2023

A Descriptive study on nutrition knowledge and dietary practices among adults with Type 2 Diabetes Mellitus and Hypertension at Kitale County Referral Hospital.

Kiarie, Ruth Wanjiru
Strathmore Business School
Strathmore University

A Descriptive Study on Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes Mellitus and Hypertension at Kitale County Referral Hospital

Kiarie Ruth Wanjiru

Submitted in partial fulfillment of the requirements for the Degree of Master of Business Administration in Healthcare Management at Strathmore University

Strathmore University Business School

Nairobi, Kenya

July 2023

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

Kiarie Ruth Wanjiru

Approval

The dissertation of Kiarie Ruth Wanjiru was approved by the following:

Prof. Joseph Onyango

Senior Lecturer, Strathmore Business School

Academic Director-Institute of Healthcare Management

Dr. Ceaser Mwangi

Executive Dean

Strathmore University Business School.

Dr. Bernard Shibwabo

Director, Office of Graduate Studies

ABSTRACT

Non-communicable diseases (NCDs) are the leading global cause of death, with most of these deaths occurring in low to middle- income countries (LMICs). Hypertension and diabetes are two of the four major NCDs, and they are often comorbidities, meaning that they occur at the same time. Morbidity and mortality is usually a result of long-term complications, and apart from medical therapy, these can be prevented by lifestyle interventions that include dietary modifications. This study sought to describe the nutrition knowledge and dietary practices of patients with type 2 diabetes and hypertension. The focus was on patients receiving care at the Kitale County Referral Hospital in Trans Nzoia County, and the study objectives were to (i) assess patients' knowledge of dietary influence on diabetes and hypertension, (ii) assess socio-cultural influences on patients' dietary practices, (iii) assess patients' willingness to change their dietary practices, and (iv) assess patient's awareness of their dietary practices. The study was supported by the Social Cognitive Theory, which is premised upon the reciprocal interaction between individual, behavioural and environmental factors. These factors interact to formulate the control that an individual has over their illness, thereby influencing their motivation to perform self-care activities. This descriptive cross-sectional study utilized quantitative techniques by use of structured questionnaires as the main data collection instrument, in a target population of 973 and a sample size of 283 respondents. Data analysis was carried out using SPSS software, quantitative techniques were used to analyze the data, and descriptive techniques were applied to analyse the characteristics of the respondents. The following conclusions were made from the results: that majority of the participants understood the role of diet in the management of these two conditions; that some cultural practices posed a challenge to some participants, and that they had the family, spousal and social support they needed; that participants were willing to change their dietary practices and adhere to the recommended diet regimens; that most participants had received adequate nutrition education and counselling, however eating balanced diets was a challenge, they were not able to find all the foods they had been advised to eat, and they had to think about the cost of buying these foods. The study recommends sustained efforts in patient education, inclusion of experiential learning through the use of a hospital kitchen in order to contextualize use of locally available foods, and strategies to combat food insecurity especially among the ageing population in the county.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

ADA-American Diabetes Association

BMI-body mass index

BP-blood pressure

CDM-chronic disease model

CVD- cardiovascular disease

DASH diet- dietary approach to stop hypertension diet

DM- diabetes mellitus

GDP- gross domestic product

IDF- International Diabetes Federation

KAP- knowledge, attitudes and practice

KCRH- Kitale County Referral Hospital

LMICs- Low to middle income countries

MOH- Ministry of Health

NCDS- Non communicable diseases

SSA- Sub Saharan Africa

SCT- Social Cognitive Theory

T2DM- Type 2 diabetes mellitus

WHO- World Health Organization

ACKNOWLEDGEMENT

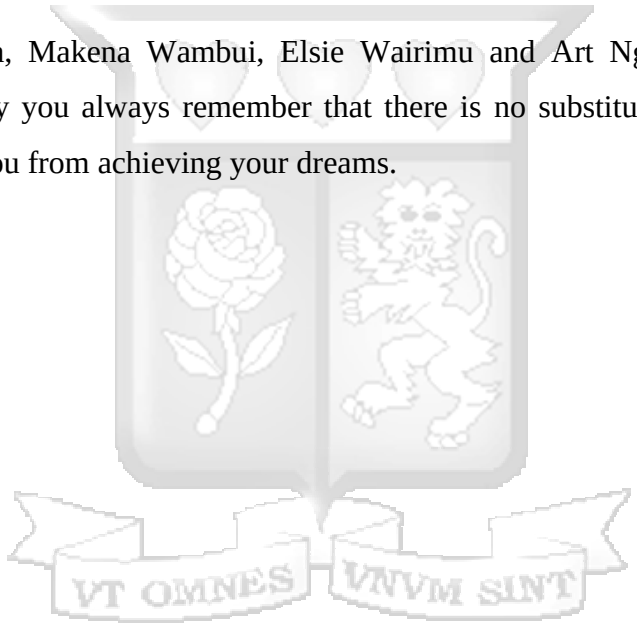
First, I give thanks to God for His immense grace and strength during the course of this study.

To my supervisor Prof. Joseph Onyango, your guidance and support kept me on course.

To Hospitainer and the Healthy Villages team, for the inspiring conversations that led to the choice of this study, and your support all through.

To my dear husband, Maina Mwangi, I could not have accomplished this without your immense support, patience and encouragement. I am truly grateful.

To our three children, Makena Wambui, Elsie Wairimu and Art Ngatho, this project is dedicated to you. May you always remember that there is no substitute for hard work and nothing should stop you from achieving your dreams.



CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter outlines the background of the study by first providing an overview of Non-Communicable Diseases (NCDs). It goes on to give a description of diabetes and hypertension and how they can be managed by nutrition interventions. It then presents the problem statement, research objectives, and questions. Finally, the chapter concludes by discussing the study's scope and significance.

1.2 Background of the study

Nutrition is a fundamental component of a healthy lifestyle (Crowley et al., 2019) and has the potential to positively or negatively impact an individual's or population's health trajectories (Herman et al., 2013). Besides providing enough nutrients to meet metabolic requirements, diet also produces a feeling of satisfaction and well-being, and modulates various functions in the body. As a result, this may have detrimental or beneficial roles in some diseases (Roberfroid, 2000). Globally, 11 million deaths annually are attributable to dietary factors, which means that poor diet is the leading risk factor for death in the world (Afshin et al., 2019). Diets that are low in key nutrients contribute to poor dietary intake and the growing burden on health care. This therefore means that people could benefit from improving their diets by increasing their consumption of key nutrients and foods (Crowley et al., 2019).

NCDs, also known as chronic diseases, are diseases that are not transmitted from one person to another and tend to be generally of a long duration and slow progression. They usually occur as a result of a combination of genetic, physiological, environmental and behavioural factors (WHO, 2021b). NCDs are the leading cause of death globally, killing 41 million people annually, equivalent to 71% of all deaths (WHO, 2021). The four major NCDs are cardiovascular disease (CVD) (with hypertension as a major cause), cancer, chronic respiratory diseases, and diabetes. These are responsible for 80% of all premature NCD deaths, which occur between the ages of 30 to 69 years (WHO, 2014). The less readily acknowledged NCDs

include mental illnesses, dementia, and the long-term physical and psychological effects of accidents and injuries (Gyasi et al., 2020).

NCDs represent a significant and increasing burden worldwide, which is also evident in low- and middle-income countries (Wagner & Brath, 2012). This can be attributed to the adverse effects of globalization and rapid urbanization. Coupled with demographic, epidemiologic and economic developments, this leads to a nutrition transition, whereby the structure of the typical diet of a particular population is altered (Shetty, 2013). The change is characterized by unhealthy diets that promote increased consumption of saturated fats, salt and sugar, and decreased consumption of dietary fibre. In addition to this, lifestyle changes contribute to reduced physical activity which promotes overweight and obesity, which are risk factors for NCDs. Risk factors are classified as modifiable or non-modifiable that can have changeable or non-changeable conditions, respectively. The modifiable risk factors include tobacco use, harmful consumption of alcohol, physical inactivity, obesity, and high blood cholesterol, while the non-modifiable risk factors include age, gender, genetic factors, race, and ethnicity (Wagner & Brath, 2012, Budreviciute et al., 2020).

Of the 14 million annual premature deaths attributable to NCDs, 90% occur in LMICs where availability and use of appropriate NCD services are insufficient, especially in poorer and rural areas (Osetinsky et al., 2020). In order to accelerate national efforts to address the rising burden of NCDs, the World Health Assembly in 2013 adopted the WHO Global Action Plan for the prevention and control of non-communicable diseases 2013–2020 (Global NCD Action Plan 2013–2020). The set targets include a 25% relative reduction in the overall mortality from NCDs, a 25% relative reduction in the prevalence of raised blood pressure and to halt the rise in diabetes and obesity (WHO, 2014). The urgency to address the global chronic disease concern is currently one of the seventeen Sustainable Development Goals (SDGs). The third goal, good health and well-being, describes a commitment to reduce premature death due to NCDs by one-third through prevention and treatment, and to ensure universal health coverage(UHC) by 2030 (Bekele et al., 2020).

It was in light of this that the Government of Kenya developed the Kenya National Strategy for the Prevention and Control of Non Communicable Diseases 2015-2020, which focused on ten strategic objectives that were key to the reduction of the burden of NCDs (Ministry of Health, 2015). The focus of objective three was to promote healthy lifestyles and implement interventions to reduce the modifiable risk factors for NCDs. Following on from this, the Kenya

National NCD Strategic Plan (NSP) 2021-2025 was launched. It places emphasis on population-wide prevention and control measures, as well as strengthening health systems on the whole continuum of care for NCDs (Mensah et al., 2020). Closer home, according to the Trans Nzoia County Integrated Development Plan 2018-2022, the prevalence of NCDs is also on the rise at a rate of 30%, and this calls for concerted effort to ensure that prevention and control measures curb this rise (Trans Nzoia, 2018).

Diabetes and hypertension are two of the four major NCDs. The cornerstone of diabetes management is promoting a lifestyle which includes a healthy diet, regular physical activity, smoking cessation and maintenance of healthy body weight (IDF, 2021). Similarly, reducing the above modifiable risk factors is the best approach to prevent hypertension and its associated adverse effects. (WHO, 2021a). This therefore means that in order for patients to benefit from nutrition, it is important that they first have adequate knowledge on the same (Roux et al., 2019).

1.2.1 Kitale County Referral Hospital

Kitale County Referral Hospital (KCRH) is a level 5 public healthcare facility in Kitale, Trans-Nzoia County, serving patients from within Trans-Nzoia and the neighbouring Bungoma, Uasin-Gishu, and West Pokot Counties. Trans-Nzoia county is located 380 kilometers northwest of Nairobi between Mt. Elgon and River Nzoia in the former Rift Valley Province with an average area of 2495km^2 and a population of 990,341(Kenya National Bureau of Statistics (KNBS), 2019).

KCRH has a bed capacity of 250 patients with an average daily bed occupancy of 300, and offers comprehensive outpatient and inpatient services. Outpatient services include general and specialist clinics, accident and emergency, dental, eye, ear, nose and throat, laboratory, imaging (X-ray, ultra sound and MRI), and a comprehensive care centre for HIV/AIDS. Inpatient care includes general and specialist wards, theatres and renal unit. As for the human resource, there are clinical personnel of various cadres totalling to 364 and 85 support staff. KCRH has a catchment population of 106,150 and serves as the only referral hospital in the county to all the five sub counties namely, Kiminini (where it is located), Saboti, Cherangany, Endebess and Kwanza.

KCRH operates a Chronic Disease Model CDM) clinic for diabetes and hypertension patients that runs daily and provides comprehensive care to patients. This entails diagnosis, lifestyle

management, treatment and continuation of care. The clinic not only serves patients within Kitale, but from the entire county. This is especially due to lack of commodities such as diagnostic equipment, laboratory reagents, and drugs in the most of the healthcare facilities.

KCRH would be an ideal location for this study because there is currently very limited data on the nutrition knowledge and dietary practices among adults with type 2 diabetes and hypertension. Gaining an understanding of their dietary practices would highlight nutrition gaps which are a result of food insecurity and this can be addressed at a policy level in order to bridge the gap. In addition to this, literacy levels are quite low, and this results in poor understanding of the dietary advice provided at the clinic. Finally, Trans Nzoia county is a melting pot of diverse cultures with varying socio-cultural practices. This study will be able to shed light on the influence of these practices on the patients' dietary intake.

Data from the Kenya Health Information System (KHIS) on the Diabetes and Hypertension Comprehensive Care Monthly Summary Form, April 2022 (KHIS, 2022) had the following information on the number of patients in care:

Table 1. 1 Number of patients with diabetes and hypertension at KCRH

Data element	**Male**	**Female**	**Total**
Cumulative no. of diabetes patients in care	432	864	**1296**
Cumulative no. of hypertension patients in care	1014	2143	**3157**
Cumulative no. of co-morbid diabetes and hypertension patients in care	356	617	**973**

Source: KHIS (accessed April 2022)

1.3 Problem statement

Two-thirds of patients with diabetes also have arterial hypertension, which increases the incidence of both micro-and macro-vascular complications. In addition to this, the co-existence of these two major risk factors leads to a four-fold increased risk for cardio-vascular disease (CVD) compared with normotensive non-diabetic patients (Pavlou et al., 2018). In Kenya, 14% of adults had three or more risk factors for CVD and 25% had hypertension or diabetes as of 2015, with models predicting increasing growth (Osetinsky et al., 2020). Diabetes and CVD in Kenya, as in many other countries, are often comorbidities (Meme et al., 2016). Data from the Institute for Health Metrics and Evaluation (2019) revealed that in Trans Nzoia, stroke ranked third as having caused the most deaths while ischemic heart disease ranked ninth (IHME, 2019). High blood pressure ranked fifth among the risk factors that drive the most deaths, while high fasting glucose ranked ninth. It is worth noting that hypertension is a risk factor for both stroke and ischemic heart disease (Lindholm, 2002).

As the leading public health challenge globally, NCDs result in ill health, economic loss, life loss, diminished quality of life, and poor social development, both in high-resource and low-resource countries (Kassa & Grace, 2019). Globally, the health care costs of managing diabetes complications account for over 50% of the direct health care costs of diabetes. Other indirect costs are as a result of disability, premature mortality, and absence from work due to sickness (Bekele et al., 2020). Similarly, the economic costs of premature death and disability from CVD are enormous. Between 2011 and 2025, the estimated financial loss due to CVD in LMICs was approximated to be $3.7 trillion, representing 2% of the GDP of LMICs on average (Cohn et al., 2021).

In Kenya, the mounting prevalence of NCDs is a major public health concern and a hindrance to long-term economic growth. This is due to reduced human capital as a result of illness during an individual's working years, and diverted societal resources. The high cost of managing NCDs is also detrimental to families, businesses and the government, leading to impoverishment (Mensah et al., 2020, Gyasi et al., 2020, Oyando et al., 2019). Additionally, in Kenya, key findings have shown that while general ailments reduce household income by 13.63%, NCDs reduce household income by 28.64%. NCDs are associated with a 23.17% reduction in household income relative to a household affected by communicable disease (Osetinsky et al., 2020). As a result, the high cost of NCD treatment and low rate of health

insurance coverage significantly limits affordability for most of the population (Subramanian et al., 2018).

A study conducted in Kenya by Norvo Nordisk that aimed to increase access to diabetes care in Embu and Trans Nzoia counties, revealed that many patients with diabetes could not afford the combined direct expenses of regular monitoring, testing, medical consultations and medicine. The financial burden of diabetes care was further increased by direct non-medical expenses such as traveling costs and lost wages of seeking care (Shannon et al., 2019). In addition to this, a study by Oyando et al., 2019 and Oyando et al., 2020 on hypertension and diabetes costs of patients in public health facilities in Kenya showed that patients costs are driven by medicines. This was a cause for concern because lack of affordability was a likely cause for uncontrolled hypertension and diabetes, and as a result would have a negative impact on continuity and comprehensiveness of care. These findings echo those from previous studies in South Africa by Mutyambizi et al., 2019 and sub-Saharan Africa by Azevedo & Alla, 2008. The consensus is that diabetes care is unaffordable and results in catastrophic health expenditure amongst diabetic patients.

In combating NCDS, countries with minimal health budgets need to channel great effort into reducing patients' reliance on costly medical solutions for which drugs are often the first line of treatment. This will reduce the associated morbidity and premature mortality. Prevention efforts within the healthcare system need to take a broader public health approach to motivate people to address their unhealthy lifestyles that result in the development of NCDs (Kassa & Grace, 2019). If not tackled seriously, the continuing surge of NCDs and the associated burden in SSA and other LMICs will undermine progress towards achieving the target of reducing by 25% premature mortality from NCDs by 2025 and one-third reduction of NCDs by 2030 (Gyasi et al., 2020).

This study therefore focuses on assessing nutrition knowledge and dietary practices among patients with diabetes and hypertension at Kitale County Referral Hospital. It is specifically targeted at patients who are already on care and aims to assess their nutrition knowledge and actual dietary practices in an effort to manage their condition.

1.4 Research objectives

1.4.1 Overall objective

To assess the nutrition knowledge and dietary practices of adults with type 2 diabetes and hypertension at Kitale County Referral Hospital.

1.4.2 Specific objectives

a) To assess patients' knowledge of dietary influence on diabetes and hypertension
b) To assess socio-cultural influence on patients' dietary practices
c) To assess patients' willingness to change their dietary practices
d) To assess patients' awareness of their dietary intake

1.4.3 Research questions

The study seeks to answer the following questions:

a) What knowledge do patients have on the influence of diet on diabetes and hypertension?
b) What are the socio-cultural influences on patients' dietary practices?
c) Are patients willing to change their dietary practices?
d) Are patients aware of their dietary intake?

1.5 Scope of the study

This descriptive study will focus on assessing nutrition knowledge and dietary practices of adults with type 2 diabetes and hypertension. The study will take place at the Kitale County Referral Hospital and will involve patients attending the Chronic Disease Model (CDM) clinic. This is due to the large number of patients drawn from the entire county, who receive care at the hospital. The study has four variables: patients' knowledge of dietary influence on diabetes and hypertension, socio-cultural influences on patients' dietary practices, and patients' willingness to change their dietary practices, and patients' actual dietary practices. With regard to the methodological scope, the study will be a descriptive cross-sectional research study that

will utilize quantitative techniques in the assessment of nutrition knowledge and dietary practices among adults with type 2 diabetes and hypertension. The data collection method will be by use of structured questionnaires.

1.6 Significance of the study

Given the surge of NCDs (and in particular diabetes and hypertension) in both Sub-Saharan Africa and Kenya, concerted effort is needed to halt the trend. Patients who are on treatment face numerous challenges to stay on course, and this ranges from lack of access to healthcare, prohibitive costs of treatment putting individuals and families at risk of impoverishment, and adverse complications in the event that they can no longer continue with treatment.

Apart from medical therapy, dietary modifications play a role in the patients' outcomes. By seeking to understand patients' dietary knowledge and socio-cultural influences, this study will be useful in addressing information gaps, exposing any misconceptions, or demonstrating patients' understanding. Assessing patients' willingness to change dietary practises, and their actual dietary practices will reveal barriers and enablers to adopting and even sustaining dietary modifications. This will be useful for health practitioners who will be able to provide tailor made nutrition counselling that suits the patient's lifestyle, and offer advice and suggestions that match their readiness for change. It may also provide an opportunity to explore novel approaches to dietary modifications that are relevant and context-specific.

These findings will also be beneficial to policy makers, at both national and county level, by revealing any knowledge gaps among patients that arise due to lack of information, or inadequate teaching methods used by health practitioners. As a result, this may inform policies on training and addressing human resource challenges. Additionally, this study will contribute to the wider body of knowledge on patients' nutrition knowledge and dietary practices, especially in Trans Nzoia, which is culturally diverse. KCRH only has anecdotal data on these practices, and this study will provide invaluable information that can address gaps in nutrition knowledge and actual dietary practices. Finally, participants will have an opportunity to reflect on their dietary knowledge and actual dietary practices, and hopefully this will motivate them to modify and sustain the relevant dietary practices.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter will describe the theoretical foundation. It will also discuss the relevant variables of this study, look into the empirical review, construct a conceptual framework and operationalize the variables. In conclusion, it will describe the gaps in the literature.

2.2 Theoretical Foundation

This section describes the theory that relates to the topic of the study, indicating its significant contributions and assumptions. The theoretical foundation for this study is the Social Cognitive Theory by Albert Bandura, which will guide the study in assessing nutrition knowledge and dietary practices of patients with diabetes and hypertension.

2.2.1 Social Cognitive Theory

The Social Cognitive Theory (SCT) was developed from the Social Learning Theory (SLT) in 1986 by Albert Bandura (Thojampa & Sarnkhaowkhom, 2019). SCT is premised upon the reciprocal interaction between the individual, behavioural and environmental factors. According to SCT, an individual's actions are based on the concept of human agency or self-efficacy. These actions derive from both the individual's behavioural capabilities such as knowledge, beliefs and skills, as well as influences of the environment for example social, economic or political, surrounding the person (Beverly & Wray, 2010).

The five primary constructs of SCT are identified as knowledge, perceived self-efficacy, outcome expectations, goals, and perceived facilitators and impediments. These interact to formulate the control a person has over their illness, thereby influencing human motivation and action. Devoid of sufficient confidence in one's self to accomplish required activities and reach desired goals, self-care actions would otherwise not be performed. This means that one can know it is necessary to perform self-care activities, but if they are not confident that they can do it, they are less likely to do so (Wendling & Beadle, 2015). Belief in one’s efficacy to

exercise control is a common pathway through which psychosocial influences affect health functioning. This core belief affects each of the basic processes of personal change, in this case health habits, and how well they maintain the habit changes they have achieved (Bandura, 2004). Since the adoption and adherence to multiple self-care behaviours requires motivation and self-regulation, individuals need to monitor their behaviours, motivate themselves, create incentives and enlist social support as needed in order to enhance their agency and maintain their efforts (Beverly & Wray, 2010).

According to Thojampa & Sarnkhaowkhom (2019), when SCT is applied to behaviour change for individuals with diabetes, it can provide a framework that considers social support as well as self-efficacy. A study on the association between self-efficacy and self-care in essential hypertension identified lack of motivation for behaviour change as one of the barriers to self-care. To counter this, self-efficacy would be key to improving motivation and therefore, engagement in self-care behaviour in hypertension. Individuals with higher perceived self-efficacy are able to motivate themselves to engage regularly in self-care behaviour and overcome obstacles which prevent them from performing these behaviours (Flynn et al., 2013).

Another study exploring the association between self-efficacy and diabetes self-management behaviours recruited participants who had diabetes and another risk factor for heart disease such as hypertension or high cholesterol. The findings concluded that self-efficacy was strongly related to healthy eating patterns (King et al., 2010). As regards social support, a study by Bai et al. (2009) on self-care behaviour in older people with diabetes showed that social support has a positive impact on self-care behaviour. Similarly, a study by Barrera et al. (2008) evaluated the effect of diet-specific interventions in postmenopausal women with diabetes. The findings demonstrated that a network of social support which includes family, friends and neighbours, was instrumental in behaviour changes which include increased physical activity and dietary control for reduced fat consumption.

2.3 Conceptual Review

This section discusses key concepts in the study, beginning with the management of diabetes and hypertension. It then focuses on nutrition knowledge and dietary practices, including socio-cultural influences and willingness to change dietary practices.

2.3.1 Diabetes Management

Diabetes mellitus (DM) is a chronic metabolic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is the hormone that regulates blood sugar. Uncontrolled diabetes is characterized by hyperglycaemia, or raised blood sugar and over time leads to serious damage to many of the body's systems such as the heart, blood vessels, nerves, eyes and kidneys (WHO, 2021a). These are serious life-threatening complications that result in higher medical care costs, reduced quality of life and increased mortality (Cho et al., 2018) .

DM is broadly classified into the following categories: type 1 diabetes, type 2 diabetes, and gestational diabetes mellitus(GDM). Type 1 diabetes mellitus (T1DM) accounts for 5% to 10% of DM and is characterized by autoimmune destruction of insulin-producing cells of the pancreas, resulting in an absolute deficiency of insulin. It is most commonly seen in children and adolescents though it can develop at any age (Regina et al., 2018). Gestational diabetes mellitus is characterised by hyperglycaemia, which is first detected during pregnancy, and this affects approximately 14% of pregnancies globally (Yamamoto et al., 2018).

Type 2 diabetes mellitus (T2DM) accounts for around 90% of all cases of diabetes. In this case, the insulin response is diminished, a condition defined as insulin resistance. During this state, insulin is ineffective and over time its production decreases, resulting in T2DM. It is most commonly seen in persons older than 45 years, but is now increasingly seen in children, adolescents, and younger adults (Regina et al., 2018). The strongest risk factor for T2DM is obesity, which is associated with low physical activity and unhealthy diet, and these can be modified to prevent disease. Non-modifiable risk factors that predispose an individual include a complex combination of genetic and metabolic factors such as ethnicity and family history (Galicia-Garcia et al., 2020). T2DM being the focus of this study will simply be referred to as diabetes.

Statistics from the International Diabetes Federation, 2019, reported that the global diabetes prevalence in 2019 was estimated to be 9.3% (463 million people), and predicted to rise to 10.2% (578 million) by 2030. In particular, it is a growing problem across Africa with an estimated 19 million adults affected, including 14.2 million in SSA. These numbers are likely to grow to 41.6 million across Africa by 2045 (IDF, 2019). In Kenya, the prevalence of diabetes was estimated to be 3.1% in 2019 and is projected to rise to 4.4% in 2035 if action is not taken. More than 8,700 diabetes-related deaths were registered in Kenya in 2015, almost all under 60 years of age (Ministry of Health, 2015).

The American Diabetes Association (ADA, 2021) recommends that treatment of diabetes entail the following three interventions: First is lifestyle management. This entails self-management education and support, nutrition therapy (to support healthy eating habits, meet weight, glycaemic, blood pressure, and lipid goals), exercise, smoking cessation, counselling, and psychosocial treatment. Second, is the provision of glycaemic targets, which involves glucose self-monitoring to act as an alarm for hypoglycaemic and hyperglycaemic episodes. Third, is the use of pharmacotherapy. These are recommended drug therapies based on effectiveness, risk of hypoglycaemia, history of cardiovascular disease, adverse effects, cost, patient preference, and effect on weight.

Glycaemic control is assessed by the Glycated Haemoglobin (A1c) measurement, which demonstrates the benefits of improved glycaemic control and has strong predictive value for diabetes complications (Turner, 1998). It reflects average glycaemia over approximately 3 months and should be performed routinely in all patients with diabetes at initial assessment and as part of continuing care. Patients who are meeting treatment goals and have stable glycemic control require A1c testing only twice per year. However, those not meeting glycemic goals may require testing every 3 months. The appropriate A1c goal for adults is <7% (53 mmol/mol) without significant hypoglycaemia (Imran et al., 2018).

Apart from controlling blood glucose levels, it is also important to manage blood pressure and blood cholesterol levels and to assess these risk factors on a regular basis, at least annually. Regular screening for the development of early diabetic complications, such as kidney disease, retinopathy, neuropathy, peripheral artery disease and foot ulceration, will allow preventive treatments in order to prevent the development and progression of these complications (IDF, 2021). Since morbidity and mortality in diabetes is usually as a result of long-term complications, the principal aim of diabetes management is the prevention of complications,

by lowering blood glucose levels hence reducing the cardiovascular risk (Van den Arend et al., 2000).

Additionally, there is strong evidence that obesity management can delay the progression from prediabetes to type 2 diabetes and is highly advantageous in the treatment of type 2 diabetes (Lim et al., 2011). This then implies that modest weight loss in patients with type 2 diabetes and overweight or obese, can improve glycaemic control and reduce the need for glucose-lowering medications (Pastors et al., 2002). Body Mass Index (BMI) is a person's weight in kilograms divided by the square of height in meters, and a high BMI can indicate high body fat content. BMI is used to document weight status and is categorised as follows: underweight: BMI <18.5 kg/m^2; normal weight: BMI 18.5-24.9 kg/m^2; overweight: BMI 25–29.9 kg/m^2; obesity class I: BMI 30–34.9 kg/m^2; obesity class II: BMI 35–39.9 kg/m^2; obesity class III: BMI ≥40 kg/m^2) (ADA, 2021).

2.3.2 Hypertension Management

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure that is ≥140/90 mmHg. This is due to the force of blood pushing against the walls of blood vessels (arteries) as it is pumped by the heart (WHO, 2021a). It is the leading cause of cardiovascular disease and responsible for 17.3 million deaths per year. It is estimated that by the year 2025, 1.56 billion adults will be hypertensive. In Kenya, the prevalence of hypertension has increased over the last decade with the STEPS survey 2015 showing that a quarter of Kenyans had hypertension. It is of great concern that only 4% of the patients on treatment achieved control, therefore foreshadowing a big risk of long-term complications (MOH, 2015).

Uncontrolled hypertension increases the risk for cardiovascular disease, stroke, hypertensive heart disease, hypertensive kidney failure and coronary artery disease (Lindholm, 2002, Joshi et al., 2014). The American College of Cardiology (ACC) and the American Heart Association (AHA) have the following classification guidelines for hypertension (Flack & Adekola, 2020): Normal (<120 systolic and <80 mm Hg diastolic); Elevated (120–129 systolic and <80 mm Hg diastolic); Stage 1 hypertension (130–139 systolic or 80–89 mm Hg diastolic); Stage 2 hypertension (≥140 systolic or ≥90 mm Hg diastolic).

The risk factors predisposing an individual to hypertension include high sodium intake, obesity, alcohol consumption, physical inactivity, unhealthy diet, age, sex, race or ethnicity (Mills et al., 2020). Up to 75% of adults with diabetes also have hypertension, and patients with hypertension alone often show evidence of insulin resistance. Thus, hypertension and diabetes are common, intertwined conditions that overlap in underlying risk factors and complications (Long & Dagogo-Jack, 2011). As a result, targeting multiple risk factors (by optimization of glycaemic, lipid, and blood pressure control) is essential in preventing and slowing the progression of these complications.

Reducing modifiable risk factors is the best way to prevent hypertension and associated adverse effects. These factors include unhealthy diets (excessive salt consumption, a diet high in saturated fat and trans fats, low intake of fruits and vegetables), physical inactivity, consumption of tobacco and alcohol, and being overweight or obese (WHO, 2021a). Fruit and vegetables are rich in nutrients such as dietary fibre, folate, potassium, flavonoids, and antioxidant vitamins, which have been associated with reduced risk for cardiovascular disease in diabetes and hypertension (Hu, 2003). Once medication has been initiated, the target blood pressure should be less than 140/90 mm Hg within three months, and thereafter reduced to less than 130/80 mm Hg in patients younger than 65 years (Unger et al., 2020).

2.3.3 Nutrition knowledge and dietary practices in diabetes and hypertension

Fundamental components in managing and preventing diabetes and its complications involve life style modifications such as regular physical activity, appropriate dietary practices, foot care practice, self-monitoring of blood glucose, and compliance with the treatment regimen. These practices are collectively referred to as self-management activities (Ngmenesegre et al., 2020, Anitha & Shriraam, 2019) and have been found to correlate with good glycaemic control positively, reduce complications and improve quality of life (Shrivastava et al., 2013).

Dietary factors play a key role in the management and prevention of diabetes through the effect of nutrition on weight and metabolic control (Forouhi et al., 2018). Compounding evidence over the last few decades supports the importance of individual nutrients, foods, and dietary patterns in the prevention and management of diabetes. Diets rich in wholegrains, fruits, vegetables, legumes, and nuts; lower in refined grains, red or processed meats, and sugar-sweetened beverages have been shown to reduce the risk of diabetes and improve glycaemic

control and blood lipids in patients with diabetes (Ley et al., 2014). Vegetables contain a large amount of dietary fibre which can lower blood glucose and improve glucose tolerance, therefore eating them in moderation is good for glycaemic control. However, fruits are high in sugars that are absorbed quickly therefore should be consumed with caution. Dietary fat, especially high consumption of saturated fat, is associated with impaired fasting glucose and insulin resistance, therefore intake should be controlled. In addition to this, an adequate supply of vitamins and minerals plays an important role in correcting metabolic disorders of diabetes and preventing complications (Wang et al., 2014). However, despite the evidence on the importance of nutrition, controversy still remains on the best macronutrient composition of the diet, setting dietary guidelines, and whether diabetes is reversible through diet (Forouhi et al., 2018).

Similarly, in hypertension, an appropriate lifestyle combined with the use of drug therapy in individuals at high risk is recommended (Gorostegi-Anduaga et al., 2018). The Dietary Approach to Stop Hypertension (DASH) diet is recommended by the American Heart Association for the non-pharmacological management of hypertension (Appel et al., 2006). This diet promotes the consumption of fruits, vegetables, and low-fat dairy products; includes whole grains, poultry, fish, and nuts; and attempts to reduce the intake of red meat, sweets, sugar-containing beverages, total fat, saturated fat and cholesterol (Siervo et al., 2015).

Diabetes nutrition therapy must be individualized in order to be effective. Various individual factors such as treatment objectives, personal preferences (such as tradition, religion, health beliefs and economics) and the disposition to make lifestyle changes, must be considered when counselling individuals. In addition to this, healthy eating patterns emphasising nutrient-dense foods in suitable portion sizes (to reduce energy intake) are important (Franz, 2016). The aim of nutrition counselling is to improve or maintain glycaemic targets, achieve weight management goals, and improve cardiovascular risk factors such as blood pressure and lipids. To this end, individualized treatment goals are recommended for all adults with diabetes and prediabetes (Evert et al., 2019).

In order for patients to benefit from nutrition, it is important that they first have adequate knowledge on the same. A diabetes-related knowledge, attitudes and practices (KAP) of adult patients with type 2 diabetes in South Africa revealed a low level of patients' nutritional knowledge. Most of them were ignorant about food groups, especially fruits and vegetables, which were mostly classified as protein, and avoiding the intake of sweets was the only dietary

restriction needed for diabetes control. The poor KAP observed among the participants was very likely to contribute to their morbidity and also highlights that patients with diabetes from resource-poor settings are often not empowered to manage their condition (Roux et al., 2019).

Several studies have been undertaken to determine the perceptions of patients with diabetes on barriers to self-management. They revealed that specific barriers to modification of dietary habits include cultural practices on what the staple foods should be, and the frequency of taking meals (Anitha & Shriraam, 2019, Tan et al., 2018a) ; spousal or family support in adopting similar dietary changes (also seen as a form of financial support) (Suglo & Evans, 2020a), and the influence of social settings (Mathew et al., 2012).

Dietary change calls for giving up long established eating patterns and acquiring new habits (Kapur et al., 2008). Factors that contribute to readiness to change include diet knowledge and skills, decision making and barriers to accessing the recommended diet (Jalilian et al., 2019). It is important to note that simultaneously modifying several elements of a diet can present challenges even for individuals who are knowledgeable and motivated. Those who are uncertain about making the modifications may get overwhelmed. To combat this, health care providers can help the patients by exploring reasons for their uncertainty, increasing their motivation, encouraging modifications that suit their lifestyle, and offering advice and suggestions that are in tandem with patients' readiness for change (Windhauser et al., 1999).

In a quest to provide more novel approaches to integrating specific food and nutrition interventions into the healthcare system, the following programs have been established: A produce prescription programme in North Carolina that had effects on healthy food purchasing and diabetes control (Xie et al., 2021); A fruit and vegetable prescription program for young children in Alaska that improved their health outcome (reduced BMI) and behaviours (Jones et al., 2020); participation in a farmer's market fruit and vegetable prescription program in Detroit, Michigan improved haemoglobin A1C in low income uncontrolled diabetics (Bryce et al., 2017); Boston Medical Center in Boston, Massachusetts, constructed an on-site rooftop farm to provide fresh produce for the hospital's preventive care food pantry, teaching kitchen, cafeterias, and inpatient meal services (Musicus et al., 2019).

These are examples of medically tailored prescriptions (non-prepared grocery items as part of a treatment plan) and produce prescriptions (vouchers for free or discounted produce that can be redeemed at specific locations). They aim to incorporate food strategies to improve health

rather than rely on traditional medical nutrition interventions such as vitamins or other nutrient supplements (Downer et al., 2020).

2.4 Application of theory to nutrition knowledge and dietary practices

Social cognitive theory (SCT) offers valuable insights into the nutrition knowledge and dietary practices of patients with diabetes and hypertension. The theory is premised on the interaction between personal, behavioural and environmental factors, which together have an effect on individual health behaviours (Thojampa & Sarnkhaowkhom, 2019). SCT is one of the most commonly used theoretical frameworks in interventions that promote behavior change. Research has shown that nutrition interventions are more successful if they strengthen individuals' knowledge of the topic (such as understanding the benefits of a healthy diet), improve environmental factors like family and social support and foster confidence in performing a specific behaviour (Rolling & Hong, 2016, Ghoreishi et al., 2019).

This study heavily relies on this theory because patients with diabetes and hypertension require adequate knowledge of nutrition, support from their family and social environment, and the ability to perform self-care tasks related to nutrition. There are personal factors such as knowledge, behavioural factors such as skills, and environmental factors such as social and family support that all have an effect on the patients' behaviour.

2.5 Empirical literature review

This section discusses the existing studies on patients' knowledge of dietary influence, socio-cultural influence on dietary practices, patients' willingness to change dietary practices and actual dietary practices of patients with diabetes and hypertension.

2.5.1 Patients' knowledge of dietary influence on diabetes and hypertension

It is known that patients, not healthcare providers, are the primary managers of their health conditions (Simmons et al., 2009). As such, the management of both diabetes and hypertension self-care is largely the responsibility of the patient (Collins et al., 2009, Douglas & Howard, 2015). In order for patients to appropriately manage diabetes, knowledge about the self-care procedures is crucial, and lack of knowledge ranks high in studies investigating barriers to self-management. (Ahola & Groop, 2013). Since diabetes patients frequently face challenges in determining the recommended diet, including its quality and quantity (Sami et al., 2020), nutrition knowledge facilitates positive dietary practices and augments diet quality. Consequently, this may have a strong influence on food selection and dietary behaviours and as a result lead to food choices that optimize metabolic self-management and quality of life (Han et al., 2020).

A study conducted in Ireland aimed to examine diabetes-related nutrition knowledge. The questionnaire that elicited response from 118 diabetic adults focused on both knowledge of the disease and nutrition. The findings showed that the level of nutrition knowledge was lower than knowledge levels relating to many other aspects of diabetes self-management. In addition to this, patients had challenges in translating complex nutritional science into effective food-based dietary guidance. For example, there was need to understand the role of total carbohydrate, and not solely sugar in order to support food choices that promote good glycaemic control. Recognizing the differences between saturated and unsaturated fat sources was also difficult, which is key for managing cardiovascular risk factors (Breen et al., 2015). Other studies have strongly linked food consumption with obesity, and this is not only associated with the quantity of food, but also the composition and quality. Additionally, high intake of red meat, sweets and fried foods contribute to the increased risk of insulin resistance and subsequently Type 2 diabetes (Sami et al., 2020). On the contrary, consumption of fruits and vegetables was shown to have an inverse relationship with Type 2 diabetes since they are rich in fibre and antioxidants which are considered a protective barrier against the disease (Ley et al., 2014,Wang et al., 2014).

A descriptive observational study on the diabetes-related KAP of adult patients with diabetes in South Africa revealed low levels of nutrition knowledge, with most participants being ignorant about food groups. This was especially the case for vegetables and fruit, which were

mostly classified as protein and the belief that avoiding the intake of sweets was the only dietary restriction needed for diabetes control. Diabetes-related practices were also poor, in this case low levels of physical exercise and unhealthy eating habits (Roux et al., 2019).

A cross-sectional KAP study related to diabetes among community members carried out in 2010 in Kenya (Kiberenge et al., 2011) demonstrated that 27% of all the respondents had good knowledge of diabetes. The level of knowledge was shown to differ according to education level and regional location of participants. In addition to this, half of the respondents with good knowledge of diabetes had good practices, and this echoes the earlier mentioned studies that revealed poor correlation between knowledge and lifestyle modification practices. In the same breath, out of 152 participants in a Nigeria study, 38% of the respondents could not identify food that contains carbohydrate, and 43% could not identify food with the highest concentration of fat. Also, only 51% had high diabetes knowledge, which was attributed to the low level of education among the participants (Adejoh, 2014).

A food consumption KAP study related to salt intake was conducted in urban areas in five SSA countries (Benin, Guinea, Kenya, Mozambique, and Seychelles) (Leyvraz et al., 2018). The results, based on 588 participants, revealed that the majority (85%) were aware that high salt intake could cause health problems and 91% thought that it was important to limit salt intake. However, only slightly over half of the respondents regularly tried to limit their salt intake, therefore supporting the need for education campaigns to reduce salt intake. An earlier prospective cross-sectional descriptive study to determine the KAP of hypertensive patients regarding the importance of lifestyle modification in the management of hypertension was carried out in Ethiopia (Tesema et al., 2016). Out of the 130 participants, 80% said they avoided salt in their diet and a majority stated that they had been taught about the danger of too much salt by a healthcare provider. The results indicated that although patients received advice on lifestyle modification, it was not enough to change their behaviour.

2.5.2 Socio-cultural influence on patients' dietary practices

Self-care behaviours are largely influenced by psychological and social factors, and the motivation of patients to self-care is enhanced by self-confidence, the presence of family support, and positive changes in relationships (Gucciardi et al., 2008). Culture is defined as the knowledge, beliefs, customs, and habits that a group of people share, and is passed on from

one generation to another. Each ethnic group has its own culturally based foods and food habits and it is therefore important to ask patients about their specific food habits(Kulkarni, 2004). Culture plays a significant role in shaping health behaviours in diabetes self-management, where individual health behaviours operate in tandem with family, community, and social structures. Family dynamics can serve as either supportive or inhibiting forces that influence these behaviours (Belue et al., 2013).

A study conducted in Singapore (Tan et al., 2018) to explore the perceptions of patients on diabetes self-care management revealed that one of the aspects that made self-management difficult was culture. Participants expressed that eating was a cultural aspect of life and therefore it was difficult to change eating habits and food choices. There was a strong resistance to reducing consumption of traditional carbohydrate-loaded foods such as sweet desserts and rice that were daily staples.

This was echoed by a study in South Africa whereby food had a social meaning, was used to show love, acceptance and humanity, and was associated with happiness. Also, certain occasions called for the consumption of certain foods in some families, for example initiation ceremonies (boiled, bland food reflecting sombreness), funerals (only black tea served) and during celebrations (fatty meats and white tea) (Puoane et al., 2006). In order to provide culturally appropriate health care interventions, cultural assessment is instrumental in understanding the broader cultural context in which a group or a person lives. This is accomplished by understanding the knowledge, health beliefs and behaviours, and illness beliefs and practices of the people involved (Kulkarni, 2004, Tripp-Reimer et al., 2001).

In marriage, it is important to understand the key role that spouses play in optimizing diabetes management. The influence of spousal support is particularly significant for couples where one partner has diabetes since the diabetes care regimen entails activities such as food purchase and preparation, which often involve the spouse. In this regard, a supportive spouse may share in the patient's diet plan, whereas a non-supportive spouse may insist on eating the restricted foods (Trief et al., 2002). A prospective study with 78 participants was conducted in New York to assess the relation between marital relationship domains and glycaemic control of individuals with diabetes. The findings indicated that individuals who described a better overall marital adjustment and higher levels of perceived marital intimacy at one time-point reported less diabetes-related distress and greater satisfaction with various aspects of their own adaptation to the illness. Therefore, this study supports the hypothesis that a better marital

relationship results in better adaptation to diabetes and diabetes-related quality of life (Trief et al., 2002).

Family support is also important because it underscores the importance of adopting similar dietary changes to the patient. Family may serves as a source of financial support in the purchase of recommended foods, or a barrier because of the practice of communal cooking and eating especially in African settings (Suglo & Evans, 2020, Bekele et al., 2020). In a Nashville, Tennessee study focusing on family support among adults with diabetes, focus group participants mentioned family involvement (spouse or family member) which was categorised as either instrumental or non-supportive/sabotaging. Instrumental was the most common form and examples of this included reading food labels while grocery shopping, carrying extra snacks in case they were needed and keeping track of calories consumed. Non-supportive behaviour mostly referred to lack of support in making healthy choices for example not providing meal options with the diabetic in mind. Participants reported feeling sabotaged by family members who were well informed about their condition, but were unmotivated to make changes themselves or help the participant to make changes.

There were also instances of 'miscarried help', which are behaviours characterized by an intent to perform supportive behaviours that infringe on an individual's self-efficacy. For example, a diabetic couple described experiencing conflict from the husband's attempts to change the wife's diet and the wife not appreciating those attempts (Mayberry & Osborn, 2012). In addition to this, an ethnographic study among the Swahili of coastal Kenya described diabetes self-management. Findings revealed that both male and female participants complained of the difficulty of changing the dietary habits of the whole family based on one person's illness. In the Swahili cultural context, family needs are more important than individual needs. It was also reported that preparing separate meals for family and self (in the case of women) was difficult due to the extra time and cost of food involved (Abdulrehman et al., 2016).

In yet another example illustrating family support, in a study in rural South India, most men reported being dependent on their wife or daughter-in-law for food. As a result, their cooperation in terms of food preferences played an important role in the participants' compliance to dietary modifications (Anitha & Shriraam, 2019). Similarly, in hypertension, a study focusing on the facilitators and barriers to hypertension self-management in urban African American families showed that family support was important. Patients felt supported

by family members in making lifestyle changes, and particularly in preparation of meals that best suited their needs (Flynn et al., 2013).

Social settings also have an influence on nutrition interventions in diabetes and hypertension. A study in coastal Kenya highlighted the significance of attending social events, but at the same time, the individual was unable to fully enjoy the feasting which is central to Swahili culture. This is because they had been advised not to eat most of the foods served at the events. As a result, the participants either ate whatever they were offered in order to please the host since it was not appropriate to request an alternative, or declined to eat (Abdulrehman et al., 2016).

In a Singaporean study, Chinese participants expressed that they could not resist family and peer pressure to consume high-calorie food during festivals and social gatherings (Tan et al., 2018). This was echoed in Kuwait where participants stated that a high number of social gatherings and living with extended families in big houses made adherence to a specific diet difficult. The culture emphasized socializing through food at mealtimes and they believed that this helped maintain and deepen relationships with family members and friends (Serour et al., 2007). In this regard, dietary restrictions would lead to social and cultural isolation for individuals, as they would no longer be able to share a similar diet to their family and acquaintances (Mora & Golden, 2017). In addition to this, Latino immigrant men reported that the work setting was a barrier to healthy eating, citing long, inflexible work hours that interfered with meals. They also reported that if they did not carry food to work they ended up making unhealthy choices by eating at fast food establishments and restaurants for convenience (Cherrington et al., 2011).

2.5.3 Patients' willingness to change their dietary practices

Taking on self-care activities such as dietary advice means that patients have to learn and practice new, complex and uncommon behaviours in addition to dealing with their routine work, social and family life. This requires major adjustments to one's previously established life style. Adherence to a restricted and monitored way of living for long periods is difficult and requires resolve, encouragement and continuous reinforcement (Kapur et al., 2008). The willingness and ability of individuals to engage in preventive and disease management behaviours is related with perceived self-efficacy. Self-efficacy is defined as the perceived

ability to engage in various self-management tasks, in this case focusing on dietary modifications (Anderson et al., 2000).

To begin with, several studies have demonstrated the unwillingness of patients to adhere to modified diet requirements. A study in Kuwait with data from 334 adults with hypertension, diabetes, or both, revealed that the main barriers to adherence to diet were unwillingness (48.6%), followed by difficulty adhering to a diet different from that of the rest of the family (30.2%), and attending social gatherings (13.7%) (Serour et al., 2007).

A cross-sectional study examining readiness for diet change, conducted on 1139 diabetic patients in Iran revealed that the following factors contributed to readiness to change: diet knowledge and skills, autonomy in diet decision making and barriers in accessing specific diets. Consequently, in order to help these patients make diet changes, it would be important to take necessary measures to increase their diet knowledge, diet decision-making and reduce diet barriers (Jalilian et al., 2019). Similarly, a Kenyan KAP study (with 1982 respondents) related to diabetes among community members, revealed that only 28% agreed with statements relating to willingness to engage in physical activity, changing eating habits and maintaining good body weights. Additionally, a significant 41% did not indicate any willingness to adopt these healthier lifestyles (Kiberenge et al., 2011). Other barriers to adherence that have been identified include foods not prepared based on dietary needs, difficulty in choosing foods, non-availability of fruits and vegetables and high cost of these foods (Worku et al., 2011).

It is important to note that educating the patient or caregiver is not a guarantee that the patient will make the required lifestyle changes. Equally important is that patient must also be willing to make those changes (Sebire et al., 2018). Sebire et al., 2018 conducted a study in England on motivation for lifestyle change among people with newly diagnosed type two diabetes. Findings revealed that only a minority of the participants lacked motivation to make the lifestyle changes (diet and physical activity), whereas the majority were motivated. Motivation was categorised as either extrinsic or intrinsic. Changes due to extrinsic motivation were driven by external factors such as avoiding punishment or gaining a reward. On the other hand, intrinsic motivation was driven by personal values and goals, avoiding guilt or enhancing self-worth and the new behaviours were enjoyable and inherently satisfying to do. It has been shown that people are more likely to work toward goals they set for themselves if behavioural change is driven by intrinsic as opposed to extrinsic motivation (Varming et al., 2015). An earlier study carried out in Columbia, USA, examined the relationship between motivation and diabetes self-

care activities. It demonstrated that participants had difficulty in maintaining self-care activities, even those who had adequate levels of health literacy. However, those with higher levels of motivation reported higher frequencies for maintaining dietary changes (Shigaki et al., 2010).

Patient empowerment is a therapeutic technique focusing on the patient, whereby they become willing and able to take responsibility for their own life. The main aim is to provide the patient with critical thinking skills and the ability to make autonomous, informed decisions. The readiness of patients with diabetes to change is assessed using the Diabetes Empowerment Scale (DES). The DES consists of three parts which focus on managing the psychosocial aspect of diabetes, assessing dissatisfaction and readiness to change, and setting and achieving a diabetes goal (Łuczyński et al., 2016). Using the DES, a cross sectional descriptive study in Oman assessed whether perceptions of empowerment affect self-care management among 300 adults with diabetes. The results indicated a significant association between empowerment and self-care behaviour. Increased empowerment was influenced by social support, education, and self-efficacy in managing psychosocial aspects.

On the contrary, poor empowerment was attributed to factors such as inadequate management of psychosocial aspects (related to self-management knowledge), difficulty in readiness to change, and poor goal setting (D'Souza et al., 2015). A similar study in China and among Latinos also showed that patient empowerment significantly improved self-efficacy and self-care behaviour (Yang et al., 2015, Peña-Purcell et al., 2011). More locally, a qualitative study in South Africa focusing on the motivation for effective self-management among diabetic and hypertensive patients was conducted. Overall findings indicated that impediments to effective self-management and behaviour change include poor health literacy, lack of self-efficacy and perceived social support. Majority of the participants reported not having received adequate information and counselling, or autonomy support from their healthcare providers. They were therefore found to be ill-equipped to play an active and empowered role in self-care and desired greater assistance and support (Murphy et al., 2015).

2.5.4 Patients' awareness of their dietary practices

Dietary practice refers to patients' choices in food consumption based on diabetes nutrition education that gives emphasis to intake of food with lower fat, higher fibre, and lower sodium (Shamsi et al., 2013). Dietary management, considered as one of the cornerstones of diabetes

care is based on the principle of healthy eating in the context of social, cultural and psychological influences on food choices. However, the challenge is that most diabetic patients have difficulty in identifying the recommended quality and quantity of food that is most suitable for them (Ekore et al., 2008).

A USA-based study consisting of 2,056 participants aimed to determine the individuals' self-reported levels and patterns of self-care. The four self-management behaviours that were examined were diet, exercise, medication use, and glucose self-testing. Findings revealed that the majority reportedly received some recommendations for diet. Out of those, 11.8% reportedly "always" followed the plan, 51.8% "usually," 23.2% "sometimes," 7.7% "rarely," and 5.5% "never" followed the plan. Out of the four self-management behaviours, individuals reported most closely following their medication regimen, followed by self-testing, and were least likely to follow recommendations for diet and exercise. The study showed that individuals generally rely on health care professionals to obtain information and as such, strategies that would ensure patient understanding and recall of self-management tasks should be used whenever possible. An example of this would be asking individuals to describe their understanding of the specifics of the recommendations before leaving the healthcare facility (Ruggiero et al., 1997).

An exploratory study aimed at gaining insights into the relationship between diabetes-related nutrition knowledge and diet quality was carried out in Singapore. The findings showed an overall poor nutrition knowledge and diet quality, and lack of correlation between nutrition knowledge and diet quality. It also identified factors affecting nutrition knowledge and adherence to dietary guidelines. The barriers were identified as an obesogenic environment, lack of personal motivation, lack of time, conflict between advice and personal values, stress from external sources, and gaps in nutrition knowledge. The enabling factors included social support, personal motivation, fear of diabetes complications, and sufficient knowledge (Han et al., 2020).

Similar findings were reported from a study in Thailand where the participants had overall poor nutrition knowledge (on the nutritional content of food, food portions, intake of sugar and healthier food choices), and there was no correlation between knowledge and overall diet quality. This suggested the presence of additional barriers in knowledge application, such as the techniques used in teaching and motivating the patients, patients' perception, and cultural and socioeconomic factors (Thewjitcharoen et al., 2018). Generally, the specific contribution

of nutrition knowledge to the overall quality of food intake is considered to be complex and is influenced by the interaction of many demographic and environmental factors (Spronk et al., 2014).

A South African cross sectional survey on the dietary intake and barriers to dietary compliance in black patients with type 2 diabetes was conducted. Dietary intake was assessed by 24-hour recalls, and knowledge and practices by means of a structured questionnaire and in-depth interviews. Findings revealed that only few had been counselled by a dietitian, and most of them stated that they followed the diet explained to them. However, their practices reflected poor knowledge and participants were confused about the amounts and portions sizes they were allowed to eat. Although some of them had been advised on what to eat, only few had changed their eating habits. One of the reasons given for this was that the diet was not culturally appropriate whereby they could not stop eating certain foods due to societal expectations and lack of suitable alternatives.

Some of the factors identified as barriers to dietary compliance included lack of knowledge regarding the disease, and inadequate and inaccurate dietary counselling (Nthangeni et al., 2002). These findings echo a more recent South African explorative study on factors influencing adherence to dietary guidelines. It identified the following factors as key to dietary adherence: motivation, knowledge, self-responsibility, family support, culture, and cost of food. This supports an ecological perspective in which to examine diabetes self-care management, as opposed to viewing it as an individual responsibility (Ebrahim et al., 2014).

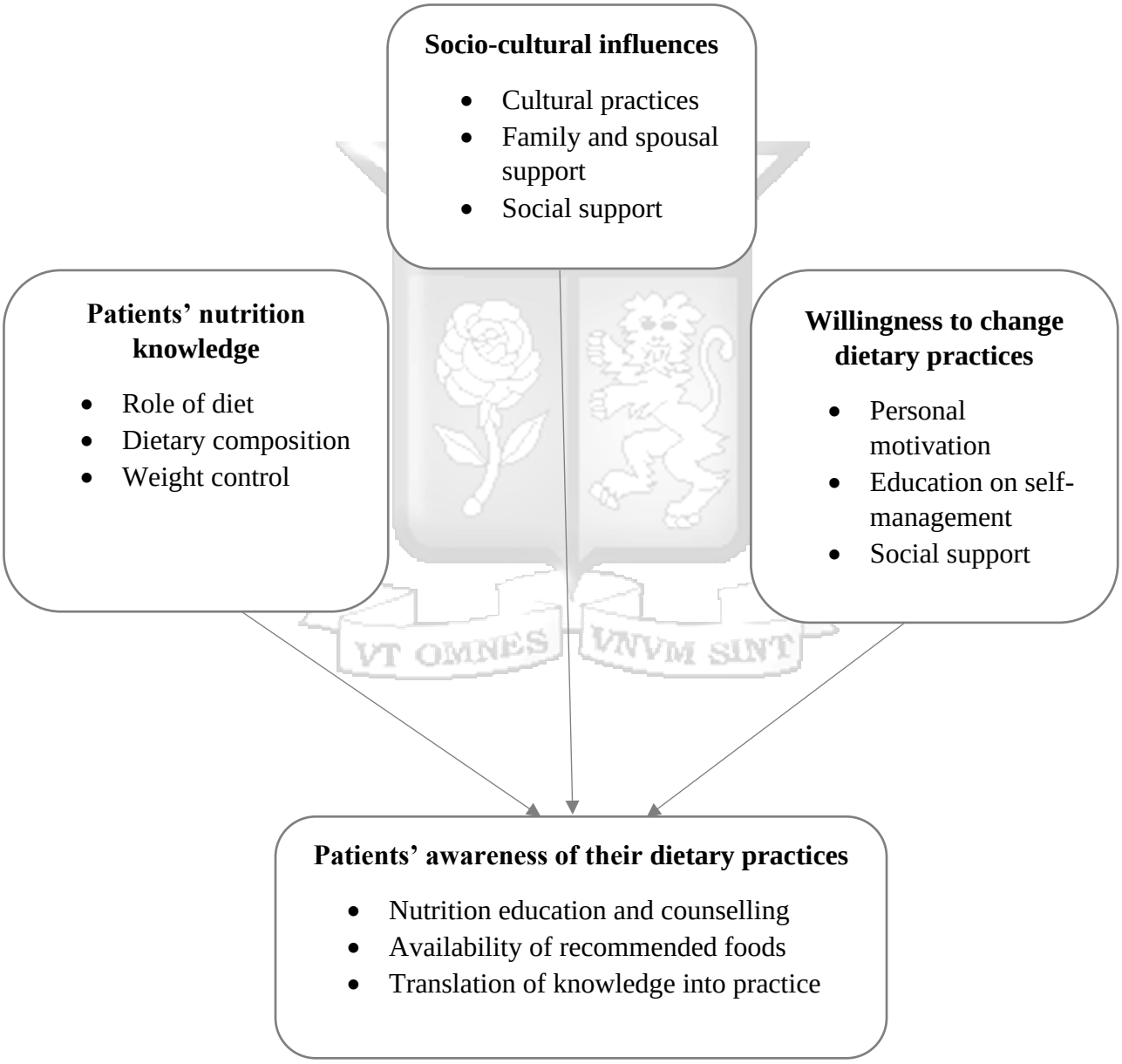
An Ethiopian study on the dietary practice and associated factors among type 2 diabetic patients revealed that a large proportion of patients had poor dietary practices. This was attributed to factors such as poor nutrition education in hospitals, having despondency, foods not prepared based on their disease, difficulty in choosing foods, non-availability of fruits and vegetables, and thinking about the high cost of food (Worku et al., 2011). This study echoes a more recent one in Ethiopia that also demonstrated poor dietary practices. In addition to this, it also showed that higher education levels, presence of family support and receiving nutrition education were predictors for good dietary practices (Demilew et al., 2018). In Kenya, a study by Wahome et al., 2018 also established that dietary knowledge, education level, occupation, and monthly income were the factors associated with the patients' dietary practices. On the contrary, another Kenyan study by Jepkemoi et al., 2021 concluded that education level and occupation had no significant association with dietary adherence.

In order to bridge this gap between nutrition knowledge and dietary quality, the translation of knowledge into practical advice may benefit from more novel, experiential education strategies (Breen et al., 2015). Many interventions that recommend a diet do so without properly teaching the skills necessary to follow such diets (nutritional recommendations are given, but with few or no cooking instructions). To aid this, a teaching kitchen would be of great benefit. This would be an ideal place where individuals can learn nutrition facts, shopping and cooking skills, and receive information and personalized guidance about exercise and behavioural optimization. In addition to this, hospitals and other health care facilities could build exemplary cafeterias, restaurants, and food service programs, which could include the same healthy, delicious and accessible recipes being taught in the teaching kitchens (Eisenberg & Burgess, 2015).

2.6 Conceptual Framework

The conceptual framework of a study outlines the relationship between the variables. It integrates the theory in a diagrammatic representation to enhance the visualization of the variables.

Figure 2. 1 Conceptual framework



Source: Author (2023)

2.7 Operationalization of the variables

Operationalization is the concept of simplifying variables into simple terms that can be easily understood by different individuals interested in the study. It enhances the measurability of research variables so as to answer research questions.

Table 1. 2 Operationalization of study variables

Variables	**Indicators**	**Rating scale**	**Empirical review**
Patient knowledge of dietary influence	• Role of diet • Dietary composition • Weight control	2-, 3-, and 5-point Likert scale (yes or no/true or false; yes, no or don't know/ very important, somehow important and not really important; strongly disagree to strongly agree	(Roux et al., 2019) (Breen et al., n.d.) (Kiberenge et al., 2011) (Leyvraz et al., 2018) (Islam et al., 2014)
Socio-cultural influences	• Cultural practices • Family and spousal support • Social settings	3-, 5- and 10-point Likert scale (yes, no, don't know; strongly disagree, disagree, not sure, agree, strongly disagree; 10-point emotional scale)	(Serour et al., 2007) (Trief et al., 2002) (Mugah, 2016) (Musee C et al., 2016)
Willingness to change dietary practices	• Personal motivation • Education on self-management • Social support	Likert scale (2-point with yes or no; 3-point with yes, no, sometimes; 5-point with strongly disagree, disagree,	(Serour et al., 2007) (Jalilian et al., 2019) (D'Souza et al., 2015) (Kiberenge et al., 2011)

		not sure, agree, strongly disagree)	
Patients' actual dietary practices	• Nutrition education and counselling • Availability of recommended diets • Translation of knowledge into practical advice	5-point Likert scale (with strongly disagree, disagree, not sure, agree, strongly disagree; always, usually, sometimes, rarely, never)	(Ruggiero et al., 1997) (Han et al., 2020) (Nthangeni et al., 2002) (Worku et al., 2011)

Source: Author (2023)

2.8 Research gap

Previous studies on the management of diabetes and hypertension have largely focused on the entirety of self-management practices, which include life style modifications such as regular physical activity, appropriate dietary practices, foot care practice, self-monitoring of blood glucose, and compliance with the treatment regimen. There is a paucity of data in Kenya regarding the interplay of patient knowledge of the role of nutrition, influence of socio-cultural practices, and the willingness of patients to integrate nutrition into their care. This is especially the case in rural communities, where this study aims to focus on.

In the context of rising diabetes and hypertension prevalence rates globally, there is a need to develop culturally sensitive, patient-centred educational programmes for nutritional self-management of patients. Given the diverse ethnic populations in Kenya, tailored programs may address their specific needs more appropriately. Such an emphasis on cultural understanding may in turn play a crucial role in optimizing disease education and self-management.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the plans and steps that the researcher will take to answer the research questions. It brings into detail the research design, the target population, sampling and sample size, data collection methods and instruments, research quality (reliability and validity), data analysis and presentation, as well as ethical considerations.

3.2 Research design

Research design refers to the techniques and methods followed by a researcher in order to obtain data (Mackey & Gass, 2015). This involves articulating the research questions, identifying the information required for analysis, methods of collecting the identified data, and the best possible technique for analyzing it (Sekaran & Bougie, 2016).

In this case, the study will be a descriptive cross-sectional survey that will utilize quantitative techniques in the assessment of nutrition knowledge and dietary practices among adults with type 2 diabetes and hypertension. Such studies involve describing the behavior of a subject, population or events without influencing them in any way, and usually gather the general views of the subjects (Hakim, 2012). This design has been selected because it enables the study to collect data at a particular time period and allows the assessment of the variables. It also facilitates the collection of a large amount of data from a sizeable target population in a simple and economical manner.

Additionally, patients with both diabetes and hypertension have been selected over those with only one of the conditions because patients with co-morbidities are at higher risk of developing complications. Therefore, more insights into the nutrition knowledge and dietary practices of these patients would be of great benefit in providing appropriate interventions.

3.3 Population and sampling

3.3.1 Target population

This refers to the total number of elements, objects or persons under consideration for the study and have similar traits (Wahyuni, 2012). The target population for the study will be patients with both diabetes and hypertension who receive care at Kitale County Referral Hospital, specifically at the Chronic Disease Model (CDM) clinic. The reason for this population is that the co-existence of both chronic conditions increases the risk of cardiovascular disease and therefore requires crucial intervention.

Inclusion criteria for the study will be non-pregnant adults (above 18 years) with both type II diabetes and hypertension who have been on treatment for at least 6 months. However, those under 18 years who meet all the other criteria and whose parents/guardians are able to give consent will be allowed to participate in the study. Exclusion criteria will be those who on treatment for less than six months, pregnant women, and those who decline to participate in the study.

Data from the Kenya Health Information System (KHIS) on the Diabetes and Hypertension Comprehensive Care Monthly Summary Form, April 2022 (KHIS, 2022) indicated that there were 973 patients at KCRH with both diabetes and hypertension. For this reason, the target population of the study will be 973 respondents.

Table 3. 1 Target population

Category	Target population	Percentage
Patients with both diabetes and hypertension	973	100
Total	**973**	**100**

Source: KHIS (accessed April 2022)

3.3.2 Sampling technique

Sampling is the process used to obtain a desired unit for the study in order to achieve the research objectives. The sample of a research study refers to the units selected from the entire population in order to draw findings and conclusions. These units must have similar traits to those of the entire target population in order to ease the process of results generalization (Creswell & Creswell, 2017). The sampling unit for the study will be patients with both diabetes and hypertension receiving care at the hospital, and non-probability convenience sampling technique will be used to select the sampling units. This will be by randomly approaching patients who attend the CDM clinic and requesting them to participate in the study. This technique has been chosen because the units are easy to access and provides room for the researcher to select a certain number of units considered convenient for the study.

3.3.3 Sample size estimation

Sample size estimation will be done using the following Yamane statistical formula:

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

Whereby,

n= sample size

N= population size (973)

e= degree of precision set at 5% (0.05)

Confidence level predetermined at 95%

Therefore, n estimated as:

$$n = \frac{973}{1+973(0.05)^2}$$

n =283

3.4 Data collection methods

Data collection methods refers to the ways in which the study obtains the data needed for analysis (Bowling, 2014). For this study, primary data will be obtained using structured questionnaires, which are considered good data collection methods since they are useful in obtaining first-hand information from the source leading to quantitative data for analysis. Additionally, the information can be store until when required (Bellamy, 2012).

The questionnaire will be developed based on the Audit of Diabetes Knowledge (ADKnowl) tool, which is designed to measure several aspects of knowledge of diabetes and its management (Speight & Bradley, 2001). It will utilize a 5-point Likert scale where 1=strongly disagree (SD), 2=disagree (A), 3=not sure (N), 4=agree (A), and 5=strongly agree (SA). The questionnaires will be divided into six sections as follows: the first section will comprise of the socio-demographic characteristics of the respondents; the second section will focus on the history of diabetes and hypertension; the third section on patients' knowledge of dietary influence on diabetes and hypertension; the fourth will focus on the socio-cultural influences on patients' dietary practices; and finally the fifth section will assess the patients' actual dietary practices.

3.5 Data collection procedures

The researcher will visit the research site and seek permission from the relevant body within the institution to obtain data from the target respondents, with explanation of the purpose and the significance of the study. Once the authority is granted, the researcher will reach out to the Clinical Officer Interns and Nursing Officer Interns stationed at the CDM clinic since they interact with the patients and are conversant with the illnesses. They will be trained on how to use the questionnaire and together with the researcher, will orally administer the questionnaires to the respondents. The use of this channel will eliminate the need for literacy of the respondents and also allow the use of a language that both the respondent and interviewer are conversant with. However, literate respondents who prefer to self-administer the questionnaire will be allowed to do so.

3.6 Research quality

Research quality refers to the level of accuracy and consistency of the research instruments in measuring the research objectives.

3.6.1 Pilot test study

A pilot study can refer to feasibility studies which are small scale versions, or trial runs, done in preparation for the major study, and can also refer to the pre-testing or trying out of a particular research instrument. Its main purpose is to give advance warning about where the main research project could fail, where research protocols may not be followed, or whether the proposed methods or instruments are inappropriate or too complicated (Teijlingen & Hundley, 2001).

Various suggestions have been made regarding the sample size for a pilot study. These recommendations include approximately 10 participants (Hertzog, 2008), between 10 and 30 participants (Johanson & Brooks, 2010), and 12 participants per group (Julious, 2005). For this study, a sample of 10 participants will be drawn from Matunda Sub-County Hospital, based on the researcher's judgement. This hospital has similar characteristics to KCRH regarding the health services provided and in particular, the chronic disease management clinic. However, these pilot test subjects will not be included in the actual research.

3.6.2 Reliability

Reliability refers to the reproducibility and consistency of the data collection instrument. It refers to the homogeneity of the instrument and the degree to which it is free from random error. Some researchers regard 0.7 as the minimally acceptable level for internal consistency reliability, however 0.5 is also acceptable as an indicator (Bowling, 2014). In order to establish the reliability of this study, Cronbach's alpha test was applied. The study established that all the variables had alpha values of above 0.7 which indicates that the instrument would provide reliable study findings over time as shown in table 3.2.

Table 3. 2 Reliability Test Results

Cronbach's Alpha Reliability Test Results		
Variable	**Alpha**	**Items**
Nutrition knowledge	0.759	8
Socio-cultural practices	0.712	7
Willingness to change	0.730	5
Actual dietary practices	0.758	5

Source: Research Data (2023)

3.6.3 Validity

Validity refers to the degree to which research instruments actually measure what they are intended to measure without providing mixed results (Cooper & Schindler, 2011). The study will focus on content validity, which lays emphasis on whether the study instruments cover all aspects that it needs to cover concerning the variable under study (Heale & Twycross, 2015). This will be achieved by the pilot test study as well as thorough scrutiny and examination by the research supervisor and randomly chosen healthcare personnel who are experts in the management of diabetes and hypertension.

3.7 Data analysis and presentation

Data analysis refers to the ability to test the information obtained in the questionnaires in order to reveal the accurate results for making study conclusions on the research questions.

Quantitative data will be analysed using Statistical Package for Social Sciences (SPSS) and the completed data collection tools reviewed to ascertain their comprehensiveness. Subsequently, the collected data will be edited and coded before being fed into the software. Quantitative techniques will be used to analyze the data after which descriptive statistics will be obtained. Descriptive techniques will be utilized to analyse the characteristics of the respondents and provide an in-depth analysis of the study variables. The study will be purely descriptive, with no inferential statistics.

Results from the study will be made available to the hospital, as well as the County Health Research, Publications and IREC Unit.

3.8 Ethical considerations

The study will be conducted after approval from the Institutional Review Board of Strathmore University and the National Commission for Science Technology and Innovation (NACOSTI). Permission to conduct the study at KCRH will be sought from the Director of Health through the Medical Superintendent of the hospital. In addition to this, informed consent will be obtained from each of the study participants at the time of their visit to the hospital. Confidentiality of the participants will be ensured by using unique identifier codes as opposed to their names.

The participants will also be informed that all the information collected from them will be stored in a password protected computer, and in a lockable cupboard with no one having access to the data. They will also be re-assured that nobody else except the study team or research ethics committee will have access to the data collected from them. Lastly, the researcher has categorically stated in the consent form that the purpose of the study is for education and all the information gathered will be treated with confidentiality.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

This chapter presents the results of the data collected during the study. The purpose of this descriptive survey was to assess the nutrition knowledge and dietary practices of adults with type 2 diabetes and hypertension at Kitale County Referral Hospital. The study findings have been presented in line with the objectives in the following order: response rate, participants' socio-demographic characteristics, patients' history of diabetes and hypertension, patients' knowledge of dietary influence on diabetes and hypertension, socio-cultural influence on patients' dietary practices, patients' willingness to change their dietary practices, and patients' actual dietary practices.

4.2 Response rate

A total of 269 respondents took part in the study out of a sample size of 283, giving a response rate of 95.1%.

4.3 Participants' characteristics

Essential socio-demographic information and history of diabetes and hypertension was collected from the research participants as reported in this section. This data provided important information about the research sample included in the study.

4.3.1 Participants' socio-demographic characteristics

The gender profile of the participants was established as 65% female, and 35% male. Concerning age, 58% of the respondents were above 60 years, 30.5% were between 45-59 years, while only 2.6% were aged between 18-35 years. As for marital status, majority of the participants (83.2%) were married, 11.6% were widowed, and those who were single and divorced/separated each accounted for 2.6%. In terms of educational level, a majority of the participants (46.3%) had attained primary school education, followed closely by no education (23.5%) and secondary education (22.4%). A minority of the participants had a certificate (1.5%), diploma (3.7%) and undergraduate degree (2.6%), whereas none had a post-graduate qualification. As regards occupational status, a majority (49.8%) of the participants were unemployed, followed closely by 45.5% in the informal sector, whereas only 4.5% were in formal employment.

Table 4. 1 Participants' socio-demographic characteristics

Socio-demographic characteristics	Frequency	Percentage (%)
Gender		
Male	94	35
Female	174	65
Age (in years)		
18-35	7	2.6
36-44	23	8.9
45-59	82	30.5
≥60	156	58.0
Marital status		
Single	7	2.6
Married	223	83.2
Widowed	31	11.6
Divorced/separated	7	2.6
Education level		
None	63	23.5
Primary	124	46.3
Secondary	60	22.4
Certificate	4	1.5
Diploma	10	3.7
Undergraduate	7	2.6
Post-graduate	0	0
Occupation		
None	134	50
Informal	122	45.5
Formal	12	4.5

Source: Research Data (2023)

4.3.2 Participants' history of diabetes and hypertension

The study sought to establish the participants' history of diabetes and hypertension. This included the duration since diagnosis of both conditions, participants' BMI, blood pressure and HbA1c. As regards duration of diabetes, majority of the participants (39%) had been diagnosed and living with diabetes for 1-5 years, 30.9% for less than one year, 16.3% for 5-10 years, and 13.8% for over 10 years. For hypertension, a majority of the participants (42%) had been diagnosed and living with hypertension for 1-5 years, 24.2% for less than 1 year, 20.4% for 5-

10 years, and 13.4% for more than 10 years. With respect to BMI, a majority of the participants were overweight (35.3%), followed closely by normal weight (33.8%). 25.7% were obese, 3% severely obese, and in contrast 2.2% were underweight. Concerning blood pressure, 55.4% of the participants had normal blood pressure, 21.9% had elevated blood pressure, 1.1% had stage 1 hypertension, whereas and 21.6% had stage 2 hypertension. Lastly, with regard to HbA1c, only 17 out of 268 participants had a record of HbA1c in the last 3 months, giving a mean value of 7.4%.

Table 4. 2 Participants' history of diabetes and hypertension

Participants' history of diabetes and hypertension	**Frequency**	**Percentage (%)**
Duration of type 2 diabetes		
Less than 1 year	83	31
1-5 years	104	38.8
5-10 years	44	16.4
Above 10 years	37	13.8
Duration of hypertension		
Less than 1 year	65	24.3
1-5 years	112	41.8
5-10 years	55	20.5
Above 10 years	36	13.4
BMI (kg/m²)		
<18.5 (underweight)	6	2.2
18.5-24.9 (normal weight)	90	33.6
25.0-29.9 (overweight)	95	35.4
30.0-39.9 (obese)	69	25.7
>40 (severely obese)	8	3.1
Blood pressure (mmHg)		
109/80-130/90 (normal)	148	55.3
130/90-150/90 (elevated)	59	21.9
150/90-160/90 (stage I hypertension)	58	21.6
>160/90 (stage II hypertension)	3	1.2
HbA1c (%)	**Frequency**	**Mean**
	17	7.4

Source: Research Data (2023)

4.4 Descriptive statistics

This section provides the results on patients' knowledge of dietary influence on diabetes and hypertension, socio-cultural influence on patients' dietary practices, patients' willingness to change their dietary practices, and patients' actual dietary practices. Participants were presented with a range of statements on a 5-point Likert scale which was interpreted as follows: 1 = Strongly disagree, 2= Disagree, 3 = Not sure, 4 = Agree, and 5 = Strongly agree.

4.4.1 Patients' knowledge of dietary influence on diabetes and hypertension

The patients' knowledge of dietary influence on diabetes and hypertension was evaluated and the responses from the Likert scale were converted into scores, as either correct or wrong. There being eight questions for evaluation, each correct response attained a score of 12.5 whereas a wrong response attained a score of 0, giving an overall score of 100. These scores were then used to determine the mean, standard deviation, median and mode for each question.

Table 4. 3 Distribution of patients' knowledge of dietary influence

Statement	M	SD	Median	Mode
Diet plays a key role in the management and prevention of diabetes and hypertension	9.3	5.4	12.5	12.5
High intake of red meat, sugary and fried foods contribute to the increased risk of diabetes	12.4	1.3	12.5	12.5
Fruits and vegetables contain vitamins and minerals which play an important role in preventing complications	10.9	4.2	12.5	12.5
Restricting the use of salt can help to reduce high blood pressure	12.3	1.5	12.5	12.5
I am able to identify the different food groups such as carbohydrates, protein, fat, fruits and vegetables	11.1	4.0	12.5	12.5
Achieving your ideal weight helps control diabetes	12.4	1.3	12.5	12.5
Controlling portion sizes (quantity of food) is important for weight management	12.4	1.1	12.5	12.5
Eating large amounts of food may lead to increased blood sugar	12.4	1.1	12.5	12.5

Source: Research Data (2023)

From the above table, the first statement had a mean score of 9.3, lower than all the other statements, which had a mean of between 10.9 to 12.5, whereby participants mostly gave correct answers to the statements assessing their knowledge of dietary influence. They demonstrated knowledge that diet plays a key role in the management of both diabetes and hypertension, and the importance of dietary composition. In addition to this, they were correct about being able to identify the different food groups, and that achieving ideal weight helps control diabetes. Finally, they also knew that controlling food portions was important for weight management and that eating large amounts of food led to increased blood sugar.

4.4.2 Socio-cultural influence on patients' dietary practices

The study also sought to assess the socio-cultural influence on patients' dietary practices. These influences include cultural practices that view food as having a social meaning and the consumption of traditional foods, family and spousal support and social support. The results are summarized in table 4.12 below.

Table 4. 4 Socio-cultural influence on patients' dietary practices

Statement	Strongly disagree n (%)	Disagree n (%)	Not sure n (%)	Agree n (%)	Strongly agree n (%)
Food has a social meaning and is used to show love and acceptance, and is associated with happiness.	1(0.4)	0	0	112(41.6)	156(58.0)
I find it difficult to reduce the consumption of traditional carbohydrate-rich foods such as ugali, Irish and sweet potatoes, nduma, matoke etc.	57(21.2)	117(43.5)	0	75(27.9)	20(7.4)
My family members are informed on how to manage diabetes and hypertension	0	9(3.3)	6(2.2)	178(66.2)	76(28.3)
My spouse (wife, husband or partner) supports me by providing or preparing the specific foods that I need	1(0.4)	2(0.7)	2(0.7)	75(27.9)	149(55.4)
My spouse (wife, husband or partner) helps me make the right food choices	0	2(0.7)	4(1.5)	72(26.8)	151(56.1)
My family members help me make the right food choices	1(0.4)	10(3.7)	6(2.2)	162(60.2)	90(33.5)
I find it difficult to make healthy food choices when attending social gatherings where food is served outside my home	71(26.4)	107(39.8)	1(0.4)	69(25.7)	21(7.8)
I am able to make healthy food choices while at work	2(1.5)	22(16.3)	3(2.2)	84(62.2)	21(15.6)

Source: Research Data (2023)

From the above results, most participants agreed to the influence of cultural practices that regard food as having a social meaning (*n*=268, 99.6%). In terms of finding it difficult to reduce consumption of traditional carbohydrate-rich foods, most participants disagreed (*n*=174, 64.7%) while a significant minority agreed (*n*=95, 35.%). As regards family and spousal support, most participants agreed that their spouses and family members were informed on how to manage the conditions, provided support in availing and preparing specific meals, and in making the right food choices. With respect to social support, most participants disagreed to finding it difficult to make healthy food choices when attending social gatherings where food is served outside their home (*n*=178, 66.2%). However, a significant proportion found this difficult (*n*=90, 33.5%). In addition to this, a majority of the participants who were in employment (*n*=105, 77.8 %) agreed that they were able to make healthy food choices while at work.

4.4.3 Patients' willingness to change their dietary practices

In this section, the study sought to assess patients' willingness to change their dietary practices. The statements used focused on personal motivation, self-management, and social support, as shown in the table below.

Table 4. 5 Patients' willingness to change their dietary practices

Statement	Strongly disagree n (%)	Disagree n (%)	Not sure n (%)	Agree n (%)	Strongly agree n (%)
I am willing to change my dietary practices and adhere to the recommended diet	3(1.1)	0	0	50(18.6)	216(80.3)
I can motivate myself to make the recommended dietary changes	1(0.4)	10(3.7)	27(10.0)	178(66.2)	53(19.7)
I am able to follow a diet regimen that is different from that of the rest of my family	2(0.7)	16(5.9)	9(3.3)	146(54.3)	96(35.7)
I am afraid that if I don't make dietary changes the healthcare providers will not be happy with me	110(40.9)	114(42.4)	20(7.4)	24(8.9)	1(0.4)
I know enough about nutrition in diabetes and hypertension to make dietary choices that are right for me	0	6(2.2)	63(23.4)	190(70.6)	10(3.7)
I know enough about myself as a person to make dietary choices that are right for me.	0	4(1.5)	54(20.1)	182(67.7)	29(10.8)
I can ask for support whenever I need to in order to maintain healthy dietary practices	2(0.7)	0	0	38(14.1)	228(84.8)

Source: Research Data (2023)

From the above results, a majority of participants (*n*=266, 98.9%) both agreed and strongly agreed to being willing to change their dietary practices and adhere to the recommended changes. Most of them were also able to motivate themselves to make the changes (*n*=231,

85.9%), and follow a diet regime different from that of the rest of the family (*n*=242, 90%). In terms of self-management, most participants disagreed with the statement that if they did not make dietary changes the healthcare providers would not be happy with them (*n*=224, 83.3%). A majority also agreed that they had enough knowledge about themselves (*n*=211, 78.5%) and nutrition (*n*=200, 74.3%) to make the right choices. Finally, a majority (*n*=266, 98.9%) strongly agreed that they were able to ask for support when needed in order to maintain healthy practices.

4.4.4 Patient's awareness of their dietary practices

The fourth objective of the study was to assess patients' actual dietary practices. This was achieved by assessing whether they had received adequate nutrition education, translation of knowledge into practice, and availability of recommended foods.

Table 4. 6 Patients' awareness of dietary practices

Characteristics	Strongly disagree n (%)	Disagree n (%)	Not sure n (%)	Agree n (%)	Strongly agree n (%)
I have received adequate nutrition education and counselling at the health facility in order to make appropriate dietary changes	4(1.5)	1(0.4)	61(22.7)	172(63.9)	31(11.5)
I usually ensure that my meals are made up of carbohydrates, protein and vegetables	18(6.7)	112(41.6)	11(4.1)	124(46.1)	4(1.5)
I am aware of the portions sizes that I am supposed to eat	0	4(1.5)	11(4.1)	169(62.8)	85(31.6)
I believe that I usually follow the dietary advice that I have been given	0	5(1.9)	12(4.5)	186(69.1)	66(24.5)
I am able to find all the foods that I have been advised to eat	18(6.7)	111(41.3)	11(4.1)	125(46.5)	4(1.5)
I have to think about the cost of buying the recommended foods because I cannot afford it	2(0.7)	83(30.9)	1(0.4)	143(53.2)	40(14.9)
If the hospital had a kitchen where I would be taught how to select and prepare certain meals, it would it make it easier for me to maintain healthy eating habits	1(0.4)	2(0.7)	2(0.7)	81(30.1)	183(68.0)

Source: Research Data (2023)

In terms of nutrition education, most participants (*n*=203, 75.4%) agreed to having received adequate education and counselling. However, a noteworthy proportion (*n*=61, 22.7%) was not

sure about this. With regard to eating balanced meals, a majority of the participants disagreed to doing so (*n*=130, 48.3%), whereas a significant minority proportion agreed with this statement (*n*=128, 47.6%). Additionally, most of them agreed to eating the recommended portion sizes (*n*=254, 94.4%) and agreed that they usually followed the dietary advice they had been given (*n*=252, 93.6%). With respect to finding all the recommended foods, as many of the participants agreed (*n*=129, 48%), as did those who disagreed (*n*=129, 48%). The remaining proportion (*n*=11, 4.1%) were not sure. A majority (*n*=183, 68.15) also agreed that they had to think about the cost of buying the recommended foods because they could not afford it. Lastly, the participants strongly agreed (*n*=264, 98.1%) that a hospital kitchen that taught them how to select and prepare meals would make it easier for them to maintain healthy eating habits.

4.5 Associations between variables

This section provides results of associations between the various variables and socio-demographic characteristics.

4.5.1 Association between socio-demographic characteristics and knowledge of dietary influence on diabetes and hypertension

Analysis of the results revealed that gender and marital status had a significant association with knowledge of dietary influence on diabetes and hypertension. Male participants had slightly higher mean knowledge scores than females, similar to the married participants who had higher knowledge scores compared to their single and widowed counterparts. However, age had non-significant association with knowledge.

Table 4. 7 Association between patients' knowledge and socio-demographic characteristics

Characteristic		n (%)	M	SD	95% CI lower	95% CI upper	Statistic	df	p
Age (years)	18 - 35	7 (2.5)	91.1	9.5	82.3	99.8	F = 0.472	3, 265	0.702
	36 - 44	23 (8.6)	90.8	12.6	85.3	96.2			
	45 - 59	83 (30.9)	93.8	11.1	91.4	96.3			
	>60	156 (58.0)	93.3	12.3	91.3	95.2			
Gender	Male	94 (34.9)	95.1	8.6	0.3	5.6	t = 2.193*	267	0.029
	Female	175 (65.1)	92.1	13.2					
Marital status	Single	14 (5.2)	86.6	25.2	72.0	101.2	F = 6.447*	2, 266	0.002
	Married	224 (83.3)	94.3	10.4	92.9	95.7			
	Widowed	31 (11.5)	87.9	10.9	83.9	91.9			

Analysis of variance (ANOVA) test was applied. Unpaired t test was applied. CI; Confidence Interval. *p<0.05
Source: Research Data (2023)

Additionally, the results also established a non-significant association between knowledge and the characteristics of education and occupation.

Table 4. 8 *Association between patients' knowledge, education and occupation characteristics*

Characteristic		n (%)	M	SD	95% CI lower	95% CI upper	Statistic	df	p
Education	None	63(23.4)	92.1	13.7	88.6	95.5	F = 0.395	5, 263	0.852
	Primary	124(46.1)	93.5	11.1	91.5	95.4			
	Secondary	61(22.7)	93.0	12.6	89.8	96.3			
	Certificate	4(1.5)	90.6	12.0	71.6	109.7			
	Diploma	10(3.7)	96.3	8.4	90.2	102.3			
	Undergraduate	7(2.6)	96.4	6.1	90.8	102.1			
Occupation	None	134(49.8)	94.4	9.4	92.8	96.0	F = 2.159	2, 266	0.117
	Informal	123(45.7)	91.6	14.3	89.0	94.1			
	Formal	12(4.5)	95.8	8.1	90.7	101.0			

Analysis of variance (ANOVA) test was applied. CI; Confidence Interval.
Source: Research Data (2023)

4.5.2 Association between knowledge of dietary influence and duration of disease

As regards the patients' history of disease, the results demonstrated a non-significant association between knowledge and the duration of both diabetes and hypertension.

Table 4. 9 Association between patients' knowledge and duration of disease

Characteristic		n (%)	M	SD	95% CI lower	95% CI upper	Statistic	df	p
Duration of diabetes (years)	<1	118(43.9)	91.5	13.4	89.1	94.0	F = 2.798	2, 266	0.063
	1 – 5	107(39.8)	93.7	11.4	91.5	95.9			
	6 – 10	44(16.3)	96.3	7.4	94.1	98.6			
Duration of hypertension (years)	<1	99(36.8)	91.4	14.6	88.5	94.3	F = 1.898	2, 266	0.152
	1 – 5	113(42.0)	94.6	8.8	92.9	96.2			
	6 – 10	57(21.2)	93.4	11.8	90.3	96.6			

Analysis of variance (ANOVA) test was applied. CI; Confidence Interval.
Source: Research Data (2023)

4.5.3 Association between knowledge of dietary influence and patients' awareness of dietary practices

Association between patients' knowledge of dietary influence on diabetes and hypertension and their awareness of dietary practices revealed significant association.

Table 4. 10 Association between patients' knowledge and awareness of dietary practices

Characteristics	n	Knowledge scores Correlation coefficient	p
I have received adequate nutrition education and counselling at the health facility in order to make appropriate dietary changes	269	$r_s = 0.274$*	<0.001
I usually ensure that my meals are made up of carbohydrates protein and vegetables	269	$r_s = 0.440$*	<0.001
I am aware of the portions sizes that I am supposed to eat	269	$r_s = 0.252$*	<0.001
I believe that I usually follow the dietary advice that I have been given	269	$r_s = 0.287$*	<0.001
I am able to find all the foods that I have been advised to eat	269	$r_s = 0.251$*	<0.001
I have to think about the cost of buying the recommended foods because I cannot afford it	269	$r_s = -0.201$*	0.001
If the hospital had a kitchen where I would be taught how to select and prepare certain meals, it would it make it easier for me to maintain healthy eating habits	269	$r_s = 0.024$	0.700

Spearmans rho correlation coefficient (r_s) test was applied. *p<0.05

Source: Research Data (2023)

4.5.4 Association between socio-cultural influences and patients' awareness of their dietary practices

The findings revealed a significant association between socio-cultural influences on dietary practices and patient's awareness of their dietary practices.

Table 4. 11 Association between socio-cultural influences and patient's awareness of their dietary practices

Characteristic	Actual dietary practices							
Socio-cultural influences	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Total	X^2	p
Strongly disagree	6(0.0)	98(0.7)	22(0.2)	378(2.8)	427(3.1)	931(6.9)	327.115	.009*
Disagree	26(0.2)	210(1.5)	122(0.9)	1187(8.7)	345(2.5)	1890(13.9)		
Not sure	4(0.0)	20(0.1)	32(0.2)	66(0.5)	32(0.2)	154(1.1)		
Agree	95(0.7)	661(4.9)	444(3.3)	3563(26.2)	1033(7.6)	5796(42.7)		
Strongly agree	49(0.4)	534(3.9)	224(1.6)	2464(18.1)	1538(11.3)	4809(35.4)		
Total	180(1.3)	1523(11.2)	844(6.2)	7658(56.4)	3375(24.9)	13580(100		

Awareness of dietary practices had 7 questions. Socio-cultural influences on dietary practices had 8 questions. Chi-square (X^2) test was applied. *p<0.05
Source: Research Data (2023)

4.5.5 Association between patients' willingness to change their dietary practices and their awareness of dietary practices

The results revealed a significant association between patients' willingness to change their dietary practices and their actual dietary practices.

Table 4. 12 Association between patients' willingness to change dietary practices and awareness of their dietary practices

Characteristics	Awareness of dietary practices							
Willingness to change dietary practices	Strongly disagree	Disagree	Not sure	Agree	Strongly agree	Total	X^2	p
Strongly disagree	13(0.1)	81(0.6)	35(0.3)	399(3.0)	298(2.3)	826(6.3)	297.073	<.001*
Disagree	24(0.2)	129(1.0)	89(0.7)	615(4.7)	193(1.5)	1050(8.0)		
Not sure	25(0.0)	161(1.2)	216(1.6)	633(4.8)	176(1.3)	1211(9.2)		
Agree	65(0.5)	631(4.8)	285(2.2)	3491(26.5)	1184(9.0)	5656(42.9)		
Strongly agree	48(0.4)	489(3.7)	222(1.7)	2234(17.0)	1438(10.9)	4431(33.6)		
Total	175(1.3)	1491(11.3)	847(6.4)	7372(56.0)	3289(25.0)	13174(100)		

Actual dietary practices had 7 questions; Willingness to change dietary practices had 7 questions. Chi-square (X^2) test was applied. *p<0.05
Source: Research Data (2023)

CHAPTER 5

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter includes a discussion of the key findings in chapter four presented according to the study objectives. This includes patients' knowledge of dietary influence on diabetes and hypertension, socio-cultural influence on patients' dietary practices, patients' willingness to change their dietary practices, and patients' awareness of their dietary practices. Additionally, it includes information on the limitations of the study as well as conclusions and recommendations.

5.2 Discussion of the study findings

Diabetes and hypertension are two of the four major NCDs and usually present as comorbidities. The two conditions overlap in underlying risk factors and complications. Similarly, the best way to prevent them and their associated adverse effects is by reducing modifiable risk factors which involve lifestyle modifications. This includes appropriate dietary practices and increased physical activity.

This study aimed to assess nutrition knowledge and dietary practices among adults with diabetes and hypertension. In doing so, the study specifically investigated patients' knowledge of dietary influence on diabetes and hypertension, socio-cultural influence on patients' dietary practices, patients' willingness to change their dietary practices, and patients' actual dietary practices. The findings of the study showed that the participants were aware of the role of diet in managing diabetes and hypertension, and that socio-cultural influences affected their dietary practices. In addition to this, they were willing to change their dietary practices and adhere to the recommended diet. With regard to the awareness of their dietary practices, in spite of having adequate nutrition knowledge, this did not translate into practice in terms of dietary composition.

5.2.1 Patients' knowledge of dietary influence on diabetes and hypertension

The study findings established that overall, the participants were in agreement that diet plays a key role in the management and prevention of diabetes and hypertension. However, this statement, with a mean score of 9.3 indicated that a noteworthy proportion were not in agreement with this. In terms of dietary composition, participants were knowledgeable to the fact that foods such as red meat, sugary, fried and salty foods contribute to the increased risk of diabetes and hypertension, and that fruits and vegetables were important in preventing complications. Participants were also able to identify the various food groups and were aware that weight management was important to control diabetes.

This high level of knowledge was in contrast with (Roux et al., 2019), (Adejoh, 2014) and (Thewjitcharoen et al., 2018) whose studies showed low levels of nutrition knowledge and participants being ignorant about food groups and portion sizes. However, different studies by (Tesema et al., 2016) and (Leyvraz et al., 2018) have demonstrated nutrition knowledge in hypertension, especially regarding the consumption of salt. Participants also agreed that portion sizes were important for weight management, underscoring the importance of achieving one's ideal weight in the management of diabetes and hypertension. This had been earlier demonstrated by (Sami et al., 2020) and (Tan et al., 2018) whose studies have linked food consumption with obesity.

5.2.2 Socio-cultural influence on dietary practices

The study findings established that cultural practices had an influence on dietary practices. To begin with, participants viewed food as having a social meaning and was used to show love and acceptance. This echoed a South African study by (Puoane et al., 2006) in which food was an integral part of family and social life, and certain occasions called for the consumption of certain foods. With regard to reducing the consumption of traditional carbohydrate-rich foods such as ugali, nduma and matoke, most participants did not find it difficult. However, a noteworthy proportion of participants even though not the majority found it difficult to reduce their consumption of such foods. This was consistent with findings by (Tan et al., 2018) where participants expressed that eating was a cultural aspect of life and therefore it was difficult to change eating habits and food choices. As such, there was a strong resistance to reducing consumption of traditional carbohydrate-loaded foods.

With respect to family and spousal support, the findings showed that participants agreed that their family members and spouses were informed on how to manages diabetes and hypertension. In addition to this they also offered support in terms of helping them make the right food choices, and even buying and preparing the required foods. These findings resonate with (Suglo & Evans, 2020), (Bekele et al., 2020) and (Flynn et al., 2013) who demonstrated the importance of spousal and family support.

This study also demonstrated the influence of social settings on dietary choices. A majority of the participants did not find it difficult to make healthy food choices when attending social gatherings where food was served outside their home. However, a significant proportion found it difficult to make the right choices in such settings. This was demonstrated by (Abdulrehman et al., 2016) and (Serour et al., 2007) who highlighted the significance of attending social events, but at the same time the individual was unable to fully enjoy the feasting which is central to their culture. As a result, the participants either ate whatever they were offered in order to please the host since it was not appropriate to request an alternative, or declined to eat.

Another facet of social settings is the workplace, and in this study the most participants agreed that they were able to make healthy food choices while at work. This contradicted findings by (Cherrington et al., 2011) and (Mathew et al., 2012) whereby workers found it difficult to make healthy food choices at work and usually ended up eating unhealthy fast food. The findings in this study could be explained by the fact that the setting being mostly rural and semi-urban, it was easy to access healthy food from local eateries and food vendors during lunch breaks.

5.2.3 Patients' willingness to change dietary practices

The study findings revealed that participants were willing to change their dietary practices and adhere to the recommended diet regimens. They demonstrated personal motivation to make the changes and even follow a diet that was different from the rest of the family. These findings contradict (Kiberenge et al., 2011) and (Serour et al., 2007) whose findings revealed that most patients were unwilling to change their eating habits and adopt healthier lifestyles. However, a study by (Jalilian et al., 2019) revealed that some of the factors that contribute to readiness to change include diet knowledge and skills, autonomy in diet decision making and barriers in accessing specific diets.

This implies that once patients are educated on self-management they would be willing to make the requisite changes. Participants in this study further agreed that they had adequate knowledge on diabetes and hypertension and knew enough about themselves to make the right dietary choices. This personal motivation was based on intrinsic factors, and not extrinsic based on external factors such as wanting to please other people, for example healthcare workers. This echoes the studies by (Sebire et al., 2018) and (Varming et al., 2015) whose findings revealed that only a minority of the participants lacked motivation to make dietary changes, whereas the majority were motivated. Lastly, participants were willing to ask for support in order to maintain the right dietary practices. Social support, as demonstrated by (D'Souza et al., 2015) and (Murphy et al., 2015) increased patient empowerment and subsequently self-care behaviour.

5.2.4 Patient's awareness of their dietary practices

The study findings established that most participants had received adequate education and counselling at the healthcare facilities, and followed the dietary advice they had been given. However, it is important to point out that there was a still a noteworthy, albeit small proportion of participants who were not sure whether they had received adequate knowledge. On the contrary, (Han et al., 2020) and (Thewjitcharoen et al., 2018) had findings that indicated overall poor diabetes-related nutrition knowledge among patients.

The positive response in the study could be explained by the increased efforts in the clinic to educate patients. In terms of eating a balanced diet, there was a tie between those who ate a balanced diet and those who did not. This was echoed in previous studies by (Worku et al., 2011) and (Demilew et al., 2018) who attributed poor dietary practices to factors such as poor nutrition education in hospitals, having despondency, difficulty in choosing foods, non-availability of certain foods, and thinking about the high cost of food. Since nutrition education was deemed sufficient among the participants in this study, poor dietary practices such as not eating a balanced diet could be explained by inability to find the recommended foods, and having to think about the cost of food. Indeed, these two factors were evident from the study findings. Lastly, participants agreed that if the hospital had a kitchen where they would be taught how to select and prepare certain meals, it would it make it easier for them to maintain healthy eating habits. This would help bridge the gap between knowledge and practice as demonstrated by (Breen et al., 2015) and (Eisenberg & Burgess, 2015).

5.2.5 Associations between various variables

The study findings revealed significant association between specific socio-demographic characteristics and patient's knowledge of dietary influence. Male participants had slightly higher mean knowledge scores than females, similar to the married participants who had higher knowledge scores compared to their single and widowed counterparts. This is in agreement with previous studies by (Mufunda et al., 2012) and (Murugesan et al., 2007) which concluded that low diabetes knowledge was associated with the female gender and could therefore be a risk factor for the development of diabetes related complications. However, other findings have showed that there are no significant difference in diabetes knowledge scores between men and women (Zowgar et al., 2018, Abbasi et al., 2018).

As for the married participants, it has been shown that a better marital relationship results in better adaptation to diabetes and diabetes-related quality of life (Trief et al., 2002), and this goes hand in hand with the family support that is made available (Suglo & Evans, 2020, Bekele et al., 2020).

The socio-demographic characteristics that had a non-significant association with knowledge were age, education and occupational status. This echoes findings from an earlier Kenyan study by Jepkemoi et al., 2021. However, other studies have shown a significant association between these characteristics and knowledge (N et al., 2015, Abbasi et al., 2018, Jasper et al., 2014). There was also a non-significant association between duration of disease and knowledge of dietary influence. This is in agreement with (Abbasi et al., 2018) and (Kilic et al., 2016) although other studies have shown that overall, patients' knowledge increases as their condition progresses (Niroomand et al., 2016), (Vijan et al., 2005).

The findings further demonstrated significant associations between knowledge of dietary influence and patients' awareness of their dietary practices. This is in agreement with (Fitzgerald et al., 2008) and (Breen et al., 2015) who found a positive association between knowledge and food intake. However, a study by (Han et al., 2020) showed no association between diabetes nutrition knowledge and diet quality. The study further revealed six barriers to dietary adherence: obesogenic environment, lack of time, conflict between advice and personal values, stress from external sources, lack of personal motivation, and gaps in knowledge. On the other hand, enablers to dietary adherence were identified as personal motivation to improve, fear of diabetes complications, sufficient knowledge, and presence of social support.

As regards socio-cultural influences, the study revealed that they had a significant association with patients' awareness of their dietary practices. A South Asian study demonstrated that interventions aimed at preventing and managing diabetes are likely to be ineffective if delivered in a socio-cultural vacuum. This therefore means that individual education should be supplemented with community-level interventions in order to address the socio- cultural frames within which choices are made (Greenhalgh et al., 2015). This is similar to a Kenyan study by (Abdulrehman et al., 2016) and several others such as (Tan et al., 2018) and (Serour et al., 2007) which highlight the overwhelming influence of socio-cultural factors as determinants of patients' dietary practices.

Lastly, the study also revealed a significant association between patients' willingness to change their dietary practices and awareness of their dietary practices. Readiness for diet change as demonstrated by (Jalilian et al., 2019) is highly dependent on factors such as knowledge, autonomy in diet decision making and barriers in accessing specific diets. Equally important is personal motivation, without which no changes can be effected. It is however important to note that even in the presence of motivation, other barriers can render all these efforts futile. This includes foods not prepared based on dietary needs, difficulty in choosing foods, non-availability and high cost of these foods (Worku et al., 2011). All these should be addressed in order to translate willingness into the actual practice.

5.3 Conclusions

The study sought to assess nutrition knowledge and dietary practices among adults with type 2 diabetes and hypertension at Kitale County Referral Hospital. The first objective was to assess patients' knowledge of dietary influence on diabetes and hypertension. The results indicated that most participants had knowledge about this, although a noteworthy proportion were not aware of this dietary influence. The second objective was to assess socio-cultural influence on patients' dietary practices. On this, the results indicated that cultural practices such as the consumption of traditional carbohydrate-rich foods was a challenge to some participants and had an effect on their dietary choices. In addition to this, family, spousal, and social support was vital for the patients to make proper dietary choices and adhere to the changes. It is important to note that most of the patients had received the support they required.

The third objective was to assess patients' willingness to change their dietary practices. The findings showed that participants were willing to change their dietary practices and adhere to the recommended diet regimens. They demonstrated personal motivation, adequate knowledge on self-management, and were willing to ask for support whenever they needed to.

Finally, the fourth objective was to assess patients' awareness of their dietary practices. On this, it was evident that the participants had received adequate nutrition education and counselling. However, eating balanced diets was a challenge, participants were not able to find all the foods they had been advised to eat, and they had to think about the cost of buying these foods because they were not affordable.

5.4 Recommendations

Given the high knowledge scores by participants, the provision of nutrition education and counselling seems to be commendable. However, given the proportion of participants with poor knowledge, healthcare workers should be encouraged to put more effort in providing education, and ensuring the message is clearly understood by the patients. More emphasis should be placed on the consumption of traditional foods, keeping in mind the cultural influences that inform the patients' choices.

In addition to this, experiential learning by using a hospital kitchen would of great benefit to patients. This would help to contextualize their knowledge on how to use locally available ingredients instead of having to look for exotic or more expensive foods, especially fruits and vegetables. To this end, the hospital management team could consider setting up such a kitchen.

The study also sought to get information on the history of diabetes and hypertension from the participants. The results indicated that only 17 out of 268 participants had HbA1c levels measured in the last three months. This is a cause for concern and the team at the CDM clinic should investigate it further.

Lastly, food security remains a challenge in the county given that a significant proportion of participants were not able to consume balanced diets. In addition to this, they had to think about the cost of buying the recommended foods. At a policy level, the county should be able to develop strategies to ensure that food security, especially to the ageing population which was the majority in this study.

5.5 Limitations of the study

There was a risk of recall bias as part of this study relied on the patients' ability to recall their actual dietary practices. Additionally, the study was dependent on self-reported data and since the information obtained from the respondents was not validated via direct observation, the results could be affected by response bias. There was also a risk of social desirability bias, with patients attempting to portray themselves in a more favorable light.

This study adopted a quantitative research design. Perhaps the inclusion of a qualitative approach would provide more elaborate findings in assessing patients' nutrition knowledge and dietary practices.

5.6 Areas of further study

The study focused on the only referral hospital in the county. Further research targeting the sub county hospitals would give more insight on the provision of nutrition education and counselling.

In addition to assessing patient's knowledge and dietary practices, further research can be conducted on the correlations between nutrition knowledge and dietary practices. This would help in providing more information on how to bridge the gap between knowledge and practice.

REFERENCE

Abbasi, Y. F., See, O. G., Ping, N. Y., Balasubramanian, G. P., Hoon, Y. C., & Paruchuri, S. (2018). Diabetes knowledge, attitude, and practice among type 2 diabetes mellitus patients in Kuala Muda District, Malaysia – A cross-sectional study. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *12*(6), 1057–1063. https://doi.org/10.1016/J.DSX.2018.06.025

Abdulrehman, M. S., Woith, W., Jenkins, S., Kossman, S., & Hunter, G. L. (2016a). Exploring Cultural Influences of Self-Management of Diabetes in Coastal Kenya: An Ethnography. *Global Qualitative Nursing Research*, *3*, 2333393616641825. https://doi.org/10.1177/2333393616641825

Abdulrehman, M. S., Woith, W., Jenkins, S., Kossman, S., & Hunter, G. L. (2016b). Exploring Cultural Influences of Self-Management of Diabetes in Coastal Kenya: An Ethnography. *Global Qualitative Nursing Research*, *3*, 2333393616641825. https://doi.org/10.1177/2333393616641825

ADA. (2021). Glycemic Targets: Standards of Medical Care in Diabetes—2021. *Diabetes Care*, *44*(Supplement_1), S73–S84. https://doi.org/10.2337/DC21-S006

Adejoh, S. O. (2014). Diabetes Knowledge, Health Belief, and Diabetes Management Among the Igala, Nigeria: *Https://Doi.Org/10.1177/2158244014539966*, *4*(2). https://doi.org/10.1177/2158244014539966

Afshin, A., Sur, P. J., Fay, K. A., Cornaby, L., Ferrara, G., Salama, J. S., Mullany, E. C., Abate, K. H., Abbafati, C., Abebe, Z., Afarideh, M., Aggarwal, A., Agrawal, S., Akinyemiju, T., Alahdab, F., Bacha, U., Bachman, V. F., Badali, H., Badawi, A., … Murray, C. J. L. (2019). Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*, *393*(10184), 1958–1972. https://doi.org/10.1016/S0140-6736(19)30041-8

Ahola, A. J., & Groop, P. H. (2013). Barriers to self-management of diabetes. *Diabetic Medicine*, *30*(4), 413–420. https://doi.org/10.1111/DME.12105

Anderson, R. M., Funnell, M. M., Fitzgerald, J. T., & Marrero, D. G. (2000). The Diabetes Empowerment Scale: a measure of psychosocial self-efficacy. *Diabetes Care*, *23*(6), 739–743. https://doi.org/10.2337/DIACARE.23.6.739

Anitha, R., & Shriraam, V. (2019). Are Patients With Type 2 Diabetes Not Aware or Are They Unable to Practice Self-Care? A Qualitative Study in Rural South India. *Journal of Primary Care and Community Health*, *10*. https://doi.org/10.1177/2150132719865820

Appel, L. J., Brands, M. W., Daniels, S. R., Karanja, N., Elmer, P. J., & Sacks, F. M. (2006). Dietary approaches to prevent and treat hypertension: A scientific statement from the American Heart Association. *Hypertension*, *47*(2), 296–308. https://doi.org/10.1161/01.HYP.0000202568.01167.B6

Azevedo, M., & Alla, S. (2008). Diabetes in Sub-Saharan Africa: Kenya, Mali, Mozambique, Nigeria, South Africa and Zambia. *International Journal of Diabetes in Developing Countries*, *28*(4), 101. https://doi.org/10.4103/0973-3930.45268

Bai, Y. L., Chiou, C. P., & Chang, Y. Y. (2009). Self-care behaviour and related factors in

older people with Type 2 diabetes. *Journal of Clinical Nursing*, *18*(23), 3308–3315. https://doi.org/10.1111/J.1365-2702.2009.02992.X

Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior*, *31*(2), 143–164. https://doi.org/10.1177/1090198104263660

Barrera, M., Strycker, L. A., MacKinnon, D. P., & Toobert, D. J. (2008). Social-Ecological Resources as Mediators of Two-Year Diet and Physical Activity Outcomes in Type 2 Diabetes Patients. *Health Psychology*, *27*(2 SUPPL. 2). https://doi.org/10.1037/0278-6133.27.2(SUPPL.).S118

Bekele, H., Asefa, A., Getachew, B., & Belete, A. M. (2020). Barriers and Strategies to Lifestyle and Dietary Pattern Interventions for Prevention and Management of TYPE-2 Diabetes in Africa, Systematic Review. *Journal of Diabetes Research*, *2020*. https://doi.org/10.1155/2020/7948712

Bellamy, C. (2012). *Principles of Methodology: Research Design in Social Science* . Sage.

Belue, R., Diaw, M., Ndao, F., Okoror, T., Degboe, A., & Abiero, B. (2013). A Cultural Lens to Understanding Daily Experiences with Type 2 Diabetes Self-Management among Clinic Patients in M'Bour, Senegal: *Http://Dx.Doi.Org/10.2190/IQ.33.4.B*, *33*(4), 329–347. https://doi.org/10.2190/IQ.33.4.B

Beverly, E. A., & Wray, L. A. (2010). The role of collective efficacy in exercise adherence: a qualitative study of spousal support and Type 2 diabetes management. *Health Education Research*, *25*(2), 211–223. https://doi.org/10.1093/HER/CYN032

Bowling, A. (2014). *Research Methods In Health: Investigating Health And Health Services*. McGraw-Hill.

Breen, C., Ryan, M., Gibney, M. J., & O'shea, D. (n.d.). *Diabetes-related nutrition knowledge and dietary intake among adults with type 2 diabetes*. https://doi.org/10.1017/S0007114515002068

Breen, C., Ryan, M., Gibney, M. J., & O'Shea, D. (2015). Diabetes-related nutrition knowledge and dietary intake among adults with type 2 diabetes. *British Journal of Nutrition*, *114*(3), 439–447. https://doi.org/10.1017/S0007114515002068

Bryce, R., Guajardo, C., Ilarraza, D., Milgrom, N., Pike, D., Savoie, K., Valbuena, F., & Miller-Matero, L. R. (2017). Participation in a farmers' market fruit and vegetable prescription program at a federally qualified health center improves hemoglobin A1C in low income uncontrolled diabetics. *Prev Med Rep*, *7*, 176–179. https://doi.org/10.1016/j.pmedr.2017.06.006

Budreviciute, A., Damiati, S., Sabir, D. K., Onder, K., Schuller-Goetzburg, P., Plakys, G., Katileviciute, A., Khoja, S., & Kodzius, R. (2020). Management and Prevention Strategies for Non-communicable Diseases (NCDs) and Their Risk Factors. *Frontiers in Public Health*, *8*, 788. https://doi.org/10.3389/FPUBH.2020.574111/BIBTEX

Cherrington, A., Ayala, G. X., Scarinci, I., & Corbie-Smith, G. (2011). Developing a family-based diabetes program for Latino immigrants: Do men and women face the same barriers? *Family & Community Health*, *34*(4), 280. https://doi.org/10.1097/FCH.0B013E31822B5359

Cho, N. H., Shaw, J. E., Karuranga, S., Huang, Y., da Rocha Fernandes, J. D., Ohlrogge, A. W., & Malanda, B. (2018). IDF Diabetes Atlas: Global estimates of diabetes prevalence

for 2017 and projections for 2045. *Diabetes Research and Clinical Practice*, *138*, 271–281. https://doi.org/10.1016/J.DIABRES.2018.02.023

Cohn, J., Kostova, D., Moran, A. E., Cobb, L. K., Pathni, A. K., & Bisrat, D. (2021). Blood from a stone: funding hypertension prevention, treatment, and care in low- and middle-income countries. *Journal of Human Hypertension 2021 35:12*, *35*(12), 1059–1062. https://doi.org/10.1038/s41371-021-00583-8

Collins, M. M., Bradley, C. P., O'Sullivan, T., & Perry, I. J. (2009). Self-care coping strategies in people with diabetes: A qualitative exploratory study. *BMC Endocrine Disorders*, *9*(1), 1–9. https://doi.org/10.1186/1472-6823-9-6/FIGURES/1

Cooper, D., & Schindler, P. (2011). *Business Research Methods*. McGraw-Hill.

Creswell J. W, & Creswell J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. SAGE Publications.

Crowley, J., Ball, L., & Hiddink, G. J. (2019). Nutrition in medical education: a systematic review. *The Lancet Planetary Health*, *3*(9), e379–e389. https://doi.org/10.1016/S2542-5196(19)30171-8

D'Souza, M. S. heil., Karkada, S. N. air., Hanrahan, N. P., Venkatesaperumal, R., & Amirtharaj, A. (2015). Do Perceptions of Empowerment Affect Glycemic Control and Self-Care Among Adults with Type 2 Diabetes? *Global Journal of Health Science*, *7*(5), 80. https://doi.org/10.5539/GJHS.V7N5P80

Demilew, Y. M., Alem, A. T., & Emiru, A. A. (2018). Dietary practice and associated factors among type 2 diabetic patients in Felege Hiwot Regional Referral Hospital, Bahir Dar, Ethiopia. *BMC Research Notes*, *11*(1), 1–7. https://doi.org/10.1186/S13104-018-3531-2/TABLES/3

Douglas, B. M., & Howard, E. P. (2015). Predictors of Self-Management Behaviors in Older Adults with Hypertension. *Advances in Preventive Medicine*, *2015*, 1–6. https://doi.org/10.1155/2015/960263

Ebrahim, Z., Ahmed, T., & De Villiers, A. (2014). *Factors influencing adherence to dietary guidelines : a qualitative study on the experiences of patients with type 2 diabetes attending a clinic in Cape Town*. https://journals.co.za/doi/epdf/10.10520/EJC157166

Eisenberg, D. M., & Burgess, J. D. (2015). Nutrition Education in an Era of Global Obesity and Diabetes: Thinking Outside the Box. *Academic Medicine*, *90*(7), 854–860. https://doi.org/10.1097/ACM.0000000000000682

Ekore, R., Ajayi, I. O., Ekore, J. O., Ekore, R. I., Ajayi, I. O., Ekore, J. O., & Okore, J. O. (2008). *Dietary management of diabetes: a practical approach for primary care physicians in Nigeria*. https://www.researchgate.net/publication/265484738

Evert, A. B., Dennison, M., Gardner, C. D., Timothy Garvey, W., Karen Lau, K. H., MacLeod, J., Mitri, J., Pereira, R. F., Rawlings, K., Robinson, S., Saslow, L., Uelmen, S., Urbanski, P. B., & Yancy, W. S. (2019). Nutrition Therapy for Adults With Diabetes or Prediabetes: A Consensus Report. *Diabetes Care*, *42*(5), 731–754. https://doi.org/10.2337/DCI19-0014

Fitzgerald, N., Damio, G., Segura-Pérez, S., & Pérez-Escamilla, R. (2008). Nutrition knowledge, food label use, and food intake patterns among Latinas with and without type 2 diabetes. *Journal of the American Dietetic Association*, *108*(6), 960–967.

https://doi.org/10.1016/J.JADA.2008.03.016

Flack, J. M., & Adekola, B. (2020). Blood pressure and the new ACC/AHA hypertension guidelines. *Trends in Cardiovascular Medicine*, *30*(3), 160–164. https://doi.org/10.1016/J.TCM.2019.05.003

Flynn, S. J., Ameling, J. M., Hill-Briggs, F., Wolff, J. L., Bone, L. R., Levine, D. M., Roter, D. L., Lewis-Boyer, L., Fisher, A. R., Purnell, L., Ephraim, P. L., Barbers, J., Fitzpatrick, S. L., Albert, M. C., Cooper, L. A., Fagan, P. J., Martin, D., Ramamurthi, H. C., & Boulware, L. E. (2013). Facilitators and barriers to hypertension self-management in urban African Americans: perspectives of patients and family members. *Patient Preference and Adherence*, *7*, 741. https://doi.org/10.2147/PPA.S46517

Forouhi, N. G., Misra, A., Mohan, V., Taylor, R., & Yancy, W. (2018). Dietary and nutritional approaches for prevention and management of type 2 diabetes. *BMJ*, *361*. https://doi.org/10.1136/BMJ.K2234

Franz, M. J. (2016). Diabetes Nutrition Therapy: Effectiveness, Macronutrients, Eating Patterns and Weight Management. *The American Journal of the Medical Sciences*, *351*(4), 374–379. https://doi.org/10.1016/J.AMJMS.2016.02.001

Galicia-Garcia, U., Benito-Vicente, A., Jebari, S., Larrea-Sebal, A., Siddiqi, H., Uribe, K. B., Ostolaza, H., Martín, C., Biofisika Bizkaia, F., & Sarriena, B. (n.d.). *Molecular Sciences Pathophysiology of Type 2 Diabetes Mellitus*. https://doi.org/10.3390/ijms21176275

Ghoreishi, M.-S., Vahedian-shahroodi, M., Jafari, A., & Tehranid, H. (2019). Self-care behaviors in patients with type 2 diabetes: Education intervention base on social cognitive theory. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *13*(3), 2049–2056. https://doi.org/10.1016/j.dsx.2019.04.045

Gorostegi-Anduaga, I., Corres, P., MartinezAguirre-Betolaza, A., Pérez-Asenjo, J., Aispuru, G. R., Fryer, S. M., & Maldonado-Martín, S. (2018). Effects of different aerobic exercise programmes with nutritional intervention in sedentary adults with overweight/obesity and hypertension: EXERDIET-HTA study. *European Journal of Preventive Cardiology*, *25*(4), 343–353. https://doi.org/10.1177/2047487317749956

Greenhalgh, T., Clinch, M., Afsar, N., Choudhury, Y., Sudra, R., Campbell-Richards, D., Claydon, A., Hitman, G. A., Hanson, P., & Finer, S. (2015). Socio-cultural influences on the behaviour of South Asian women with diabetes in pregnancy: Qualitative study using a multi-level theoretical approach. *BMC Medicine*, *13*(1), 1–15. https://doi.org/10.1186/S12916-015-0360-1/FIGURES/3

Gucciardi, E., DeMelo, M., Offenheim, A., & Stewart, D. E. (2008). Factors contributing to attrition behavior in diabetes self-management programs: a mixed method approach. *BMC Health Services Research*, *8*. https://doi.org/10.1186/1472-6963-8-33

Gyasi, R. M., Phillips, D. R., & Meeks, S. (2020). Aging and the Rising Burden of Noncommunicable Diseases in Sub-Saharan Africa and other Low- and Middle-Income Countries: A Call for Holistic Action. *The Gerontologist*, *60*(5), 806–811. https://doi.org/10.1093/GERONT/GNZ102

Hakim C. (2012). *Research Design: Successful Designs for Social Economics Research*. Routledge.

Han, C. Y., Chan, C. G. B., Lim, S. L., Zheng, X., Woon, Z. W., Chan, Y. T., Bhaskaran, K.,

Tan, K. F., Mangaikarasu, K., & Chong, M. F. F. (2020). Diabetes-related nutrition knowledge and dietary adherence in patients with Type 2 diabetes mellitus: A mixed-methods exploratory study: *Proceedings of Singapore Healthcare*, *29*(2), 81–90. https://doi.org/10.1177/2010105820901742

Heale, R., & Twycross, A. (2015). Validity and reliability in quantitative studies. *Evidence-Based Nursing*, *18*(3), 66–67. https://doi.org/10.1136/EB-2015-102129

Herman, D. R., Taylor Baer, M., Adams, E., Cunningham-Sabo, L., Duran, N., Johnson, D. B., & Yakes, E. (2013). Life Course Perspective: Evidence for the Role of Nutrition. *Maternal and Child Health Journal 2013 18:2*, *18*(2), 450–461. https://doi.org/10.1007/S10995-013-1280-3

Hertzog, M. (2008). Considerations in determining sample size for pilot studies. *Research in Nursing and Health*, *31*(2), 180–191. https://doi.org/10.1002/NUR.20247

Hu, F. (2003). Plant-based foods and prevention of cardiovascular disease: an overview. *The American Journal of Clinical Nutrition*, *78*(3), 544S-551S. https://doi.org/10.1093/AJCN/78.3.544S

IDF. (2019). *IDF Diabetes Atlas 9th edition*. https://diabetesatlas.org/atlas/ninth-edition/

IDF. (2021). *IDF Diabetes Atlas 10th edition*. www.diabetesatlas.org

IHME. (2019). *Kenya - TransNzoia | Institute for Health Metrics and Evaluation*. https://www.healthdata.org/kenya-transnzoia

Imran, S., Agarwal, G., Bajaj, H., & Ross, S. (2018). Clinical Practice Guidelines -Targets for Glycemic Control. *Canadian Journal of Diabetes*. http://guidelines.diabetes.ca/cpg/chapter8#bib0010

Islam, F. M. A., Chakrabarti, R., Dirani, M., Islam, M. T., Ormsby, G., Wahab, M., Critchley, C., & Finger, R. P. (2014). Knowledge, Attitudes and Practice of Diabetes in Rural Bangladesh: The Bangladesh Population Based Diabetes and Eye Study (BPDES). *PLOS ONE*, *9*(10), e110368. https://doi.org/10.1371/JOURNAL.PONE.0110368

Jalilian, H., Pezeshki, M. Z., Janati, A., Najafipour, F., Imani, A., Zozani, M. A., & Khodayari Zarnaq, R. (2019). Readiness for diet change and its association with diet knowledge and skills, diet decision making and diet barriers in type 2 diabetic patients. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *13*(5), 2933–2938. https://doi.org/10.1016/J.DSX.2019.07.065

Jasper, U. S., Ogundunmade, G., Opara, M. C., Akinrolie, O., Pyiki, E. B., & Umar, A. (2014). *Determinants of diabetes knowledge in a cohort of Nigerian diabetics*. https://doi.org/10.1186/2251-6581-13-39

Jepkemoi, G., Gichunge, C., & Masibo, P. (2021). Determinants of adherence to dietary guidelines among Type 2 Diabetes Mellitus patients at Moi Teaching and Referral Hospital-Kenya. *African Journal of Food, Agriculture, Nutrition and Development*, *21*(3), 17752–17763. https://www.ajol.info/index.php/ajfand/article/view/209506

Johanson, G. A., & Brooks, G. P. (2010). Initial Scale Development: Sample Size for Pilot Studies. *Educational and Psychological Measurement*, *70*(3), 394–400. https://doi.org/10.1177/0013164409355692

Jones, L. J., VanWassenhove-Paetzold, J., Thomas, K., Bancroft, C., Quinn Ziatyk, E., Kim,

L. S. H., Shirley, A., Warren, A. C., Hamilton, L., George, C. V., Begay, M. G., Wilmot, T., Tsosie, M., Ellis, E., Selig, S. M., Gall, G., & Shin, S. S. (2020). Impact of a Fruit and Vegetable Prescription Program on Health Outcomes and Behaviors in Young Navajo Children. *Current Developments in Nutrition*, *4*(8). https://doi.org/10.1093/CDN/NZAA109

Joshi, M. D., Ayah, R., Njau, E. K., Wanjiru, R., Kayima, J. K., Njeru, E. K., & Mutai, K. K. (2014). Prevalence of hypertension and associated cardiovascular risk factors in an urban slum in Nairobi, Kenya: A population-based survey. *BMC Public Health*, *14*(1), 1–10. https://doi.org/10.1186/1471-2458-14-1177/TABLES/3

Julious, S. A. (2005). Sample size of 12 per group rule of thumb for a pilot study. *Pharmaceutical Statistics*, *4*(4), 287–291. https://doi.org/10.1002/PST.185

Kapur, K., Kapur, A., Ramachandran, S., Mohan, V., Aravind+, S. R., Badgandi++, M., & Srishyla+++, M. V. (2008). *Barriers to Changing Dietary Behavior*. www.japi.org27OriginalArticle

Kassa, M., & Grace, J. (2019). The Global Burden and Perspectives on Non-Communicable Diseases (NCDs) and the Prevention, Data Availability and Systems Approach of NCDs in Low-resource Countries. *Public Health in Developing Countries - Challenges and Opportunities*. https://doi.org/10.5772/INTECHOPEN.89516

Kenya National Bureau of Statistics (KNBS). (2019). *2019 Kenya Population and Housing Census Volume I: Population by County and Sub-County - Kenya National Bureau of Statistics*. https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-i-population-by-county-and-sub-county

KHIS. (2022). *Kenya Health Information System*. www.hiskenya.org

Kiberenge, M. W., Ndegwa, Z. M., Njenga, E. W., & Muchemi, E. W. (2011). Knowledge, attitude and practices related to diabetes among community members in four provinces in Kenya: a cross-sectional study. *Pan African Medical Journal*, *7*(1), 2. https://doi.org/10.4314/pamj.v7i1.69095

Kilic, M., Uzunçakmak, T., & Ede, H. (2016). The effect of knowledge about hypertension on the control of high blood pressure. *International Journal of the Cardiovascular Academy*, *2*(1), 27–32. https://doi.org/10.1016/J.IJCAC.2016.01.003

King, D. K., Glasgow, R. E., Toobert, D. J., Strycker, L. A., Estabrooks, P. A., Osuna, D., & Faber, A. J. (2010). Self-Efficacy, Problem Solving, and Social-Environmental Support Are Associated With Diabetes Self-Management Behaviors. *Diabetes Care*, *33*(4), 751–753. https://doi.org/10.2337/DC09-1746

Kulkarni, K. D. (2004). Food, Culture, and Diabetes in the United States. *Clinical Diabetes*, *22*(4), 190–192. https://doi.org/10.2337/DIACLIN.22.4.190

Ley, S. H., Hamdy, O., Mohan, V., & Hu, F. B. (2014). Prevention and management of type 2 diabetes: dietary components and nutritional strategies. *The Lancet*, *383*(9933), 1999–2007. https://doi.org/10.1016/S0140-6736(14)60613-9

Leyvraz, M., Mizéhoun-Adissoda, C., Houinato, D., Baldé, N. M., Damasceno, A., Viswanathan, B., Amyunzu-Nyamongo, M., Owuor, J., Chiolero, A., & Bovet, P. (2018). Food Consumption, Knowledge, Attitudes, and Practices Related to Salt in Urban Areas in Five Sub-Saharan African Countries. *Nutrients 2018, Vol. 10, Page*

1028, *10*(8), 1028. https://doi.org/10.3390/NU10081028

Lim, E. L., Hollingsworth, K. G., Aribisala, B. S., Chen, M. J., Mathers, J. C., & Taylor, R. (2011). *Reversal of type 2 diabetes: normalisation of beta cell function in association with decreased pancreas and liver triacylglycerol*. https://doi.org/10.1007/s00125-011-2204-7

Lindholm, L. H. (2002). The problem of uncontrolled hypertension. *Journal of Human Hypertension 2002 16:3*, *16*(3), S3–S8. https://doi.org/10.1038/sj.jhh.1001433

Long, A. N., & Dagogo-Jack, S. (2011). Comorbidities of Diabetes and Hypertension: Mechanisms and Approach to Target Organ Protection. *The Journal of Clinical Hypertension*, *13*(4), 244–251. https://doi.org/10.1111/J.1751-7176.2011.00434.X

Łuczyński, W., Głowińska-Olszewska, B., & Bossowski, A. (2016). Empowerment in the Treatment of Diabetes and Obesity. *Journal of Diabetes Research*, *2016*. https://doi.org/10.1155/2016/5671492

Mackey A., & Gass S. (2015). *Second language research: Methodology and design*. Routledge.

Mathew, R., Gucciardi, E., De Melo, M., & Barata, P. (2012). Self-management experiences among men and women with type 2 diabetes mellitus: A qualitative analysis. *BMC Family Practice*, *13*(1), 1–12. https://doi.org/10.1186/1471-2296-13-122/TABLES/2

Mayberry, L. S., & Osborn, C. Y. (2012). Family Support, Medication Adherence, and Glycemic Control Among Adults With Type 2 Diabetes. *Diabetes Care*, *35*(6), 1239–1245. https://doi.org/10.2337/DC11-2103

Meme, N., Amwayi, S., Nganga, Z., & Buregyeya, E. (2016). Prevalence of undiagnosed diabetes and pre-diabetes among hypertensive patients attending Kiambu district Hospital, Kenya: a cross-sectional study. *Pan African Medical Journal*, *22*(1). https://doi.org/10.4314/pamj.v22i1.

Mensah, J., Korir, J., Nugent, R., & Hutchinson, B. (2020). Combating Noncommunicable Diseases in Kenya. *Combating Noncommunicable Diseases in Kenya: An Investment Case*. https://doi.org/10.1596/33539

Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews Nephrology 2020 16:4*, *16*(4), 223–237. https://doi.org/10.1038/s41581-019-0244-2

Ministry of Health. (2015). *Kenya National Strategy For The Prevention And Control Of Non-Communicable Diseases*. www.health.go.ke

MOH. (2015). *Kenya STEPwise Survey For Non Communicable Diseases Risk Factors 2015 Report*. https://www.health.go.ke/wp-content/uploads/2016/04/Steps-Report-NCD-2015.pdf

Mora, N., & Golden, S. H. (2017). Understanding Cultural Influences on Dietary Habits in Asian, Middle Eastern, and Latino Patients with Type 2 Diabetes: A Review of Current Literature and Future Directions. *Current Diabetes Reports*, *17*(12), 1–12. https://doi.org/10.1007/S11892-017-0952-6/TABLES/5

Mufunda, E., Wikby, K., Björn, A., & Hjelm, K. (2012). Level and determinants of diabetes knowledge in patients with diabetes in Zimbabwe: a cross-sectional study. *The Pan*

African Medical Journal, *13*, 78. /pmc/articles/PMC3567417/

Mugah, M. S. (2016). Socio-Cultural Dynamics Influencing Diabetes Control: A Case Study of Vihiga District Hospital, Kenya. *International Journal of Scientific Research and Innovative Technology*, *3*(2), 2313–3759.

Murphy, K., Chuma, T., Mathews, C., Steyn, K., & Levitt, N. (2015). A qualitative study of the experiences of care and motivation for effective self-management among diabetic and hypertensive patients attending public sector primary health care services in South Africa. *BMC Health Services Research*, *15*(1), 1–9. https://doi.org/10.1186/S12913-015-0969-Y/FIGURES/1

Murugesan, N., Snehalatha, C., Shobhana, R., Roglic, G., & Ramachandran, A. (2007). Awareness about diabetes and its complications in the general and diabetic population in a city in southern India. *Diabetes Research and Clinical Practice*, *77*(3), 433–437. https://doi.org/10.1016/J.DIABRES.2007.01.004

Musee C, Omondi D, & Odiwuor W. (2016). *Dietary Adherence Pattern in the Context of Type 2 Diabetic Management within Clinical Setting, Kenya*. https://doi.org/10.5923/j.diabetes.20160502.02

Musicus, A. A., Vercammen, K. A., Fulay, A. P., Moran, A. J., Burg, T., Allen, L., Maffeo, D., Berger, A., & Rimm, E. B. (2019). Implementation of a rooftop farm integrated with a teaching kitchen and preventive food pantry in a hospital setting. *American Journal of Public Health*, *109*(8), 1119–1121. https://doi.org/10.2105/AJPH.2019.305116

Mutyambizi, C., Pavlova, M., Hongoro, C., Booysen, F., & Groot, W. (2019). Incidence, socio-economic inequalities and determinants of catastrophic health expenditure and impoverishment for diabetes care in South Africa: A study at two public hospitals in Tshwane. *International Journal for Equity in Health*, *18*(1), 1–15. https://doi.org/10.1186/S12939-019-0977-3/TABLES/5

N, S., SB, Y., AM, J., BDP, P., J, S., & DL, B. (2015). Diabetes Knowledge and Associated Factors among Diabetes Patients in Central Nepal. *International Journal of Collaborative Research on Internal Medicine & Public Health*, *7*(5), 0–0. https://www.iomcworld.org/abstract/diabetes-knowledge-and-associated-factors-among-diabetes-patients-in-central-nepal-18868.html

Ngmenesegre, J., Id 1☯, S., & Evans, C. (2020). *Factors influencing self-management in relation to type 2 diabetes in Africa: A qualitative systematic review*. https://doi.org/10.1371/journal.pone.0240938

Niroomand, M., Ghasemi, S. N., Karimi-Sari, H., Kazempour-Ardebili, S., Amiri, P., & Khosravi, M. H. (2016). Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: A cross-sectional study. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *10*(1), S114–S119. https://doi.org/10.1016/J.DSX.2015.10.006

Nthangeni, G., Steyn, N. P., Alberts, M., Steyn, K., Levitt, N. S., Laubscher, R., Bourne, L., Dick, J., & Temple, N. (2002). Dietary intake and barriers to dietary compliance in black type 2 diabetic patients attending primary health-care services. *Public Health Nutrition*, *5*(2), 329–338. https://doi.org/10.1079/PHN2002256

Osetinsky, B., Mwangi, A., Pastakia, S., Wilson-Barthes, M., Kimetto, J., Rono, K., Laktabai, J., & Galárraga, O. (2020). Layering and scaling up chronic non-communicable disease

care on existing HIV care systems and acute care settings in Kenya: a cost and budget impact analysis. *Journal of the International AIDS Society*, *23*(S1), e25496. https://doi.org/10.1002/JIA2.25496

Oyando, R., Njoroge, M., Nguhiu, P., Kirui, F., Mbui, J., Sigilai, A., Bukania, Z., Obala, A., Munge, K., Etyang, A., & Barasa, E. (2019). Patient costs of hypertension care in public health care facilities in Kenya. *The International Journal of Health Planning and Management*, *34*(2), e1166–e1178. https://doi.org/10.1002/HPM.2752

Oyando, R., Njoroge, M., Nguhiu, P., Sigilai, A., Kirui, F., Mbui, J., Bukania, Z., Obala, A., Munge, K., Etyang, A., & Barasa, E. (2020). Patient costs of diabetes mellitus care in public health care facilities in Kenya. *The International Journal of Health Planning and Management*, *35*(1), 290–308. https://doi.org/10.1002/HPM.2905

Pastors, J. G., Warshaw, H., Daly, A., Franz, M., & Kulkarni, K. (2002). The Evidence for the Effectiveness of Medical Nutrition Therapy in Diabetes Management. *Diabetes Care*, *25*(3), 608–613. https://doi.org/10.2337/DIACARE.25.3.608

Pavlou, D. I., Paschou, S., Anagnostis, P., Spartalis, M., Spartalis, E., Vryonidou, A., Tentolouris, N., & Siasos, G. (2018). Hypertension in patients with type 2 diabetes mellitus: Targets and management. *Maturitas*, *112*, 71–77. https://doi.org/10.1016/J.MATURITAS.2018.03.013

Peña-Purcell, N. C., Boggess, M. M., & Jimenez, N. (2011). An Empowerment-Based Diabetes Self-management Education Program for Hispanic/Latinos: A Quasi-experimental Pilot Study. *The Diabetes Educator*, *37*(6), 770–779. https://doi.org/10.1177/0145721711423319

Puoane, T., Matwa, P., Bradley, H., & Hughes, G. (2006). *Socio-cultural Factors Influencing Food Consumption Patterns in the Black African Population in an Urban Township in South Africa*.

Regina, C. C., Mu'ti, A., & Fitriany, E. (2018). Diabetes Mellitus Type 2. *Verdure: Health Science Journal*, *3*(1), 8–17. http://europepmc.org/books/NBK513253

Roberfroid, M. B. (2000). Concepts and strategy of functional food science: the European perspective. *The American Journal of Clinical Nutrition*, *71*(6), 1660S-1664S. https://doi.org/10.1093/AJCN/71.6.1660S

Rolling TE, & Hong MY. (2016). The Effect of Social Cognitive Theory-Based Interventions on Dietary Behavior within Children. *J Nutrition Health Food Sc*.

Roux, M. le, Walsh, C., Reid, M., & Raubenheimer, J. (2019). Diabetes-related knowledge, attitude and practices (KAP) of adult patients with type 2 diabetes mellitus in the Free State province, South Africa. *South African Journal of Clinical Nutrition*, *32*(4), 83–90. https://doi.org/10.1080/16070658.2018.1468536

Ruggiero, L., Glasgow, R. E., Dryfoos, J. M., Rossi, J. S., Prochaska, J. O., Orleans, C. T., Prokhorov, A. V., Rossi, S. R., Greene, G. W., Reed, G. R., Kelly, K., Chobanian, L., & Johnson, S. (1997). Diabetes Self-Management: Self-reported recommendations and patterns in a large population. *Diabetes Care*, *20*(4), 568–576. https://doi.org/10.2337/DIACARE.20.4.568

Sami, W., Alabdulwahhab, K. M., Hamid, M. R. A., Alasbali, T. A., Alwadani, F. Al, & Ahmad, M. S. (2020). Dietary Knowledge among Adults with Type 2 Diabetes—

Kingdom of Saudi Arabia. *International Journal of Environmental Research and Public Health 2020, Vol. 17, Page 858*, *17*(3), 858. https://doi.org/10.3390/IJERPH17030858

Sebire, S. J., Toumpakari, Z., Turner, K. M., Cooper, A. R., Page, A. S., Malpass, A., & Andrews, R. C. (2018). I've made this my lifestyle now: A prospective qualitative study of motivation for lifestyle change among people with newly diagnosed type two diabetes mellitus. *BMC Public Health*, *18*(1), 1–10. https://doi.org/10.1186/S12889-018-5114-5/TABLES/1

Sekaran U., & Bougie R. (2016). *Research methods for business: A skill building approach*. Wiley.

Serour, M., Alqhenaei, H., Al-Saqabi, S., Mustafa, A.-R., & Ben-Nakhi, A. (2007). Cultural factors and patients' adherence to lifestyle measures. *British Journal of General Practice*, *57*(537).

Shamsi, N., Shehab, Z., Alnahash, Z., Almuhanadi, S., & Al-Nasir, F. (2013). Factors Influencing Dietary Practice among Type 2 Diabetics. *Bahrain Medical Bulletin*, *35*(3).

Shannon, G. D., Haghparast-Bidgoli, H., Chelagat, W., Kibachio, J., & Skordis-Worrall, J. (2019). Innovating to increase access to diabetes care in Kenya: an evaluation of Novo Nordisk's base of the pyramid project. *Https://Doi.Org/10.1080/16549716.2019.1605704*, *12*(1). https://doi.org/10.1080/16549716.2019.1605704

Shetty, P. (2013). Nutrition Transition and Its Health Outcomes. *The Indian Journal of Pediatrics 2013 80:1*, *80*(1), 21–27. https://doi.org/10.1007/S12098-013-0971-5

Shigaki, C., Kruse, R. L., Mehr, D., Sheldon, K. M., Bin Ge, Moore, C., & Lemaster, J. (2010). Motivation and diabetes self-management. *Chronic Illness*, *6*(3), 202–214. https://doi.org/10.1177/1742395310375630

Shrivastava, S. R. B. L., Shrivastava, P. S., & Ramasamy, J. (2013). Role of self-care in management of diabetes mellitus. *Journal of Diabetes & Metabolic Disorders 2013 12:1*, *12*(1), 1–5. https://doi.org/10.1186/2251-6581-12-14

Siervo, M., Lara, J., Chowdhury, S., Ashor, A., Oggioni, C., & Mathers, J. C. (2015). Effects of the Dietary Approach to Stop Hypertension (DASH) diet on cardiovascular risk factors: a systematic review and meta-analysis. *British Journal of Nutrition*, *113*(1), 1–15. https://doi.org/10.1017/S0007114514003341

Simmons, L., Baker, N. J., Schaefer, J., Miller, D., & Anders, S. (2009). Activation of patients for successful self-management. *Journal of Ambulatory Care Management*, *32*(1), 16–23. https://doi.org/10.1097/01.JAC.0000343120.07844.A9

Speight, J., & Bradley, C. (2001). The ADKnowl: identifying knowledge deficits in diabetes care. *Diabetic Medicine : A Journal of the British Diabetic Association*, *18*(8), 626–633. https://doi.org/10.1046/J.1464-5491.2001.00537.X

Spronk, I., Kullen, C., Burdon, C., & O'Connor, H. (2014). Relationship between nutrition knowledge and dietary intake. *British Journal of Nutrition*, *111*(10), 1713–1726. https://doi.org/10.1017/S0007114514000087

Subramanian, S., Gakunga, R., Kibachio, J., Gathecha, G., Edwards, P., Ogola, E., Yonga, G., Busakhala, N., Munyoro, E., Chakaya, J., Ngugi, N., Mwangi, N., Rege, D. Von, Wangari, L. M., Wata, D., Makori, R., Mwangi, J., & Mwanda, W. (2018). Cost and

affordability of non-communicable disease screening, diagnosis and treatment in Kenya: Patient payments in the private and public sectors. *PLOS ONE*, *13*(1), e0190113. https://doi.org/10.1371/JOURNAL.PONE.0190113

Suglo, J. N., & Evans, C. (2020a). Factors influencing self-management in relation to type 2 diabetes in Africa: A qualitative systematic review. *PLoS ONE*, *15*(10). https://doi.org/10.1371/JOURNAL.PONE.0240938

Suglo, J. N., & Evans, C. (2020b). Factors influencing self-management in relation to type 2 diabetes in Africa: A qualitative systematic review. *PLOS ONE*, *15*(10), e0240938. https://doi.org/10.1371/JOURNAL.PONE.0240938

Tan, C. C. L., Cheng, K. K. F., Sum, C. F., Shew, J. S. H., Holroyd, E., & Wang, W. (2018a). Perceptions of Diabetes Self-Care Management among Older Singaporeans with Type 2 Diabetes: A Qualitative Study. *Journal of Nursing Research*, *26*(4), 242–249. https://doi.org/10.1097/JNR.0000000000000226

Tan, C. C. L., Cheng, K. K. F., Sum, C. F., Shew, J. S. H., Holroyd, E., & Wang, W. (2018b). Perceptions of Diabetes Self-Care Management among Older Singaporeans with Type 2 Diabetes: A Qualitative Study. *Journal of Nursing Research*, *26*(4), 242–249. https://doi.org/10.1097/JNR.0000000000000226

Tan, C. C. L., Cheng, K. K. F., Sum, C. F., Shew, J. S. H., Holroyd, E., & Wang, W. (2018c). Perceptions of Diabetes Self-Care Management among Older Singaporeans with Type 2 Diabetes: A Qualitative Study. *Journal of Nursing Research*, *26*(4), 242–249. https://doi.org/10.1097/JNR.0000000000000226

Teijlingen van E., & Hundley, V. (2001). *The importance of pilot studies*.

Tesema, S., Disasa, B., Kebamo, S., & Kadi, E. (2016). Knowledge, Attitude and Practice Regarding Lifestyle Modification of Hypertensive Patients at Jimma University Specialized Hospital, Ethiopia. *Primary Health Care: Open Access*, *6*(1), 1–4. https://doi.org/10.4172/2167-1079.1000218

Thewjitcharoen, Y., Chotwanvirat, P., Jantawan, A., Siwasaranond, N., Saetung, S., Nimitphong, H., Himathongkam, T., & Reutrakul, S. (2018). Evaluation of dietary intakes and nutritional knowledge in Thai patients with type 2 diabetes mellitus. *Journal of Diabetes Research*, *2018*. https://doi.org/10.1155/2018/9152910

Thojampa, S., & Sarnkhaowkhom, C. (2019). The Social Cognitive Theory with Diabetes: Discussion. *International Journal of Caring Sciences*, *12*, 2. www.internationaljournalofcaringsciences.org

Trans Nzoia. (2018). *Trans Nzoia CIDP 2018-2022*. http://www.transnzoia.go.ke/wp-content/uploads/2019/05/CIDP-Final-2018.pdf

Trief, P. M., Wade, M. J., Britton, K. D., & Weinstock, R. S. (2002). A Prospective Analysis of Marital Relationship Factors and Quality of Life in Diabetes. *Diabetes Care*, *25*(7), 1154–1158. https://doi.org/10.2337/DIACARE.25.7.1154

Tripp-Reimer, T., Choi, E., Kelley, L. S., & Enslein, J. C. (2001). Cultural Barriers to Care: Inverting the Problem. *Diabetes Spectrum*, *14*(1), 13–22. https://doi.org/10.2337/DIASPECT.14.1.13

Turner, R. (1998). Intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 diabetes

(UKPDS 33). *The Lancet*, *352*(9131), 837–853. https://doi.org/10.1016/S0140-6736(98)07019-6

Unger, T., Borghi, C., Charchar, F., Khan, N. A., Poulter, N. R., Prabhakaran, D., Ramirez, A., Schlaich, M., Stergiou, G. S., Tomaszewski, M., Wainford, R. D., Williams, B., & Schutte, A. E. (2020). 2020 International Society of Hypertension Global Hypertension Practice Guidelines. *Hypertension*, *75*(6), 1334–1357. https://doi.org/10.1161/HYPERTENSIONAHA.120.15026

Van den Arend, I. J. M., Stolk, R. P., Krans, H. M. J., Grobbee, D. E., & Schrijvers, A. J. P. (2000). Management of type 2 diabetes: a challenge for patient and physician. *Patient Education and Counseling*, *40*(2), 187–194. https://doi.org/10.1016/S0738-3991(99)00067-1

Varming, A. R., Hansen, U. M., Andrésdóttir, G., Husted, G. R., & Willaing, I. (2015). Empowerment, motivation, and medical adherence (EMMA): the feasibility of a program for patient-centered consultations to support medication adherence and blood glucose control in adults with type 2 diabetes. *Patient Preference and Adherence*, *9*, 1243. https://doi.org/10.2147/PPA.S85528

Vijan, S., Stuart, N. S., Fitzgerald, J. T., Ronis, D. L., Hayward, R. A., Slater, S., & Hofer, T. P. (2005). Barriers to following dietary recommendations in Type 2 diabetes. *Diabetic Medicine*, *22*(1), 32–38. https://doi.org/10.1111/J.1464-5491.2004.01342.X

Wagner, K. H., & Brath, H. (2012). A global view on the development of non communicable diseases. *Preventive Medicine*, *54*(SUPPL.), S38–S41. https://doi.org/10.1016/J.YPMED.2011.11.012

Wahome, E., Makau, W., & Kiboi, W. (2018). Predictors of dietary practices and nutritional status among diabetic type II patients in Kiambu County, Kenya. *International Journal of Community Medicine and Public Health*, *5*(7), 2726–2734. https://doi.org/10.18203/2394-6040.ijcmph20182606

Wahyuni, D. (2012). The Research Design Maze: Understanding Paradigms, Cases, Methods and Methodologies. *JAMAR*, *10*. http://ssrn.com/abstract=2103082

Wang, H., Song, Z., Ba, Y., Zhu, L., & Wen, Y. (2014). Nutritional and eating education improves knowledge and practice of patients with type 2 diabetes concerning dietary intake and blood glucose control in an outlying city of China. *Public Health Nutrition*, *17*(10), 2351–2358. https://doi.org/10.1017/S1368980013002735

Wendling, S., & Beadle, V. (2015). The relationship between self-efficacy and diabetic foot self-care. *Journal of Clinical & Translational Endocrinology*, *2*(1), 37–41. https://doi.org/10.1016/J.JCTE.2015.01.001

WHO. (2014). *Global Status report on NCDs 2014*. https://apps.who.int/iris/bitstream/handle/10665/148114/9789241564854_eng.pdf

WHO. (2021a). *Hypertension*. https://www.who.int/news-room/fact-sheets/detail/hypertension

WHO. (2021b). *Noncommunicable diseases*. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

Windhauser, M. M., Ernst, D. B., Karanja, N. M., Crawford, S. W., Redican, S. E., Swain, J. F., Karimbakas, J. M., Champagne, C. M., Hoben, K. P., & Evans, M. A. (1999).

Translating the Dietary Approaches to Stop Hypertension Diet from Research to Practice: Dietary and Behavior Change Techniques. *Journal of the American Dietetic Association*, *99*(8), S90–S95. https://doi.org/10.1016/S0002-8223(99)00422-8

Worku, A., Abebe, S. M., & Wassie, M. M. (2011). *Dietary practice and associated factors among type 2 diabetic patients: a cross sectional hospital based study, Addis Ababa, Ethiopia*. https://doi.org/10.1186/s40064-015-0785-1

Xie, J., Price, A., Curran, N., & Ostbye, T. (2021). The impact of a produce prescription programme on healthy food purchasing and diabetes-related health outcomes. *Public Health Nutrition*, *24*(12), 3945–3955. https://doi.org/10.1017/S1368980021001828

Yamamoto, J. M., Kellett, J. E., Balsells, M., García-Patterson, A., Hadar, E., Solà, I., Gich, I., Van der Beek, E. M., Castañeda-Gutiérrez, E., Heinonen, S., Hod, M., Laitinen, K., Olsen, S. F., Poston, L., Rueda, R., Rust, P., Van Lieshout, L., Schelkle, B., Murphy, H. R., & Corcoy, R. (2018). Gestational Diabetes Mellitus and Diet: A Systematic Review and Meta-analysis of Randomized Controlled Trials Examining the Impact of Modified Dietary Interventions on Maternal Glucose Control and Neonatal Birth Weight. *Diabetes Care*, *41*(7), 1346–1361. https://doi.org/10.2337/DC18-0102

Yang, S., Hsue, C., & Lou, Q. (2015). Does Patient Empowerment Predict Self-Care Behavior and Glycosylated Hemoglobin in Chinese Patients with Type 2 Diabetes? *Https://Home.Liebertpub.Com/Dia*, *17*(5), 343–348. https://doi.org/10.1089/DIA.2014.0345

Zowgar, A. M., Siddiqui, M. I., & Alattas, K. M. (2018). Level of diabetes knowledge among adult patients with diabetes using diabetes knowledge test. *Saudi Medical Journal*, *39*(2), 161. https://doi.org/10.15537/SMJ.2017.2.21343

APPENDICES

APPENDIX 1: ETHICAL APPROVAL

Strathmore UNIVERSITY

7th September 2022

Dr Kiarie Ruth,
ruth.kiarie@strathmore.edu

Dear Dr Kiarie,

RE: An Assessment of Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes Mellitus and Hypertension: A Case Study of Kitale County Referral Hospital

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU- master's** research proposal. Your application reference number is **SU-IERC1399/22.** The approval period is from **7th September 2022 to 6th September 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 SU-ISERC.
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 SU-ISERC within 48 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 SU-ISERC within 48 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 SU-ISERC.

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

Yours sincerely,

for: **Dr Ben Ngoye,**
Secretary; SU-ISERC

STRATHMORE UNIVERSITY INSTITUTIONAL
SCIENTIFIC AND ETHICAL REVIEW COMMITTEE
(SU-ISERC)
07-Sep-2022
Email:ethicsreview@strathmore.edu
P.O BOX 59857-00200
NAIROBI-KENYA

Cc: Prof Fred Were,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

APPENDIX 2: NACOSTI RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **324462**

Date of Issue: **17/October/2022**

RESEARCH LICENSE

This is to Certify that Dr.. Ruth Kiarie of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Transnzoia on the topic: An Assessment of Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes Mellitus and Hypertension: A Case Study of Kitale County Referral Hospital for the period ending : 17/October/2023.

License No: **NACOSTI/P/22/20514**

324462

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.

See overleaf for conditions

APPENDIX 3: RESEARCH AUTHORIZATION

REPUBLIC OF KENYA
COUNTY GOVERNMENT OF TRANS NZOIA

TEL: 054 – 30301
054 – 30302

Email:
researchunit@transnzoia.go.ke

From the director's office
P.O. BOX 4211 – 30200
KITALE

DEPARTMENT OF HEALTH SERVICES

Our Ref: CGTN/HS/RH/02 VOL 1/ 2020 ***Date:*** *Wednesday, September 28, 2022*

To
RUTH KIARIE
MBA-HCM 315722/2003

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on the topic "***an assessment of nutrition knowledge and dietary practices among adults with type 2 diabetes mellitus and hypertension***", I am pleased to inform you that the authority is hereby granted.

Please note that the authority granted is only administrative and is subjected to the validity of the following:

1. **Approval from a competent institution ethics review committee.**
2. **Approval from the National Commission for science, technology and innovation**

Please ensure that your research is conducted within the time stipulated in your application. Any extension shall require fresh endorsement.

Sincerely

Dr. Wamalwa Anthony
Chairperson Health Research Unit
TRANS NZOIA COUNTY

HEALTH RESEARCH UNIT
28 SEP 2022
TRANS - NZOIA COUNTY
P. O. Box 4211 - 30200, KITALE

APPENDIX 4: LETTER OF INTRODUCTION

Ole Sangale Rd, Madaraka Estate,
P.O Box 59857 00200, Nairobi, Kenya.
Cell: +254 703 414/6/7, Twitter: @SBSKenya
Email: info@sbs.ac.ke or visit www.sbs.strathmore.edu

Strathmore UNIVERSITY BUSINESS SCHOOL

14th September 2022

To Whom It May Concern,

RE: FACILITATION OF RESEARCH – RUTH KIARIE

This is to introduce Ruth Kiarie who is a Master of Business Management in Healthcare Management (MBA-HCM) Student at Strathmore University Business School, admission number MBA-HCM 135722/20. As part of our MBA-HCM Programme, Ruth is expected to do applied research and undertake a project. This is in partial fulfilment of the requirements of the MBA-HCM course. To this effect, Ruth would like to request for appropriate data from your organization.

Ruth is undertaking a research paper on "**An Assessment of Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes Mellitus and Hypertension: A Case Study of Kitale County Referral Hospital.**" The information obtained shall be treated confidentially and shall be used for academic purposes only.

Our MBA-HCM Programme seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct use to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of practical value to your organization.

We appreciate your support and shall be willing to provide any further information if required.

Yours sincerely,

Njoki Kiagiri
Manager – Graduate Programmes
Strathmore University Business School.

APPENDIX 5: RESEARCH BUDGET

ITEM	QUANTITY	UNIT PRICE	TOTAL (KSh.)
Questionnaires, consent forms	300	50	15,000
Research assistants for data collection	4	2,000	8,000
Printing and binding of the proposal	3	1,000	3,000
Data Analysis	1	35,000	35,000
Printing and binding of dissertation	3	2,000	6,000
Miscellaneous	1	10,000	10,000
TOTAL			**77,000**

APPENDIX 6: STUDY QUESTIONNAIRE

STUDY TITLE: An Assessment of Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes and Hypertension: A Case Study of Kitale County Referral Hospital

Participant's identification code……... Date…….

Instructions

This questionnaire has been divided into six sections and you are kindly requested to respond to questions in all sections. Your participation in this research is voluntary and your informed consent will be sought before being issued with this questionnaire. There will be no monetary benefit in participating.

Information provided will be treated as confidential. Therefore, you are requested not to write your name on any page. Findings from this study will serve to provide information on the nutrition knowledge and dietary practices among adults with Type 2 diabetes and hypertension. You are therefore requested to avail truthful information that would enable the right generalizations.

Kindly use a pen in filling the questionnaire.

Your participation is highly appreciated

SECTION 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS

1.Age

18-35 years [ ] 36-44 years [ ]

45-59 years [ ] Above 60 years [ ]

2.Gender

Male [ ] Female [ ]

3.Marital status

Single [ ] Married [ ]

Widowed [ ] Divorced/separated [ ]

4.Education level

Primary [ ] High school [ ]

Certificate [ ] Diploma [ ]

Undergraduate [ ] Post-graduate [ ]

5.Occupation:

6.Residence: Sub county _____ Ward _____

7. Ethnicity _____

SECTION 2: HISTORY OF DIABETES AND HYPERTENSION

1.Duration of diabetes

Less than 1 year [ ] 1-5 years [ ]

5-10 years [ ] More than 10 years [ ]

2.Duration of hypertension

Less than 1 year [ ] 1-5 years [ ]

5-10 years [ ] More than 10 years [ ]

3.Weight (kg): _____

4.BMI (kg/m^2): _____

5.HBA1C (%): _____

6.Blood Pressure (mmHg): _____

SECTION 3: PATIENTS' KNOWLEDGE OF DIETARY INFLUENCE ON DIABETES AND HYPERTENSION

The following statements describe patients' knowledge of dietary influence on diabetes and hypertension. Please indicate with a tick (√) your level of agreement with each statement on a scale of 1-5, where:

1=strongly disagree (SD), 2=disagree (A), 3=not sure (N), 4=agree (A), 5=strongly agree (SA).

	Statement	**SD**	**D**	**N**	**A**	**SA**
1	Diet plays a key role in the management and prevention of diabetes and hypertension					
2	High intake of red meat, sugary and fried foods contribute to the increased risk of diabetes					
3	Fruits and vegetables contain vitamins and minerals which play an important role in preventing complications					
4	Restricting the use of salt can help to reduce high blood pressure					
5	I am able to identify the different food groups such as carbohydrates, protein, fat, fruits and vegetables					
6	Achieving your ideal weight helps control diabetes					
7	Controlling portion sizes (quantity of food) is important for weight management					
8	Eating large amounts of food may lead to increased blood sugar					

SECTION 4: SOCIO-CULTURAL INFLUENCE ON PATIENTS' DIETARY PRACTICES

The following statements describe socio-cultural influences on patients' dietary practices. Please indicate with a tick (√) your level of agreement with each statement on a scale of 1-5, where:

1=strongly disagree (SD), 2=disagree (A), 3=not sure (N), 4=agree (A), 5=strongly agree (SA).

	Statement	**SD**	**D**	**N**	**A**	**SA**
1	Food has a social meaning and is used to show love and acceptance, and is associated with happiness					
2	I find it difficult to reduce the consumption of traditional carbohydrate-rich foods such as ugali, Irish and sweet potatoes, nduma, matoke etc.					
3	My family members are informed on how to manage diabetes and hypertension					
4	My spouse (wife, husband or partner) supports me by providing or preparing the specific foods that I need					
5	My spouse (wife, husband or partner) helps me make the right food choices					
6	My family members help me make the right food choices					
7	I find it difficult to make healthy food choices when attending social gatherings where food is served outside my home					
8	I am able to make healthy food choices while at work					

SECTION 5: PATIENTS' WILLINGNESS TO CHANGE THEIR DIETARY PRACTICES

The following statements describe patients' willingness to change their dietary practices. Please indicate with a tick (√) your level of agreement with each statement on a scale of 1-5, where:

1=strongly disagree (SD), 2=disagree (A), 3=not sure (N), 4=agree (A), 5=strongly agree (SA).

	Statement	**SD**	**D**	**N**	**A**	**SA**
1	I am willing to change my dietary practices and adhere to the recommended diet					
2	I can motivate myself to make the recommended dietary changes					
3	I am able to follow a diet regimen that is different from that of the rest of my family					
4	I am afraid that if I don't make dietary changes the healthcare providers will not be happy with me					
5	I know enough about nutrition in diabetes and hypertension to make dietary choices that are right for me					
6	I know enough about myself as a person to make dietary choices that are right for me.					
7	I can ask for support whenever I need to in order to maintain healthy dietary practices					

SECTION 6: PATIENTS' AWARENESS OF THEIR DIETARY PRACTICES

The following statements describe patients' awareness of their actual dietary practices. Please indicate with a tick (√) your level of agreement with each statement on a scale of 1-5, where:

1=strongly disagree (SD), 2=disagree (A), 3=not sure (N), 4=agree (A), 5=strongly agree (SA).

	Statement	**SD**	**D**	**N**	**A**	**SA**
1	I have received adequate nutrition education and counselling at the health facility in order to make appropriate dietary changes					
2	I am able to identify the different food groups such as carbohydrates, protein, fruit and vegetables					
3	I am aware of the portions sizes that I am supposed to eat					
4	I believe that I usually follow the dietary advice that I have been given					
5	I am able to find all the foods that I have been advised to eat					
6	I have to think about the cost of buying the recommended foods because I cannot afford it					
7	If the hospital had a kitchen where I would be taught how to select and prepare certain meals, it would it make it easier for me to maintain healthy eating habits					

APPENDIX 7: PARTICIPANT INFORMATION AND CONSENT FORM

Study Title: A Descriptive Study on Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes Mellitus and Hypertension at Kitale County Referral Hospital

Investigator: RUTH WANJIRU KIARIE *(Master of Business Administration in Healthcare Management)* STRATHMORE BUSINESS SCHOOL, STRATHMORE UNIVERSITY.

Purpose of study: The study focuses on patients with diabetes and hypertension receiving care at Kitale County Referral Hospital. It aims to assess their nutrition knowledge and dietary practices and subsequently inform policies and practices that will ensure patients have adequate nutrition knowledge and put them into practice. The study is purely for educational purposes and the information gathered will be treated with confidentiality.

How to Participate: You will be asked to give responses to some questions which will be asked regarding your medical condition, knowledge and perceptions of nutrition in managing the conditions. This may take approximately 15 minutes.

Right to refusal or withdrawal: Taking part in this study is your choice; you may choose not to be in it. Your participation is voluntary and you are free to agree or disagree to participate in this study. You may withdraw from the study at any time even after signing this form and there will be no victimization.

Confidentiality and privacy: Your involvement in this research study will be kept confidential by identifying you in the study records by a code/unique number. The study results/report that will be used in the final thesis will not use your name. All research records will be stored in securely locked cabinets. That information may be transcribed into our database but this will be sufficiently encrypted and password protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

Risks and benefits: There are no risks or discomforts associated with this study and neither are there any direct benefits to you for taking part in.

For further clarifications or questions on this study, please contact me

Investigator: Ruth Kiarie (Mobile: 0714203569 or Email ruth.kiarie@strathmore.edu)

My Supervisor: Prof. Joseph Onyango (Mobile: 0720879706 or Email: jonyango@strathmore.edu)

Enquiries to: The Secretary- Strathmore University Institutional Ethics Review Board,

P.O BOX 59857-00200, NAIROBI; Email: ethicsreview@strathmore.edu; Tel No: + 254 703 034 375

Your signature indicates that this research study has been explained to you, that you have been given the opportunity to ask questions, and that you agree to take part in this study.

Signature: …..... Date: .....

For Official Use:

Name:…… Signature:…….. Date: ……

(Research Personnel)

APPENDIX 8: PROPOSED WORKPLAN

Draft Title of Research work: A Descriptive Study on Nutrition Knowledge and Dietary Practices Among Adults with Type 2 Diabetes Mellitus and Hypertension at Kitale County Referral Hospital

WORK PLAN (*Use the Schedule of Important Timelines in Appendix L of these guidelines to help you develop an appropriate work plan*)

Progress Stage	**Stage Description**	**Proposed dates**
1	Scoping of the research study	21st-25th February 2022
2	Choice of Research Topic	28th February 2022
3	Research Problem clarification, research objectives, purpose and significance	1st-14th March 2022
4	Literature review	21st March-8th April 2022
5	Research methodology	11th-19th April 2022
6	Completing and submitting the research proposal	16th May-2nd June 2022
7	Proposal defense	13th-17th June 2022
8	Data collection	20th-25th June 2022
9	Data analysis and Interpretation	20th- 23rd June 2022
10	Research report writing – first draft	23rd-26th June 2022
11	Final draft of research report	26th June 2022
12	Submission of research for examination	27th June 2022

Any remarks:

_____

_____

RESEARCH WORK EXAMINATION PROCESS AND CLEARANCE FOR GRADUATION

Step	Activity	Proposed Deadline	Proposed Graduation Yr*
1.	Submit research report for examination	27th June 2022	2022
2.	Examination of research report	27th June-4th July 2022	
3.	Oral defence	4th-15th July 2022	
4.	Correction of research report	16th-28th July 2022	
5.	Confirmation of final version of research report and Registration for graduation	29th July 2022	

**Note: Graduation is on the last Friday in June. A student needs to have been registered to graduate by the last week of May.*

*****The research report MUST be corrected and confirmed as the final version before graduation***

SIGNATURES AND DATES:

Candidate's Name	Signature	Date
Supervisor	Signature	Date
Co-Supervisor (if applicable)	Signature	Date

Faculty Dean Signature Date

Please forward to Dean, SGS

Dean (School of Graduate Studies):

Name Signature Date