaw et al., 2016). Ahn et al. (2022) established that most (41%) of the participants in the study investigating healthcare utilization during the COVID-19 pandemic had secondary school education. This study however departs from the establishment by Oduro et al.

(2023) that, participants with more than high school education have significantly higher odds of COVID-19 induced healthcare utilization avoidance compared to those with no form of education. Additionally, the study by Tino et al. (2019) in Uganda, revealed that lower education status was associated with reduced loss to follow-up among people living with DM.

This study further revealed that the highest number 148(70.1%) of respondents who utilized the clinic were married, while 4(1.9%) were separated. This finding may imply the prevalence of both financial and moral support for married respondents by spouses in relation to utilization of specialty clinic services. It was also established that education on the disease symptoms, medication, diet among other teachings conducted during Monday clinic days, involves the caregivers, and this could further explain the superior clinic utilization among the married.

Regarding employment status, the most 109(52.4%) respondents indicated they were not formally employed, 60(28.8 %) were formally employed while the minority, 39 (18.8%) said they were Self-employed. For those who indicated that they were not formally employed, the majority indicated that they were farmers. For those formally employed, the majority were teachers, while for the self-employed, the majority were engaged in some form of business. Kakamega county population is engaged in subsistence farming, and this will explain the higher number of informal employments. Employment is an indication of a source of income, important in facilitating travel and medicine costs especially at a time when there was prolonged medicine stock out and participants advised to purchase the same from private chemists.

4.4.1 Individual patient characteristics influence on utilization of DM II specialty clinics

The engagement with clinic appointment has components of both health behavior and health seeking behavior. People living with DM are at risk of a multitude of factors that stem from inherent complication of the disease in the setting of competing health problems in this case, COVID-19 as well as possibilities of age and comorbidity preponderant in this population.

Table 4.4

How Individual patient characteristics influenced utilization of DM II clinic (n=211)

Patient characteristic		Frequency	%
I fear visiting the clinic because I could contract COVID-19 at the facility.	Yes	74	35.1
	No	137	64.9
	Total	**211**	**100.0**
I felt I had good control of my diet during the pandemic.	Yes	176	83.4
	No	35	16.6
	Total	**211**	**100.0**
My religion did not encourage visit to the clinics.	Yes	30	14.2
	No	181	85.8
	Total	**211**	**100.0**
My family members are afraid that I could contract COVID - 19 if I visited the facility.	Yes	63	29.9
	No	148	70.1
	Total	**211**	**100.0**
I have had a family member who contracted COVID-19	Yes	40	19.0
	No	171	81.0
	Total	**211**	**100.0**

"... The clinic implemented the social distancing directive by remodeling the sitting positions about four months into the pandemic. The county had not reported many cases of COVID-19 at his time..." (FGD\Male\02).

The study established convergence, where the quantitative findings showed that most 137(64.9%) respondents did not fear visiting the facility because of fear of contracting COVID-19. Arguably, this number may in part constitute the 72% of respondents (figure 4.1) who had perfect (100%) clinic utilization but with low absolute numbers of clinic attendance in the period under study. The study attributed this finding to responsiveness in executing the MOH guidelines on disease prevention by facility management. Literature records significant stigma and scare occasioned by COVID-19, with many people entertaining fear of contracting the disease at clinic. Bhanot et al. (2021), observed that patients suffering from COVID-19 suffered stigma and isolation from the family with negative consequences on their physical and psychological health. A review of the clinic utilization records at the clinic revealed a remarkable decline in clinic utilization to a low of 259 total visits in December 2020 from 1000 visits in the pre-pandemic period – December 2019. The declined utilization may be attributed to patients seeking services from adequately stocked facilities or just opting to stay away.

"...Education on the disease has had a positive influence in clinic utilization as we also involve the family members or caregivers during the education day..." (FGD\Female\06).

This study determined that most 176(83.4%) respondents, who reported good control of their diet, reported superior clinic utilization. The demographic characteristics in

this study revealed that most 112 (53.1%) respondents were aged above 62 years, a proxy indicator of duality of disease duration and health education positively influencing clinic utilization. Additionally, the same population indicated not being afraid to visit the clinic for care. Respondents further reported to have been contacted by phone when they missed scheduled clinic attendance. All these efforts worked towards preventing the worsening of the diabetes disease symptoms.

> "…*You may have noticed that many of the participants are married and therefore have some form of support as they also join in the education session for the patients. Most patients did not report COVID-19 infections in their homes…" (FGD\Female\ 03).*

The study established convergence where respondents indicated the family was not afraid the respondent could contract COVID-19 at the facility, the most 148(70.1%) reported superior clinic utilization. The finding is consistent with literature in which Waari et al. (2018) reported that dissatisfaction with family members support, was associated with poor medication adherence. In a different study, the importance of social support was demonstrated by the study that observed 49.9% of the respondents lacked someone to help them with pharmacy refills, putting them at risk of contracting COVID-19 (Barone et al., 2020). Social support buffers stress, influences affective states, motivates good behaviors and is an important moderator in the Theory of Reasoned Action (Fishbein, 1967).

> *"… The disease was believed to be concentrated around Nairobi and its environs, making it sound remote to Kakamega county, in addition to most gatherings being discouraged…" (FGD\Male\04).*

On the aspect of whether a family member had suffered from COVID-19, the study established a convergence between the qualitative and quantitative data in which most 171(81%) respondents did not have a family member who had contracted COVID-19, a factor that may have played a role in minimizing fear of contracting the disease as it seemed remote. The highest number 181(85%) of the respondents' religion encouraged clinic utilization, and most 174(82.5%) respondents indicated churches discouraged live service with the lockdown. This finding supports literature where Knight et al. (2021) encouraged espousal of religious practices that ultimately lead to reduced spread of infections during pandemics by utilizing experiences that supported precautionary actions.

4.4.1 Disease factors influence DM II Clinic utilization

The complexity of DM and associated care require that the patient is engaged in care to promote decision autonomy, collaborative symptom management and prevention of potential complications both in the short and long term, to include pandemic and emergency seasons. Resources are available for teaching diabetic patients regarding self-care and the importance of clinic utilization for routine screening for glycemic control (MOH, 2014).

Table 4.6

How Disease factors influenced DM II clinic utilization during the COVID-19 pandemic(n=211)

Disease Characteristic		Frequency	%
I have had the disease long enough and I know how to manage it.	Yes	197	93.4
	No	14	6.6
	Total	**211**	**100.0**
Disease symptoms did not get worse during the pandemic.	Yes	122	57.8
	No	89	42.2
	Total	**211**	**100.0**
I suffer from a second chronic condition besides diabetes	Yes	164	77.7
	No	47	22.3
	Total	**211**	**100.0**
Other than DMII medications, I am currently on regular treatment for a different NCD.	Yes	161	76.3
	No	50	23.7
	Total	**211**	**100.0**

Regarding disease factors, the study established that most 197(93.4%) of the respondents reported they have been living with the disease long enough and therefore understood self-care, most 122(57.8%) respondents indicated the disease symptoms did not worsen during the pandemic. The study by Chen et al. (2022) indicated initial evidence that reductions in outpatient care did not result in outright changes in acute care complications related to diabetes. However, the study did not consider the long-term health outcomes resulting from persistent pandemic. Literature indicates that pandemics could negatively affect glycaemia, and thus the odds that COVID-19 pandemic and subsequent lockdown would negatively affect health outcomes of people with diabetes. This finding agrees with that of Sekhar et al. (2018), which concluded that, an activated patient has been shown to comply with medication regiment and have better glycemic control with an improved quality of life. It has recently been determined that over time, the long COVID-19 exhibits risks associated

with several blood sugar lowering medicines during the pandemic which may in the long term have adverse outcomes to include death.

The study further established most 164(77.7%) respondents reported to have been living with a second NCD which the respondent was on regular treatment. This finding supports pre-pandemic literature that almost half of adults and elderly people in the study recorded having one or more NCDs, and that utilization of healthcare was more profound in this population (Pati et al., 2014). With regular use of medication for a second NCD, for most 161(76.3%) respondents, this study observed that the combination of living with and being on treatment for a second NCD directly enhanced the odds of clinic utilization.

4.4.1 Facility related factors influence on DM II clinic utilization

The third objective aimed to assess how the facility related factors in line with MOH's COVID-19 guideline on mitigation of spread influenced clinic utilization. The findings are presented in table 4.7.

Table 4.5

How Facility related factors influenced DM II clinic utilization during COVID-19 pandemic

Facility related factors		**Frequency**	**%**
It was easy to get my usual supply of medicines during lockdown.	Yes	102	48.3
	No	109	51.7
	Total	**211**	**100.0**
There is provision for hand washing facilities at the clinic all the time.	Yes	211	100.0
	No	00	0
	Total	**211**	**100.0**
The facility management advised me to attend the clinic if I had an emergency	Yes	205	97.2
	No	6	2.8
	Total	**211**	**100.0**
The waiting time for service at the specialty clinic during this pandemic is long.	Yes	42	19.9
	No	169	80.1
	Total	**211**	**100.0**
The number of HCW has been low compared to pre-pandemic.	Yes	52	24.6
	No	159	75.4
	Total	**211**	**100.0**
The clinic remained in operation throughout the pandemic period.	Yes	178	84.4
	No	33	15.6
	Total	**211**	**100.0**

> *"... The patients would come for their scheduled clinics but after review, we would ask them to go and buy medicines from private chemists because there were no supplies for a long time. Sadly, NHIF does not cover medication supplied by the private chemists..." (FGD\Female\ 01).*
>
> *"... Our clinic remained open even when there were no drugs for patients..." (FGD\Male\04).*

This study determined convergence where most 109(51.7%) respondents reported not to have found it easy to get their usual supply of medication during COVID-19 pandemic. They had to pay out of pocket to replenish the regular treatment from

private chemists. This study concurred with literature where Barone et al. (2020) revealed that difficulties in getting medical supplies, increase in prices of commodities and drugs and lack of food had negative impact on DM care. Additional literature supported this study's finding after determining about 57% of patients reported COVID-19 pandemic had posed negative impact on either of their follow-up visits or availability of medications (Shimels et al., (2021).

This study's FGD elicited non-closure of the clinics, re-organization of the clinic sitting positions but reported access to quality care was affected by unavailability of medicines for a significant period of the COVID-19 pandemic, approximately from late 2020 to mid-2021.

The study observed that all 211(100%) respondents agreed that following the MOH guidelines, there was availability of hand washing facilities in the hospital. Literature (Ayre et al., 2021) established adherence to COVID-19 prevention behaviors, but with the distancing behaviours tending to reduce with time, prompting the author to infer that there was need for social responsibility so that there was transition from government-imposed restrictions to individual responsibility. Though this practice was associated with the pandemic, guidelines that address healthcare beyond the immediate emergency, should be encouraged. Most 205(97.2%) respondents indicated they were encouraged to attend clinics and majority 178(84.4%) respondents reported the clinic remained operational throughout after the initial fourth months at the start of the pandemic. The study by Oduro et al. (2023), confirmed that past epidemics like the Ebola Epidemic in West Africa, resulted in indirect effects, some catastrophic in nature than those occasioned by direct effect, majorly because the former is often not

glaringly life threatening and therefore overlooked, yet consequential. The Ebola epidemic caused controlled access to healthcare, failed trust for health care and an overall decline in the utilization of healthcare. There was positive observation made where, most 157(75.4%) of the respondents reported adequate number of health care workers at the facility during the pandemic, a state that facilitated a short turnaround time for consultation.

4.4.2 COVID-19 Restrictions influence on DM II clinic utilization

Regarding the effect of COVID-19 restrictions on clinic utilization, the findings are displayed in table 4.8.

Table 4.6

How COVID-19 restrictions influenced on DM II clinic utilization (n=211)

Covid-19 restrictions		**Frequency**	**%**
Lock down reduced adherence to clinic appointment.	Yes	82	38.9
	No	129	61.1
	Total	**211**	**100.0**
The health care workers continued with community visits during the pandemic.	Yes	37	17.5
	No	174	82.5
	Total	**211**	**100.0**
The reduced number of people allowed per vehicle prolong the waiting time for transport to the clinic.	Yes	116	55.0
	No	95	45.0
	Total	**211**	**100.0**
The sitting arrangement allowed for social distancing.	Yes	202	95.7
	No	9	4.3
	Total	**211**	**100.0**
The clinic health care workers reached out to me on phone if I missed the scheduled clinic during this pandemic.	Yes	128	60.7
	No	83	39.3
	Total	**211**	**100.0**

"...The funding and financial support was there only when devolution was working well. We have not carried out home visits and outreaches for over 2 years now..." (FGD\Male\ 02).

"...There is a gap and thus the need for school visits to screen, home visits and community sensitization with hope of support for availability of strips and glucometers..."(FGD\Female\ 01).

The study determined convergence where descriptive statistics elicited that most 174(82.5%) of respondents observed the visits by the healthcare workers did not continue during the pandemic. WHO reported that during the COVID -19 pandemic, there was service disruption experienced in 75% of reporting countries with diabetes mellitus care reporting 49% service disruption (WHO, 2020). This study found that most 121(61.1%) respondents did not think lockdown affected clinic utilization. Respondents reported that; the clinic remained open, the health care workers were available, and that COVID-19 restriction did not hinder the utilization of the clinic. This is likely attributed to the finding that by the time of the study, the facility management had executed the MOH directives that encouraged prevention of contact transmission. Ghosal et al. (2020), concluded that the duration of lockdown had a direct proportion to the worsening of glycemic control and diabetes-related complications. It was feared the increase in diabetes-related complications would overburden the already strained healthcare system and cause increased COVID-19 infections in patients with such uncontrolled glycaemia.

Most 123(60.7 %) respondents reported that they were contacted via mobile phone for skipped scheduled clinics. Phone communication on missed clinics most likely provided opportunities for the HCWs to encourage respondents on clinic utilization.

They also communicated preventive measures instituted in line with MOH guideline. This finding was contrary to that of a longitudinal study in Kenya which revealed that mobile phone had no impact on diabetes clinic appointment (Theuri et al., 2020), and signals the beginning of telehealth on a small scale. The observed non-disruption of service in Kakamega could be related to low reported COVID-19 cases as observed at the peripheries of the Capital city of Nairobi with little community transmission therefore low R-naught (R_0) (Adetifa et al., 2021).

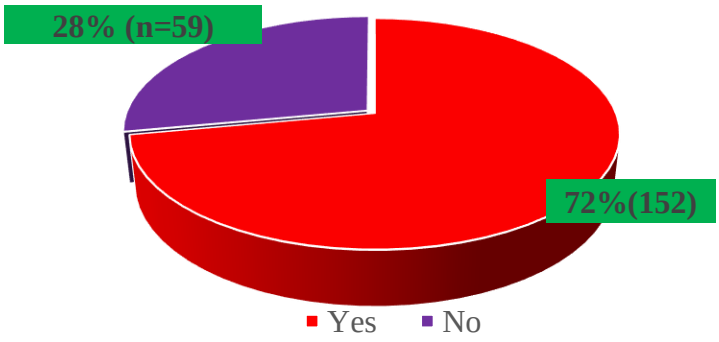
4.4.5 Utilization of DM II clinic during the pandemic

Specialty or specialization clinics provide the advantage of focused healthcare, where patients receive treatment- investigations, education, medication, and commodities- for a specific health condition. The clinics are condition-specific and patient-centered, which become the motive quality (Jain & Dewey, 2021). The clinics which are run by HCW with specialized relevant training, operate on scheduled program to monitor adherence to good health practices, progress in disease management and attention to individualized patient needs. The outcome variable was operationalized as a dichotomy of having perfect clinic utilization at 100% honouring of clinic appointments or as non-perfect utilization at non-100% utilization of DM II clinics.

Respondents were asked if they attended all their clinic appointments during the period of the pandemic under study as a measure of clinic schedule adherence. Figure 4.1 demonstrates the results of this investigation.

Figure 4.1

Utilization of DM type II clinic during the pandemic



> *"…We might have lost patients to Covid-19 because there were no strategies then. Now --- Laboratory's name withheld, a non-governmental organization, through the use of an app has generated a list to follow-up patients from the system who we are contacting and establishing that some have died not necessarily due to COVID-19 as reported by the relative…" (FGD\Female\ 01).*

Figure 4.1 communicates that 152 (72%) respondents had a perfect clinic utilization while 59 (28%) did not utilize the clinic appointments during the pandemic.

The study reviewed clinic records on utilization between March 2021 to February 2022, which was a total of 12 months during the COVID-19 pandemic with 4 peaks at an interval of about 3 months. The study observed from the clinic patient attendance records, that the month of July 2021 had clinic attendance of 1000 people, an attendance that was comparable to pre-pandemic period attendance, and perhaps a proxy indicator of significant DM clinic non-attendance in the period under study.

Several studies reveal how the healthcare system responded by upscaling the telehealth and telemedicine services to counteract some of the anticipated long-term consequences of delayed in-person care at the onset of the COVID-19 pandemic

(Kichloo et al., 2020). However, the study also observed that some health conditions require physical examination, rather than remotely monitoring patients. Underutilization of care was observed in the study by Chen et al. (2022), which established increased diabetes-related telehealth visits and the number of visits with a simultaneous decline for in-person clinic visits and visits per patient. A different study (Fischer et al., 2020) reported that about 40% of the participants who had DM related appointments scheduled, had all the appointments cancelled or postponed, and few of the remaining number of participants reporting a switch of the appointments to virtual telehealth appointments, with 45% of the latter group reporting lower satisfaction with the telehealth appointments.

For the respondents who missed 100% or perfect clinic appointments, table 4.9 summarizes the number of times participants skipped clinic schedule.

Table 4.7

No of times participant missed clinic appointments (n=59)

No of times clinic appointments missed	Frequency	%
1	21	35.6
2	10	16.9
3	13	22.0
4	7	11.9
5	4	6.8
6	1	1.7
8	2	3.4
12	1	1.7
Total	59	100.0

From table 4.9, the study established that 21(35.6%) respondents missed clinic appointment once (1). One respondent missed a worrisome 12 times. The findings

show that 152(72%) respondents met the criteria for acceptable utilization of DM II specialty clinics. This study observes that, DM being a multi-organ complex disease requiring constant interaction with health care for optimal control and prevention of acute and long-term complications, requires more stringent utilization of care. In this regard, the findings of this study show that during the COVID-19 pandemic, there was a moderate extent of healthcare utilization whose impact may require further investigation. Literature has reported mortality with non-clinical attendance having been associated with of mortality hazard of 1.16 (1.04–1.30) for those missing one to two appointments and 1.61 (1.36–1.90) for those missing two or more appointments (Currie et al., 2012). This implies an even higher mortality hazard during a pandemic and hence the need to minimize effects of COVID-19 disruption. Diabetes DM II is less aggressive than DM I and this may explain the generally non-severe 'attitude' a patient may have for the disorder and hence reduced need for clinic appointments. However, the critical factor is that the disease is consequential.

The descriptive statistics established that the female gender, status of being married, better education and professing Christian faith had a positive influence on clinic utilization. Additionally, age of respondent – above 62 years – coupled with having lived longer with DM and a second NCD returned positive influence on clinic utilization. Prolonged exposure to DM has an equivalent exposure period of health education, treatment and periods of ill health that contribute to reduced loss to follow up even in times of pandemics.

4.5 Inferential statistics

The inferential statistics have been used to determine the predictive odds of factors that influenced DM II clinic utilization.

4.5.1 Bivariate analysis of factors that influence clinic adherence among the respondents

To test whether there was statistical independence between the dependent variable - utilization of DM II specialty clinics- and exposure variables of patient characteristics, disease factors, facility and restriction factors, the chi-square test for association was used. The p value in regression helps determine whether the relationship observed in a sample exists in the larger population. The results of this statistical test are shown in tables 4.10 and 4.11.

Table 4.8

Chi-squared test for factors that influence clinic utilization among the respondents

Factor influencing Clinic adherence.		**Attended all appointments**				**N**	**Chi square**
		Yes		**No**			
		n	%	n	%		
Gender	Male	53	34.9	23	36	76	χ^2=0.312, df=1, p=0.576
	Female	99	65.1	36	64	135	
	Total	152	100	59	100	211	
Level of education	Primary	68	45.6	24	40.7	92	χ^2=0.485 df=2, p=0.785
	Secondary	56	37.6	25	42.4	81	
	Tertiary	25	16.8	10	16.9	35	
	Total	149	100	59	100	208	
Employment status	Formal	44	29.3	16	27.6	60	χ^2=0.709 df=2, p=0.702
	Self employed	26	17.3	13	22.4	39	
	Not employed	80	53.3	29	50	109	
	Total	150	100	58	100	208	
Fear of visiting facility	Yes	46	30.3	28	47.5	74	χ^2=5.518 df=1, **p=0.019**
	No	106	69.7	31	52.5	137	
	Total	152	100	59	100	211	
Good control of diet	Yes	133	87.5	43	72.9	176	χ^2=6.565 df=1, **p=0.010**
	No	19	12.5	16	27.1	35	
	Total	152	100	59	100	211	
Religion was against clinic visit	Yes	23	15.1	7	11.9	30	χ^2=0.372 df=1, p=0.542
	No	129	84.9	52	88.1	181	
	Total	152	100	59	100	211	

Table 4.11

Chi-squared test for factors that influence clinic utilization among the respondents

Factor influencing utilization	**Clinic**	**Attended all appointments**				**N**	**Chi square**
		Yes		No			
		n	%	n	%		
Church discontinued live service	Yes	124	81.6	50	84.7	174	χ^2=0.295
	No	28	18.4	9	15.3	37	df=1,
	Total	152	100	59	100	211	**p=0.587**
Family not afraid that I would contract Covid-19	Yes	33	21.7	30	50.8	63	χ^2=17.229
	No	119	78.3	29	49.2	148	df=1,
	Total	152	100	59	100	211	**p=<0.001**
Was easy to get my medications	Yes	84	55.3	18	30.5	102	χ^2=10.430
	No	68	44.7	41	69.5	109	df=1,
	Total	152	100	59	100	211	**p=0.001**
Clinic remained open during Covid-19 pandemic	Yes	133	87.5	45	76.3	178	χ^2=4.062
	No	19	12.5	14	23.7	33	df=1,
	Total	152	100	59	100	211	**p=0.044**
Age of the respondent	>65 yrs	78	51.3	38	64.4	116	χ^2=4.219
							df=1,
	<65 yrs	74	48.7	21	35.6	95	**p=0.040**
	Total	152	100.0	59	100.0	211	

Tables 4.10 and 4.11 exhibit that the following exposure variables were statistically significant at $p < 0.05$; Fear of respondent visiting facility at (χ^2=5.518, df=1, p=0.019), good diet control (χ^2=6.565, df=1, p=0.010), family not afraid respondent would

contract COVID-19 at the clinic (χ^2=17.229 df=1, p=<0.001), ease of obtaining medicines (χ^2=10.430 df=1, p=0.001), clinic remaining open during the pandemic (χ^2=4.062 df=1, p=0.044) and age of respondents (χ^2=4.062 df=1, p=0.040). The study infers the plausibility of the six variables on the outcome variable, that the relationship is not by chance and the likelihood that it applies to the population from which the participants were sampled. This finding is strengthened by the evidence of randomized sampling of study subjects. Further that changes in the independent variables are associated with changes in clinic utilization. These findings are statements of fact about the descriptive statistics.

The findings further indicate that religion (9χ^2=0.372 df=1,p=0.542) trends towards significance, while gender, education, and employment status were not significant at (χ^2=0.312, df=1, p=0.576), (χ^2=0.485 df=2, p=0.785), and (χ^2=0.709 df=2, p=0.702) respectively, in explaining the differences observed in DM II specialty clinic utilization during the pandemic. The inference is that the four variables were not associated with changes in clinic utilization. Literature refers to significant influence of gender and education on healthcare utilization. One of the reasons for non-significant findings can be low study sample for evaluation of the stated variable. The implication is acceptance of results as non-significant when the finding is significant. However, granted the study employed a scientific process, the findings were deemed acceptable.

4.5.2 Multivariate analysis of factors that influence clinic utilization among the respondents

Because the dependent variable was binary, a logistic regression model was constructed to predict the probability that a respondent would have perfect clinic utilization at any given point in the study area. The variables included in the model were: family being afraid that the respondent could contract COVID-19 in the clinic, respondent perceived ease of getting usual supplies of medicine, age of the respondent and respondent's belief that he/she has good control of diet during the pandemic. These variables were included because they were statistically significant in explaining variation in the observed clinic appointment utilization. Further, due to their special contribution to clinic schedule adherence cited in literature, the variables; gender, education level, respondent's fear of visiting facility because he/she could contract COVID-19 at the facility, employment status and others, though not statistically significant, were also included in the model. Because there were no continuous categorical variables, the assumption of linearity test was not performed. A predictor variable in the following regression model with odds ration below 1, implies that for every unit increase in the respective variable, there is an associated decrease in the odds of clinic utilization.

Table 4.9

Logistic regression model information

Model fitting information				
	Intercept	**Model**	**df**	**Sig.**
-2 Log Likelihood	244.236	209.363		

Model Chi-square test	34.873	10	<0.001
Cox and Snell	0.156		
Nagelkerke R square	0.224		
Hosmer Lemeshow Chi-square test.	7.038	8	0.533

To test model fit, the Omnibus test, -2log likelihood test, Cox & Snell and Hosmer Lemeshow chi-square test was determined as shown in table 4.12**.** The omnibus tests based on the chi-square statistic measures the difference between the model as it currently stands and the model when only the constant is included in predicting clinic utilization among the respondents. This model was statistically significant at (χ^2 = 34.873, df=10, p= < 0.001), rendering it not best fitting model.

The table (4.12) contains the Cox & Snell R Square and Nagelkerke R Square values used to calculate the explained variation. The explained variation ranges from 15.6% to 22.4% meaning a random person is 22% likely to use the clinic. Prediction of above 30% is best model, which is not the case this study, hence not a best fit.

The third approach of assessing the adequacy of the model is to analyse how poor the model is at predicting the categorical outcomes (DM II clinic use) using the Hosmer Lemeshow test. The result should not be statically significant. From table 4.12, the P value was established as not significant (χ^2=7.038, df=8, p=0.533) making the Hosmer Lemeshow test a good logistic regression model fit for the study.

4.5.3 Variables in the equation

Table 4.10

Variables in the logistic regression model

	β	**S.E.**	**Wald**	**Sig.**	**OR**	**95% C.I**	
						Lower	**Upper**
Family being afraid I could get Covid-19 in the clinic	-1.327	0.471	7.927	**0.005**	**0.265**	0.105	0.668
Easy to get usual supplies of medicine	0.832	0.371	5.028	**0.025**	**2.297**	1.11	4.753
Age (Categorical)	-0.82	0.376	4.765	**0.029**	**0.441**	0.211	0.92
Good control of diet	0.828	0.434	3.65	0.056	2.29	0.979	5.356
HCW call when care is missed	-0.654	0.369	3.144	0.076	0.52	0.252	1.071
Gender	-0.481	0.379	1.611	0.204	0.618	0.294	1.299
Level of education	-0.33	0.292	1.273	0.259	0.719	0.405	1.275
Employment status	-0.209	0.241	0.747	0.388	0.812	0.506	1.303
Having a family member who contracted Covid-19	-0.349	0.433	0.65	0.420	0.705	0.302	1.648
Constant	3.035	2.058	2.176	0.140	20.806		

From table 4.13, only three variables in the logistic regression model were significant in predicting clinic utilization. Variable on family being afraid the respondent could contract COVID-19 was (β=-1.327, OR= 0.26, p=0.005, 95% CI=0.105-0.668) translating to 0.3 odds decrease. The implication of this finding is that increasing from 0 to 1, a decrease in family support for the respondent is associated with a reduction of 70% in the odds of clinic utilization. The finding for the variable on the ease with

which respondents would obtain the usual medications at the clinic was (β=0.832, OR= 2.297, p=0.025, 95% CI=1.11- 4.753), 2.3 odds increase in clinic utilization. This indicates that an increase in medication variable is associated a 130% increase in the odds of clinic utilization. Variable 3 related to age of respondent was (β=-0.82, OR= 0.44, p=0.029, 95% CI=1.21- 0.92), 0.4 odds decrease. The implication of the finding is that for every decrease in age below the mean age of 62 years, there is 60% reduction in the odds of clinic utilization when compared to respondent aged above 62 years. Importantly, these three variables exhibited high statistical significance at the bivariate analysis. The rest of the exposure variables as shown in table 4.13 were not significant in predicting clinic utilization in this study and that changes in any of these variables is not associated with increase or reduction in clinic use. These infers that for the seven variables all factors remaining constant, have no significant influence on clinic use and that they would not inform resource allocation prioritization.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter summarizes the results based on the study objectives. The conclusions and recommendations generated from the study aim to improve availability, acceptability, and affordability aspects of access, ultimately decreasing loss to specialty clinic utilization by persons living with DM II during emergencies that arise from pandemics or otherwise. These findings can inferentially apply when considering HS strengthening in relation to management of NCDs during infectious disease pandemics. The chapter further suggests areas for further inquiry.

5.2 Summary of the Findings

The magnitude of health care utilization is a consequence of a mixed demand-supply framework, modelled by need, predisposing and enabling factors. This study was anchored on the pillar of health service delivery, set out to investigate utilization of diabetes clinics by a population that was experiencing unprecedented circumstances of COVID-19 pandemic. Utilization of speciality clinics among people living with diabetes in Kakamega county was interrogated in the context of theoretical threat of a COVID-19 pandemic, with the sole objective of determining the prevalence of clinic utilization amidst patient, disease, facility and government directives factors,

derivatives of acceptability, affordability, availability, and geographic aspects of access.

5.3 Socio-demographic factors

The study considered the respondent's age, gender, marital status, level of education and employment position among the socio-demographic factors. Descriptive analysis reflected superior clinic attendance by persons with a mean age of 62 years, mode of 64 years, majority being of the female gender. The conclusion made was, more utilization by participants with at least secondary education, who majority were Christian faithfuls, and that every participant was engaged in an income generating activity, either as a teacher, a farmer or as a businessperson. The study's demographic findings mirrored literature on superior clinic attendance by persons with a mean age of over 62 years, of female gender with good education and some form of employment, indicating failed departure from literature in an area that requires rethinking.

5.4 Patient related characteristics

The quantitative and qualitative data analysis of this variable indicated that the participants and their family members did not express fear of contracting COVID-19 by visiting the clinics, with religion discouraging church in person attendance but carefully not discouraging clinic visits. The church significantly contributed to disease containment by intentionally introducing and maintaining online church services. With most participants having not experienced a member of the family with the disease, these three factors contributed to better clinic attendance. The study findings on the variable were a departure from most literature which indicates fear of

visiting the health facilities for non-emergencies observed in many nations. The author, however, observed that the study period (March 2021 to February 2022), was a period when most of the county's health ministry guidelines on infection transmission prevention had been effected and maintained at the time. Future studies should focus on assessing the transformation of the new practices to strategies and policies as part of the preparedness to curtail any future service disruptions that mostly happen in the initial periods of the pandemics, and that majorly disrupt health care for those living with non-communicable diseases.

5.5 Disease related factors

The study established that the majority of the participants suffered comorbidities for which they were on regular treatment. The study, having established that the participants had experienced the disease for a long time, concluded that these competing risks, and occasional adverse outcomes arising from failed clinic attendance, enhanced clinic utilization, contributing to reduced disease complications during the pandemic. Regular clinic attendance results in an activated patient, which, according to literature, results in better compliance to medication regiment and better blood sugar control. Living with a second NCD increases the odds of healthcare utilization. This finding was found to be holding in the study.

5.6 Facility related factors

Analysis of the facility related factors in the study indicated the participants experienced challenges in accessing their regular ant-diabetes treatment occasioned by the stock outs of the drugs at the facility with the patients being directed to buy them

from private chemists, a finding that had convergence with the qualitative information from the FGDs. The findings were in tandem with significant literature which established significant disruption in accessing medicines and other outpatient services across the globe. Notably, the income generated from subsistence farming – the main farming in the study county is subsistence farming-is insufficient to meet the cost of regular treatment and other family financial needs for an extended period. The observation, the study concluded, may have contributed to the reduced absolute clinic numbers in the period under study. The study further concluded that the reduced turnaround time at the clinic was attributable to reduced absolute clinic numbers, confirmed from evaluating the clinic records on previous attendance. The FGDs confirmed missing clinic attendance records for some months into the pandemic, with some months experiencing higher number of patients up to about 1000 from 400, an aspect of inefficient record keeping that impedes effective decision making, informed policy development and resource allocation.

5.7 COVID-19 Restrictions

The analysis of the influence of the COVID-19 restrictions on clinic utilization revealed that the community visits by healthcare workers had stopped long before the pandemic, but the study observed that the HCWs maintained a virtual contact with the patients by way of telephone to remind them of clinic visits. Transport challenges were experienced after the government guided that the number of passengers on the public transport be reduced to allow for social distancing, affecting home to clinic turnaround time. Lock down, most respondents reported, did not affect clinic utilization. However, the study observed a reduction in the number of physical visits. This study determined

that some form of telehealth happened, albeit on a small scale, at the facility under study. Literature is rich on the responsiveness witnessed in health facilities globally, with the expedited adoption of telehealth and tele pharmacy to address the access challenges posed by lockdown and social distancing.

5.8 Utilization of DM II Specialty Clinic during the pandemic

The study determined perfect clinic utilization at 72%. Respondents skipped scheduled clinics, ranging from 1 to all 12 clinics. Study finding concurs with literature that observed diabetes clinic underutilization for multiple-organ involmentbdisease and calls for regular monitoring. FGDs elicited deaths of some of the patients that were reported when the HCW called to remind them to attend the clinic, with the cause of deaths not necessarily from COVID -19. The study observes that such deaths may have resulted from worsening disease status following skipped clinics, as literature indicates an increase in mortality hazard with every clinic skipped. The study observed that the combined population of participants with secondary and tertiary education was superior, and that these patients may have significant odds of COVID-19 induced healthcare utilization avoidance. Literature further reports utilization of care among nurses to have been as low as, 62% in the same county and higher than the national average of 60.7% (MOH ,2014). A pointer to under use of healthcare by care providers and an indication of a revised approach to healthcare delivery methods.

5.8 Inferential statistics

The study established that respondent and family fear to visit the facility, good diet control, availability of the medicines, clinic operational hours and age of respondent were statistically significant at $p<0.05$. Religion trends towards significance. To assess predictor for a perfect clinic utilization, the study established that a decrease in family support was associated with 70% reduction in the odds of clinic utilization. The variable of ease with accessing medication indicated 130% increase in the odds of clinic utilization. The third variable indicated that for every unit decrease in age, there is 60% reduction in the odds of clinic utilization. From the study, the highest odds of clinic utilization in the period of study is linked to ease of obtaining medication and the least odds of clinic utilization is associated with lack of family support.

5.9 Conclusions

The goal of HSM is to ensure there exists within the health sector: good leadership and governance, an inherent strong financially fair system, responsiveness to health human resource challenges, uninterrupted and quality health service provision, and availability of medical commodities. The system must be cognizant of the pandemic challenges occasioned by the global village the world has become and commence the journey to a paradigm shift from the norm to incline towards technological advancement and discoveries that is shaping the modern world. Until recently, however, there was no widespread adoption of telemedicine. Missed medication supply and loss to follow up clinics have a direct relationship with increase in mortality hazard. There is urgency for strategy and policy that will reconsider the masculinity,

power and dominance in healthcare utilization and advance appropriate sick role behavior, to address the loss of clinic follow up of male gender. The health system authorities and policymakers should start designing interventions that acknowledge socioeconomic and demographic factors that influence health use avoidance. The prevalence of pandemic induced healthcare utilization avoidance by those with higher education is a multi-sectoral concern. With the official announcement of the end of the pandemic, the time is ripe to better understand the extent to which pandemic induced care disruption adversely impact long-term health outcomes for patients with non-communicable diseases. The study, that was anchored on the service delivery pillars, determined that HSS was needed in three pillars: service delivery, medical products, vaccines and technologies and Health information systems to manage future pandemics in the global village.

5.9 Recommendations

The following recommendations are generated from the study findings to KCGH.

i. The county health office should activate the process of policy establishment aimed to promote and adopt telemedicine at the outpatient clinics early enough to allow maturity of the system and foster preparedness in the event the global village experiences another pandemic. This will minimize in person clinic visits, promote good care outcomes, stall delayed attendance disease complications, and enhance human resource utilization during emergencies.

ii. The county health ministry must work with the national MOH to establish comprehensive un-interrupted supply of medical products to address observed

biased medication supplies that isolate persons living with NCDs during pandemics.

iii. The future of healthcare is in technology and discoveries. Efficient record keeping is important in ensuring care continuity. KCGH should mobilize resource to digitize patient attendance and care record for ease of reference and continuity of patient care in person and remotely.

iv. There is need for biased policy establishment that is cognizant of the socioeconomic and demographic factors, specifically age, gender, and employment, observed to influence clinic attendance.

v. The KCGH in conjunction with the county health office must purpose to establish the reason for non-clinic utilization by non-Christians.

vi. To develop a coherent outreach programme not only to schools and communities but incorporate colleges, workplaces to sensitize the young population and unemployed.

5.10 Areas of further research

1. Investigate the effect of telemedicine on outpatient clinic utilization at KCGH.
2. Conduct a qualitative study to determine factors influencing clinic utilization among the young and male persons living with diabetes in Kakamega county.
3. Investigate impact of COVID-19 on long term health outcomes of people living with diabetes and attending the KCGH.

REFERENCES

Abebaw, M., Messele,A., Hailu, M., & Zewdu, F . (2016). Adherence and Associated Factors towards Antidiabetic Medication among Type II Diabetic Patients on Follow-Up at University of Gondar Hospital, Northwest Ethiopia. *Advances in Nursing, 2016*,1-7. https:// doi.org/10.1155/2016/8579157

Adetifa, I.M.O., Uyoga, S., Gitonga, J.N., Mugo, D., Otiende, M., Nyangwange, J. Karanja, H., Tuju, J., Wanjiku, P., Aman, R., Mwangangi, M., Amoth, P. & Warimwe, G. M. (2021). Temporal trends of SARS-CoV-2 seroprevalence during the first wave of the COVID-19 epidemic in Kenya. *Nature Communication, 12*(1)*, 3966.* https://doi.org/10.1038/s41467-021-24062-3

Ahn, S. Kim, S., & Koh, K. Associations of the COVID-19 pandemic with older individuals' healthcare utilization and self-reported health status: a longitudinal analysis from Singapore. (2022). *BMC Health Service Research, 22*(1), 66. https://doi.org/10.1186/s12913-021-07446-5

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: does it matter? *American Sociological Association, 36*(1),1-10. https://doi.org/10.2307/2137284

Amsah, N., Md Isa, Z., Ahmad, N., & Abdul Manaf, M.R. (2023). Impact of COVID-19 Pandemic on Healthcare Utilization among Patients with Type 2 Diabetes Mellitus: A Systematic Review. *International Journal of Environmental Research and Public Health, 20*(5), 4577. https://doi.org/10.3390/ijerph20054577

Andayi, F., Chaves, S.S., & Widdowson, M. A. (2019). Impact of the 1918 Influenza Pandemic in Coastal Kenya. *Tropical Medicine of Infectious Diseases, 4*(2), 91. https://doi.org 10.3390/tropicalmed4020091

Apornak, A. Human Resources Allocation in the Hospital Emergency Department during COVID-19 Pandemic. (2021). *International Journal of Healthcare Management, 14*(1), 264–270. https://doi.org/ 10.1080/20479700.2020.1861173

Assefa, N., Sié, A., Wang, D., Korte, M. L., Hemler, E. C., Abdullahi, Y. Y., & Oduola, A. (2021). Reported barriers to healthcare access and service disruptions caused by COVID-19 in Burkina Faso, Ethiopia, and Nigeria: a telephone survey. *The American Journal of Tropical Medicine and Hygiene, 105*(2),3 23-330. https://doi.org/ 10.4269/ajtmh.20-1619

Ayele, A. A., Tegegn, H. G., Ayele, T. A., & Ayalew, M. B. (2019). Medication regimen complexity and its impact on medication adherence and glycemic control among patients with type 2 diabetes mellitus in an Ethiopian general hospital. B*MJ Open Diabetes Research and Care, 7*(1), e000685. https://doi.org/10.1136/bmjdrc-2019-000685

Ayre, J., Cvejic, E., McCaffery, K., Copp, T., Cornell, S., Dodd, R.H., Pickles, K., Batcup, C., Isautier, J.M.J., Nickel, B., Dakin, T., & Bonner, C. Contextualising COVID-19 prevention behaviour over time in Australia: (2021). *PLoS One, 16*(6), e0253930. https://doi.org/10.1371/journal.pone.0253930

Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's Behavioral Model of Health Services Use: a systematic review of studies from 1998-2011. *Psycho-social Medicine. 9* (11), 1-15. https://doi.org/10.3205/psm000089

Bai,Y., Yao, L., Wei, T., Tian, F., Jin, D. Y., Chen, L., & Wang, M. (2020). Presume asymptomatic carrier transmission of COVID-19. *American Medical Association, 323*(14),1406-140. https://doi: 10.1001/jama.2020.2565

Barone, M. T. U., Harnik, S. B., de Luca, P. V., de Souza Lima, B. L., Wieselberg, R. J. P., Ngongo, B., ... & Giampaoli, V. (2020). The impact of COVID-19 on people with diabetes in Brazil. *Diabetes research and clinical practice, 166*,1-9. https://doi.org/ 10.1016/j.diabres.2020.108304

Baruah, K, V. S., & Kumar, K. H. (2014). Management of diabetes during natural emergencies. J*ournal of Social Health and Diabetes, 2*(2), 67-69. https://doi.org/10.4103/2321-0656.130788

Bhanot, D., Singh, T., Verma, S.K., & Sharad, S. (2021). Stigma and Discrimination During COVID-19 Pandemic. *Frontiers in Public Health,* 8, 577018. https://doi.org/10.3389/fpubh.2020.577018

Bornstein, S. R., Rubino, F., Ludwig, B., Rietzsch, H., Schwarz, P. E., Rodionov, R. N., & Mingrone, G. (2021). Consequences of the COVID-19 pandemic for patients with metabolic diseases. *Nature metabolism, 3*(3), 289-292. https://doi.org/10.1038/s42255-021-00358-y

Chang, A. Y., Cullen, M. R., Harrington, R. A., & Barry, M. (2021). The impact of novel coronavirus COVID-19 on noncommunicable disease patients and health systems: a review. J*ournal of Internal Medicine, 289*(4), 450-462. https://doi.org/10.1111/joim.13184

Chen, J.L., Krupp, G.R., & Lo, J.Y. (2022). The COVID-19 Pandemic and Changes in Health Care Utilization Among Patients with Type 2 Diabetes. *Diabetes Care, 45*(4), e74–e76. https://doi.org/10.2337/dc21-2248

Cho, E., & Kim, S. (2015). Cronbach's coefficient alpha: Well known but poorly understood.
Organizational Research Methods, 18(2), 207-230. https://doi.org/10.1177/1094428114555994

Cooper, D., & Schindler, P. (2008). *Business Research Methods* (12th ed.). Mcgraw-hill Us.

Currie, C. J., Christopher Ll. M., Poole, C. D., Jenkins-Jones, S., Rubin, R. R., Burton, C. M., & Evans. M. (2012). The Impact of Treatment Noncompliance on Mortality in People with Type 2 Diabetes. *Diabetes Care, 35*(6), 1279–1284. https://doi.org/10.2337/dc11-1277

Daniel, W.W. (1999). *Biostatistics: A Foundation for Analysis in the Health Sciences.* (7th ed.). John Wiley & Sons.

Devolution, P. M. (2013). *Kakamega County Development Profile*.

D'Souza, D., Empringham, J., Pechlivanoglou, P., Uleryk, E. M., Cohen, E., & Shulman, R. (2023). Incidence of Diabetes in Children and Adolescents During the COVID-19 Pandemic: A Systematic Review and Meta-Analysis. *JAMA Network Open, 6*(6), e2321281. https://doi.org/10.1001/jamanetworkopen.2023.21281

Edqvist, J., Lundberg, C., Andreasson, K., Pigi Dikaiou, L. K., Ludvigsson, J., Lind, M., Adiels, M., & Rosengren, A. (2023). Severe COVID-19 Infection in Type 1 and Type 2 Diabetes During the First Three Waves in Sweden. *Diabetes Care, 46* (3), 570–578. https://doi.org/10.2337/dc22-1760

Fahlen, E., & Davidsson, J. (2016). *Factors that affect adherence to recommended treatment among diabetes patients in Kampala.* url=https://api.semanticscholar.org/CorpusID:53492656

Fischer, S.H., Uscher-Pines, L., Roth, E. & Breslau, J. The Transition to Telehealth during the First Months of the COVID-19 Pandemic: Evidence from a National Sample of Patients. J*ournal of General Internal Medicine, 36*(3), 849–851). https://doi.org/10.1007/s11606-020-06358-0

Fishbein, M. E. (Ed.). (1967). *Readings in attitude theory and measurement*. Wiley.

Gamble, A., Pham, Q., Goyal, S., & Cafazzo, J. A. (2020). The challenges of COVID-19 for people living with diabetes: Considerations for digital health. *JMIR diabetes, 5*(2), e19581. https://doi.org/10.2196/19581

Garg, S., Basu, S., Rustagi, R., & Borle, A. (2020). Primary Health Care Facility Preparedness for Outpatient Service Provision during the COVID-19 Pandemic in India: Cross-Sectional Study. *Journal of Medical Internet Research*,6(2), e19927. https://doi.org/10.2196/19927

Ghosal, S., Sinha, B., Majumder, M., & Misra, A. (2020). Estimation of effects of nationwide lockdown for containing coronavirus infection on worsening of glycosylated haemoglobin and increase in diabetes-related complications: A simulation model using multivariate regression analysis. *Diabetes Metabolic Syndrom, 214*(4), 319-323. https://doi.org/10.1016/j.dsx.2020.03.014.

Ghosh, A., Arora, B., Gupta, R., Anoop, S., & Misra, A. (2020). Effects of nationwide lockdown during COVID-19 epidemic on lifestyle and other medical issues of patients with type 2 diabetes in north India. *Diabetes Metabolic Syndrome clinical Research and Reviews,14*(5), 917-920. https://doi.org/ 10.1016/j.dsx.2020.05.044

Hebbard, C., Lee, B., Katare, R.,& Garikipati, V.N.S. (2021). Diabetes, Heart Failure, and COVID-19: An Update. *Frontiers of Physiology. 12*, 706185. https://doi.org/10.3389/fphys.2021.706185

Jain, S., & Dewey, R.S. The Role of "Special Clinics" in Imparting Clinical Skills: Medical Education for Competence and Sophistication. *Advanced Medical Education practice,* 12, 513-518. https://doi.org/10.2147/AMEP.S306214

Jamison, D.T., Breman, J. G., Measham, A. R., Alleyne, G., Claeson, M., Evans, D. B., Jha, P., Mills, A., Musgrove, P. (2006). *Disease Control Priorities in Developing Countrie*s (2nd ed.). World Bank and Oxford University Press.

Kaufman, F. R. (Ed). (2012). *Medical Management of Type 1 Diabete*s. American Diabetes Association.

Kenya National Bureau of Statistics and ICF. (2023). *Kenya Demographic and Health Survey 2022. Key Indicators Report.* Nairobi, Kenya, and Rockville, Maryland, USA: KNBS and ICF.

Kichloo, A., Albosta, M., Dettloff, K., Wani, F., El-Amir, Z., Singh, J., Aljadah, M., Chakinala, R.C., Kanugula, A.K., Solanki, S., & Chugh, S. (2020). Telemedicine, the current COVID-19 pandemic and the future: a narrative review and perspectives moving forward in the USA. *Fam Med Community Health, 8*(3), e000530. https://doi.org/ 10.1136/fmch-2020-000530

Kilonzo, S.M., & Omwalo, B. O. (2021).The Politics of Pulpit Religiosity in the Era of Covid-19 in Kenya. Frontiers in Kenya, *Frontier Communication, 6*, 616288. https://doi.org/10.3389/fcomm.2021.616288

Kiragu, Z. W., Gathecha, G., Mwangi, M. K., Ndegwa, Z., Pastakia, S., Nyagah, D., Cizungu, R. N., Takah, Mutwiri, M., Ndolo, M., & Wirtz, V.J. (2021). Access to Medicines for Non-Communicable Diseases (NCDS) during COVID-19 in Kenya: A Descriptive Commentary. *Health Systems Reform, 7*(1), 1-8. https:// doi.org/10.1080/23288604.2021.1984865

Knight, D., Daniel, V. D., & William P. C. (2021) Religion in the US during the time of a Pandemic: A Medical Perspective. *Journal of Religion and Health, 60*(5), 3177–3192. https://doi.org/10.1007/s10943-021-01366-8

Kothari, C.K., & Garg, G. (2014). *Research Methodology*. (2nd Ed.). New age International Publishers Limited.

Lippi, G., Sanchis-Gomar, F. & Henry, B.M. (2021), Response to: Is newly diagnosed diabetes a stronger risk factor than pre-existing diabetes for COVID-19 severity? J*ournal of Diabetes, 13*(2), 179-180. https://doi.org/10.1111/1753-0407.13127

Ministry of Health. (2014). *Strategy for Community Health* 2014-2019. http://guidelines.health.go.ke:8000/media/STRATEGY_FOR_COMMUNITY_HEALTH_2014-2019.pdf

Ministry of Health. (2014). *Kenya Health Policy 2014-2030: Towards attaining the highest standard of health*. http://publications.universalhealth2030.org/uploads/kenya_health_policy_2014_to_2030.pdf

Ministry of Health. (2015). *Kenya STEPwise Survey for Non-Communicable Diseases Risk Factors 2015*. *(Report)*. http://www.nutritionhealth.or.ke/wp-content/uploads/Downloads/Kenya%20STEPwise%20Survey%20for%20Non-Communicable%20Diseases%20Risk%20Factors%20Report%202015

Ministry of Health. (2021). *Guidelines on Management of COVID-19 in Kenya. https://healthsciences.uonbi.ac.ke/sites/default/files/2021-*

10/Final%20GUIDELINES%20ON%20THE%20MANAGEMENT%2001-09-21.pdf

Monaghesh, E., & Hajizadeh, A. (2020). The role of telehealth during COVID-19 outbreak: A systematic review based on current evidence. *BMC public health, 20*(1193), 1-9. https://doi.org/10.1186/s12889-020-09301-4

Mugenda, O. M & Mugenda, A.G. (2003). *Research Methods:Quantitative & Qualitative approches* (2nd Ed.). Act presas.

Namukhula, F. (2015). *Factors influencing management and control of diabetes mellitus in health projects: a case of Bungoma county hospital in Bungoma county, Kenya* [Doctoral dissertation, University of Nairobi]. https://docplayer.net/56509465-Factors-influencing-management-and-control-of-diabetes-mellitus-in-health-projects-a-case-of-bungoma-county-hospital-in-bungoma-county-kenya.html

National Bureau of Statistics-Kenya and ICF International. (2015). 2*014 KDHS Key Findings.* Rockville, Maryland, USA: KNBS and ICF International

Kenya National Bureau of Statistics. (2019). *2019 Kenya Population and Housing Census* https://www.knbs.or.ke/download/2019-kenya-population-and-housing-census-volume-i-population-by-county-and-sub-county/

Ndwiga, A. M., Kimani, M., & Oirere, N. O. B. (2019). *The effect of mobile phone technology in bridging the gaps in ARV uptake care service delivery in Kenya: a case study in Kibera, Nairobi County*. [Master's thesis, Kenya Methodist University]. http://repository.kemu.ac.ke/bitstream/handle/123456789/735/Alice%20Ndwiga%20thesis.pdf?sequence=1&isAllowed=y

Nebert, M. K., Agina, B. M. O., & Andre, Y. (2017). Health Behaviour among Nurses Working in Public Hospitals in Kakamega County, Kenya. *Nursing Research and Practice, 2017*(2) 1-8. https://doi.org/10.1155/2017/4683189

O'Donnell O. (2007). Access to health care in developing countries: breaking down demand side barriers. *Cad Saude Publica, 23*(12), 2820-34. https://doi.org/10.1590/s0102-311x2007001200003

Oduro, M.S., Peprah, P., Morgan, A.K. & Agyemang-Duahet, W. (2023). Staying in or out? COVID-19-induced healthcare utilization avoidance and associated socio-demographic factors in rural India. *BMC Public Health, 23*(1), 1-16. https://doi.org/10.1186/s12889-023-16282-7

Patel, S.Y., Rose, S., Barnett, M.L., Huskamp, H.A., Uscher-Pines, L., & Mehrotra A. Community Factors Associated with Telemedicine Use During the COVID-19 Pandemic. (2021). *JAMA Network Open. 4*(5), e2110330. https://doi.org/10.1001/jamanetworkopen.2021.10330

Pati, S., Agrawal, S., Swain, S., Lee, J. T., Vellakkal, S., Hussain, M. A., & Millett, C. (2014). Non communicable disease multimorbidity and associated health care utilization and expenditures in India: cross-sectional study. *BMC Health Service Research,14,* (451),1-9. https://doi.org/10.1186/1472-6963-14-451

Poudel, A.N., Zhu, S., Cooper, N., Roderick, P., Alwan, N., Tarrant, C., Ziauddeen, N., & Yao, G.L. (2021). Impact of Covid-19 on health-related quality of life of patients: A structured review. *PLoS One, 16*(10), e0259164. https://doi.org/10.1371/journal.pone.0259164

Pugliese, G., Vitale, M., Resi, V., & Orsi, E. (2020). Is diabetes mellitus a risk factor for Corona Virus Disease 19 (COVID-19)?. *Acta Diabetol, 57*(11), 1275-1285. https://doi.org/10.1007/s00592-020-01586-6

Raballo, M., Trevisan, M., Trinetta, A. F., Charrier, L., Cavallo, F., Porta, M., & Trento, M. (2012). A study of patients' perceptions of diabetes care delivery and diabetes: Propositional analysis in people with type 1 and 2 diabetes managed by group or usual care. *Diabetes care, 35(2),* 242-247. https://doi.org/10.2337/dc11-1495

Roberton, T., Carter, E.D., Chou, V.B., Stegmuller, A.R., Jackson, B.D., Tam, Y., Sawadogo-Lewis, T., & Walker, N. (2020). Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries. *The Lancet Global Health, 8*(7), e901-e908. https://doi.org/10.1016/S2214-109X (20)30229-1

Romdhane, H. B., & Grenier, F. R. (2009). Social determinants of health in Tunisia: The analysis of Ariana. *International journal of equity in health, 8*(9), 1-8. https://doi.org/10.1186/1475-9276-8-9

Sekhar, S., Khan, K. A., & Appalaneni, R. (2018). Patient Activation Measures in Type2 DM in Tertiary Care Hospital–Does it Differ between Male and Female. *National Journal of Medical Research, 8*(01), 7-11. https://njmr.in/index.php/file/article/view/151

Shimels, T., Asrat Kassu, R., Bogale, G., Bekele, M., Getnet, M., Getachew, A., & Abraha, M. (2021). Magnitude and associated factors of poor medication

adherence among diabetic and hypertensive patients visiting public health facilities in Ethiopia during the COVID-19 pandemic. *PloS one, 16*(4), e0249222. https://doi.org/10.1371/journal.pone.0249222

Siddiqui, M. H., Khan, I. A., Moyeen, F., & Chaudhary, K. A. (2019). Identifying barriers to therapeutic adherence in type 2-diabetes: A complex and multidimensional clinical issue. *Asploro Journal of Biomedical and Clinical Case Reports, 2*(1), 22-28. https://doi.org/10.36502

So, C.F., & Chung, J.W. (2018). Telehealth for diabetes self-management in primary healthcare: A systematic review and meta-analysis. *Journal of Telemedicine and Telecare*, 24(5), 356-364. https://doi.org/10.1177/1357633X17700552

Statistics, K. N. (2014). *Kenya Demographic and Health Survey*. Nairobi: Government.

Subathra, G.N., Rajendrababu, S.R., Senthilkumar, V., Mani, I., & Udayakumar, B. (2021). Impact of COVID-19 on follow-up and medication adherence in patients with glaucoma in a tertiary eye care centre in south India. *Indian Journal of Ophthalmology, 69*(5), 1264–1270. https://doi.org/10.4103/ijo.IJO_164_21

Terwee, C.B., Gerding, M.N., Dekker, F.W., Prummel. M.F., van der Pol, J.P., & Wiersinga, W.M. (1999). Test-retest reliability of the GO-QOL: a disease-specific quality of life questionnaire for patients with Graves' ophthalmopathy. *Journal of Clinical Epidemiology, 52*(9), 875-84. https://doi.org/10.1016/s0895-4356(99)00069-4

Teixeira da Silva, J.A. Stigmatization, Discrimination, Racism, Injustice, and Inequalities in the COVID-19 Era. (2020). *International Journal of Health Policy Management, 9*(11),484-485. https://doi.org/10.34172/ijhpm.2020.87

The Constitution of Kenya. (2010). http://www.icla.up.ac.za/images/constitutions/kenya_constitution.pdf (Accessed 31st.

Theuri, A. W., Makokha, A. & Kyallo, F. Effect of using mobile phone communication in the management of Type 2 Diabetes Mellitus among adult patients attending Kitui County Referral Hospital, Kenya. (2019). I*nternational Journal Of Diabetes Research, 8*(2), 23-29. https:// doi.org/10.5923/j.diabetes.20190802.02

Tino, S., Wekesa, C., Kamacooko, O., Makhoba, A., Mwebaza, R., Bengo, S., Nabwato, R., Kigongo, A., Ddumba, R., Mayanja, B. N., Kaleebu, P., Newton, R., & Nyerinda, M. Predictors of loss to follow up among patients with type 2 diabetes mellitus attending a private not for profit urban diabetes clinic in Uganda – a descriptive retrospective study. (2019). *BMC Health Service Research 19*(1), 598. https://doi.org/10.1186/s12913-019-4415-4

Tourkmani, A. J., ALHarbi, T., Rsheed, A.M.B., Alrasheedy, A.A., ALMadani, W., AL. Juraisi, F., Alotaibi, A. F, AlHarbi, M., AlAbood, A.F., & Alshaikh, A.A. (2021). The impact of telemedicine on patients with uncontrolled type 2 diabetes mellitus during the COVID-19 pandemic in Saudi Arabia: Findings and implications. *Journal of Telemedicine and Telecare 29*(5), 390-398. https://doi.org/10.1177/1357633X20985763

Tuczynska, M., Matthews-Kozanecka, M., & Baum, E. (2021). Accessibility to Non-COVID Health Services in the World During the COVID-19 Pandemic. *Frontiers in Public Health*, 9, 1-7. https://doi.org/10.3389/fpubh.2021.760795

Waari, G., Mutai, J., & Gikunju, J. (2018). Medication adherence and factors associated with poor adherence among type 2 diabetes mellitus patients on follow-up at Kenyatta National Hospital, Kenya. *Pan African Medical Journal*, *29*(1), 1-15. https://doi.org/10.11604/pamj.2018.29.82.12639

Wambua, S., Malla, L., Mbevi, G., Kandiah, J., Nwosu, A. P., Tuti, T., Paton, C., Wambu, B., English, M., & Okiro, & E. A. (2022). Quantifying the indirect impact of COVID-19 pandemic on utilization of outpatient and immunization services in Kenya: a longitudinal study using interrupted time series analysis. B*ritish Medical Journal Open*, *12*(3), e055815. https://doi.org/10.1136/bmjopen-2021-055815

Wild, S.H., & Forouhi, N.G. (2007). What is the scale of the future diabetes epidemic, and how certain are we about it?. *Diabetologia*, *50*(5), 903-5. https://doi.org/10.1007/s00125-007-0647-7

World Health Organization. (2005). S*ustainable health financing , universal coverage and socila health insurance. fiftyeight World Health Assembl*y. https://iris.who.int/handle/10665/20383. World Health Organization

World Health Organization . (2007). *Everybody's business:strengthening health systems to improve health outcomes:WHO'S framework for action. Key components of a well-functioning health system.* WHO Press. https://iris.who.int/handle/10665/43918

World Health Organization. (2016). *Global report on diabetes*. https://www.who.int/publications/i/item/9789241565257

World Health Organization. (2020). *Practical considerations and recommendations for religious leaders and faith-based communities in the context of COVID-19*. https://www.who.int/publications/i/item/practical-considerations-and recommendations-for-religious-leaders-and-faith-based-communities-in-the-context-of-covid-19.

Yamane, T. (1973). *Statistics: An Introductory Analysis*. John Weather Hill, Inc.

APPENDIX I: INFROMED CONSENT FORM

Kenya Methodist University P. 0 Box 267-60200

MERU, Kenya

SUBJECT: INFORMED CONSENT

Dear Respondent,

My name is **Carolyne Mukhaya Mulanda,** and Iam a M.Sc. student from Kenya Methodist University. I am conducting a study titled: **Factors influencing utilization of specialty clinic during covid-19 pandemic among patients with diabetes mellitus type II at the Kakamega county referral hospital.** The results will be used to improve health services in Kenya and other Low-income African countries. Consequently, the increased efficiency of health care services will benefit countries, communities and individuals. This proposed study is vital to enhancing health systems because it will create new information in this field, encouraging decision-makers to make evidence- based decisions. Especially in the face of pandemics.

Procedure to be followed.

Involvement in the study will require that I ask you a few questions and also access further information from the clinic records all department of the hospital to resolve the six pillars of the health care system. I will register your information in a checklist for the questionnaire.

You are entitled to refuse to take part in this study. You won't be penalized or punished for not enrolling in the research and your choice won't be held against you and won't negatively affect the services you receive from the facility.

Please note involvement in the research is optional. You can ask study-related questions at any time. You may refuse to answer any questions, or you may terminate an interview at any time. You can also cease to be in the study at any time without any repercussions for the services that you receive.

Discomforts and risks

If there is any question that make you feel uncomfortable to answer, you may choose not to answer. You can also stop the interview whenever you want. Completing the interview may take around 30 minutes

Benefits

You will help us to strengthen health systems in Kenya and other low-in-coming countries in Africa by you participating in this study. As a result, the improved quality of health care services will benefit countries, communities and individuals. This field attachment is vital to improving health systems because it will create new information in this sector which will empower decision-makers to make evidence-based decisions.

Rewards

Anyone who chooses to participate in the study will not be rewarded.

Confidentiality

The interviews will be held in a private setting with adherence to COVID-19 protocols. The questionnaire will not record your name and will be kept in a secure location.

Contact Information

If you have any questions, you may contact the following supervisors Professor Wanja Tenambergen

Email: wanja.tenambergen@kemu.ac.ke Mobile: +254 726 678020

Dr, Keziah Njoroge

Email: Kezia.njoroge@kemu.ac.ke Mobile: +254 738970746

Participant's Statement

The above statement concerning my involvement in the survey is apparent to me. I have been given an opportunity to ask questions, and to my satisfaction, my questions were answered. My participation in this research is completely voluntary. I recognize my records will be considered secret and I can exit the research at any point. I acknowledge that at my workplace, whether I decide to leave the study or not, I will not be victimized, and my choice will not change the way I am viewed at my place of employment.

Name of Participant…….

Date…….

Signature…….

Investigator's Statement

I, the undersigned, have explained to the volunteer in a language s/he understands the procedures to be followed in the study and the risks and the benefits involved.

Name of Interviewer……Date…….

Interviewer Signature……

APPENDIX II: RESEARCH QUESTIONNAIRE FOR RESPONDENTS

Questionnaire No: ..... Date: .....

INSTRUCTIONS

(a) Explain the purpose of the interview to the patient.

(b) Ask for consent before proceeding with the interview

(c) Make sure all questions are answered

(d) Tick as appropriate

Section A: Socio-demographic characteristics

1. Please indicate your age in years ----------

2.What is your gender

- Male----------
- Female--------

3.What is your marital status?

- Married ----------
- Single ----------
- Widowed ----------

- Separated ----------

4.What is your religion or denomination?

- Christian ----------
- Muslim ----------
- Others, please specify here ----------

5.Kindly indicate your highest level of education attained?

- Primary ----------
- Secondary ----------
- Tertiary college ----------

6.What is your employment status?

- Formally employed.
- Self-employed.
- Not employed

7.Kindly indicate your occupation. ----------

Section B: How Patient related characteristics are influencing utilization of DMII clinics during COVID-19 Pandemic.

Individual factors

8.I fear visiting the clinic because I can contract COVID-19 at the facility.

- Yes.
- No.

9.I feel I have had good control of my diet during the pandemic.

- Yes
- No

Religious factor

10.My religion does not encourage visit to the clinics.

- Yes
- No

11.The church discontinued live service with lockdown.

- Yes
- No

Family factors

12.My family members are afraid I may contract COVID -19 if I visit the facility.

- Yes
- No

13. I have had a family member who contracted COVID-19.

- Yes
- No

Section C: Disease factors influencing DMII clinic utilization during COVID-19 pandemic.

Disease duration

14.I have had the disease long enough and I know how to manage it.

- Yes

- No

Disease symptoms

15.Disease symptoms did not get worse during the pandemic.

- Yes
- No

16.I suffer from a second chronic condition besides diabetes.

- Yes
- No

Regimen complexity

17.Other than DMII medications, I am currently on regular treatment for a different NCD.

- Yes
- No

Section D. Facility related factors influence on DM II clinic utilization during COVID-19 pandemic.

Availability of medical commodities

18.It was easy to get my usual supply of medicines during lockdown.

- Yes
- No

Hand hygiene facilities

19.There is provision for hand washing facilities at the clinic all the time.

- Yes
- **No**

Stay at home directive

20.The facility management advised me to attend the clinic if I have an emergency

- Yes
- No

21.The waiting time for service at the specialty clinic during this pandemic is long.

- Yes
- No

22.The number of HCW has been low compared to pre-pandemic.

- Yes
- No

23.The clinic has remained in operation throughout the pandemic period.

a. Yes

b. No

Section E: Influence of COVID-19 restrictions on specialty clinic utilization

Lock down

24.Lock down reduced adherence to clinic appointment.

- Yes
- No

25.The health care workers have continued with community visits during the pandemic.

- Yes
- No

Social distancing

26.The reduced number of people allowed per vehicle prolong the waiting time for transport to the clinic.

- Yes
- No

27.The sitting arrangement allows for social distancing.

- Yes
- No

Phone consultation

28.The clinic health care workers reach out to me on phone if I miss the scheduled clinic during this pandemic.

- Yes
- No

Section F: Utilization of the specialty clinic

29.I have attended all scheduled specialty clinic appointment.

- Yes
- No

30.If your answer to question 24 is No, please indicate below the number of times you have missed specialty clinic appointments between March 2021 to February 2022.

---------- times.

APPENDIX III: QUESTIONNAIRE FOR FOCUSED GROUP DISCUSSION

1. What has been the population of the DM II before the pandemic- January 2020?

2 What was the population of the DM II clinic patients in July2020, December 2020, March 2021, July 2021, December 2021, and February 2022?

3 How would you rate clinic utilization by the younger population?

4 Was there stock out of medication during the COVID -19 pandemic?

5 If yes, for how long and what alternative was offered to the patients?

6 Were there patients who missed out on clinic schedules and if yes, was there a schedule to reach out to the patients who had missed clinic once?

7 If so, was every patient who missed scheduled clinic/s contacted?

8 Have you observed a difference in the population of patients who profess different faiths?

9 Was there a re-organization of the clinic to allow social distancing? If so in what form?

10 Has there been clinic closure at any time during the COVID-19 pandemic?

11 Did the clinic continue with the outreach programmes during the pandemic period?

12 In your opinion, do consider the lock may have influenced clinic attendance?

13 How would you rate the impact of health education provided on Mondays of every week at the clinic on blood sugar control?

APPENDIX IV: ETHICAL APPROVAL

KENYA METHODIST UNIVERSITY
P. O. BOX 267 MERU - 60200, KENYA
TEL: 254-064-30301/31229/30367/31171
FAX: 254-64-30162
EMAIL: INFO@KEMU.AC.KE

June 14, 2022

KeMU/SERC/HSM/16/2022

CAROLYNE MUKHAYA MULANDA
HSM-3-2835-2/2013

Dear Carolyne,

SUBJECT: FACTORS INFLUENCING UTILIZATION OF SPECIALTY CLINIC DURING COVID-19 PANDEMIC AMONG PATIENTS WITH DIABETES MELLITUS TYPE II AT THE KAKAMEGA COUNTY REFFERAL HOSPITAL, IN KAKAMEGA COUNTY

This is to inform you that Kenya Methodist University Scientific Ethics and Review Committee has reviewed and approved your research proposal. Your application approval number is KeMU/SERC/HSM/16/2022. The approval period is 14th June, 2022 – 14th June, 2023

This approval is subject to compliance with the following requirements:

I. Only approved documents including (informed consents, study instruments, MTA) will be used.

II. All changes including (amendments, deviations, and violations) are submitted for review and approval by Kenya Methodist University Scientific Ethics and Review committee.

III. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KeMU SERC within 72 hours of notification.

IV. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KeMU SERC within 72 hours.

V. Clearance for export of biological specimens must be obtained from relevant institutions.

VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.

VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU SERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

DR. A. WAMACHI
CHAIR, SERC

KENYA METHODIST UNIVERSITY
P. O. Box 267 Meru - 60200, Kenya
Tel: 254-064-30301/31229/30367/31171
Fax: 254-64-30162
Email: deanrd@kemu.ac.ke

DIRECTORATE OF POSTGRADUATE STUDIES

June 16, 2022

Commission Secretary,
National Commission for Science, Technology and Innovations,
P.O. Box 30623-00100,
NAIROBI.

Dear Sir/Madam,

RE: CAROLYNE MUKHAYA MULANDA – (REG. NO. HSM-3-2855-2/2013)

This is to confirm that the above named is a bona fide student of Kenya Methodist University, in the School of Medicine and Health Sciences, Department of Health System Management undertaking a Masters' Degree in Health System Management . She is conducting research on: **"Factors Influencing Utilization of Specialty Clinic during Covid-19 Pandemic among Patients with Diabetes Mellitus Type II at the Kakamega County Refferal Hospital, in Kakamega County".**

We confirm that her research proposal has been presented and approved by the University.

In this regard, we are requesting your office to issue a research license to enable her collect data.

Any assistance accorded to her will be appreciated.

Thank you.

For 16 JUN 2022

Dr. John Muchiri, Ph.D.
Director, Postgraduate Studies

Cc: Dean SMHS
CoD, HSM
Postgraduate Co-ordinator-HSM
Supervisors

APPENSDIX V: NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **422253**

Date of Issue: **01/July/2022**

RESEARCH LICENSE

This is to Certify that Ms.. CAROLYNE MUKHAYA MULANDA of Kenya Methodist University, has been licensed to conduct research in Kakamega on the topic: FACTORS INFLUENCING UTILIZATION OF SPECIALTY CLINIC DURING COVID-19 PANDEMIC AMONG PATIENTS WITH DIABETES MELLITUSTYPE II AT KAKAMEGA COUNTY REFFERAL HOSPITAL IN KAKAMEGA COUNTY for the period ending : 01/July/2023.

License No: **NACOSTI/P/22/18581**

422253

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

APPENDIX VI: KAKAMEGA COUNTY GENERAL HOSPITAL RSEARCH LICENCE

COUNTY GOVERNMENT OF KAKAMEGA

E-mail: wpgh15@yahoo.com
Telephone: Kakamega 0702930346
When replying, please quote:

REF: CGH/KAK/ERC/VOL.I/137

COUNTY GENERAL HOSPITAL
P.O. Box 15-G.P.O-50100
KAKAMEGA

DATE: 4th August, 2022

MINISTRY OF HEALTH SERVICES

CAROLYNE MUKHAYA MULANDA
LICENCE NO. NACOSTI/P/22/18581

RE: RESEARCH AUTHORIZATION FOR DATA COLLECTION – NO. ERC/158-08/2022

This is to inform you that **Kakamega County General Hospital Ethics Review Committee (KCGH ERC)** has authorized your research proposal titled: ***"Factors Influencing Utilization of Speciality Clinic during COVID 19 Pandemic Among Patients with Diabetes Mellitus Type II at Kakamega County General Hospital".*** The approval period is 4th August, 2022 – 1st July, 2023.

This authorization is subject to compliance with the following requirements:

i. Only approved documents including informed consent, study instruments, MTA will be used.
ii. All changes including amendments, deviations and violations are submitted for review and approval by the **KCGH ERC.**
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to **KCGH ERC** within 24 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety of welfare of the study participants and others or affect the integrity of the research must be reported to **KCGH ERC** within 24 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to **KCGH ERC**.

This authorization should be attached to your research license from National Commission for Science, Technology and Innovation (NACOSTI) and also other necessary clearances.

DR. AJEVI AUSTINE
CHAIRMAN
ETHICS AND RESEARCH COMMITTEE

KAKAMEGA COUNTY GEN. TEACHING & REFERRAL HOSPITAL
MEDICAL SUPERINTENDENT
04 AUG 2022

APPENDIX VII: MAP OF KAKAMEGA COUNTY