

**FACTORS AFFECTING MEDICAL NUTRITIONAL
THERAPY AMONG TYPE 2 DIABETES PATIENTS AT
KENYATTA NATIONAL HOSPITAL, NAIROBI,
KENYA**

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**Factors Affecting Medical Nutritional Therapy among Type 2
Diabetes Patients at Kenyatta National Hospital, Nairobi, Kenya**

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DECLARATION

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

Signature..... Date.....

Joseph Son Asati

This thesis has been submitted for examination with our approval as the university Supervisors.

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DEDICATION.

I dedicate this project to my loving and caring wife Evarose Nyanchama Son for her unwavering support, encouragement and prayers throughout this journey not forgetting my children (Sheila, Wiseman, Shawn, Ayden, Tamara & Tendai) who have looked up to me to always set and achieve new milestones in life. To my parents, thanks a million times for walking with me. Your love, your care and words of encouragement have immensely supported me through this course. You are the best parents in the world.

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ABBREVIATIONS AND ACRONYMS

ACE	American College of endocrinology
ADA	American Diabetes association
AHEAD	Action for Health in Diabetes
BMI	Body Mass Index
CDC	Centre for Disease Control
DPPR	Diabetes Prevention Programme Research
DQIP	Diabetes Quality Improvement Program
DSMT	Diabetes Self-Management Training
GI	Glycemic Index
HbA1C/A1C	Glycosylated Hemoglobin
HST	Health System Trust
IDF	International Diabetes Federation
MNT	Medical Nutrition Therapy
RD	Registered Dietitian
SPSS	Statistical Package for the Social Sciences
USA	United States of America

OPERATIONAL DEFINITION OF TERMS

Diabetes Mellitus	is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time.
Diabetic Ketoacidosis	Is a serious complication of diabetes that occurs when your body produces high levels of blood acids called ketones.
Glycemic Index	a figure representing the relative ability of a carbohydrate food to increase the level of glucose in the blood.
Hyperglycemia	Abnormally low blood glucose levels.
Hypoglycemia	Abnormally high blood glucoses levels
Medical Nutrition Therapy	is a nutritional diagnostic, therapy, and counseling services for the purpose of disease management, which are furnished by a registered dietitian (RD) or nutrition professional.
Type 1 Diabetes	is a chronic illness characterized by the body's inability to produce insulin due to the autoimmune destruction of the beta cells in the pancreas.
Type 2 Diabetes	Is a chronic illness characterized by high blood sugar as a result of insulin resistance.

ABSTRACT

The prevalence of Diabetes Mellitus has been rising in Kenya, and successful management of the condition is a challenge. Evidence from randomized controlled trials, observational studies and meta-analyses has shown that nutrition intervention for patients with Diabetes Mellitus improves metabolic outcomes, such as blood glucose and hbA_{1C}. The aim of this study was to provide an insight into the factors affecting Medical Nutrition Therapy (MNT) among the Type 2 Diabetes patients as perceived by the patients and professional healthcare providers. This was a descriptive cross-sectional study where data from patients was collected using questionnaire administered by two trained research assistants as well as through schedule interviews with key informants. The study was carried out at Kenyatta National Hospital Diabetes Clinic where 422 Type 2 Diabetes patients, who had been attending the clinic more than 3 months were recruited into the study. This was done through systematic sampling. Overall non-adherence to recommended Medical Nutritional Therapy (MNT) was 35.8% and was significantly associated with Primary level of education (AOR=3.44; 95% CI: 1.35 – 8.82; p=0.010), Secondary level of education (AOR=3.48; 95% CI: 1.40 – 8.66; p=0.007), and Tertiary level of education (AOR=6.97; 95% CI: 2.69 – 18.05; p<0.001). Getting to the diabetes clinic by other means other than walking (AOR=3.49; 95% CI: 1.56 – 7.80; p=0.002), irregular visits (when sick) (AOR=3.65; 95% CI: 1.73 – 7.71; p=0.001) were significantly associated with non-adherence to recommended Medical Nutrition Therapy. Non-adherence to recommended Medical Nutritional Therapy (MNT) was also significantly associated with agreement to the fact that '*duration of time taken determines how serious the client takes the treatment*' (AOR=1.75; 95% CI: 1.09 – 2.82; p=0.020) and regular eating of food that is not prepared according to recommended diet (MNT) (OR=3.78; 95% CI: 1.29 – 11.08; p=0.016). The levels of non-adherence according to this study were high at 35.8%. Reasons for non-adherence were having a formal education, irregular visits to the diabetic clinic, eating food that was not prepared according recommended MNT while away from home, overstaying at the diabetes clinic and not having enough staff.

CHAPTER ONE

INTRODUCTION

1.1 Background Information

According to International Diabetes Federation (IDF) 425 million people had diabetes in 2017; by 2045 this will have risen to 629 million. The number of people with type 2 diabetes is increasing in every country. Most of them (80%) live in low-and middle-income countries. It has been estimated that 50% of the diabetes people aged 20-79 years are unaware of their condition and it was estimated to have caused 4. million deaths in 2017 in this age group. In Sub Saharan Africa 16 million adults are estimated to have diabetes. This number is expected to rise to 41 million by 2045(IDF 2017). An estimated 16 million adults aged 20-79 years have diabetes in Africa, representing a regional prevalence of 6%.

The highest prevalence of diabetes in Africa is between ages 55 and 64. Africa has the highest proportion of undiagnosed diabetes; over two-thirds (69.2%) of people with diabetes are unaware they have the disease. More than half (55.3%) of people with diabetes live in cities, even though the population in the region is predominantly (60.3%) rural. The highest prevalence of diabetes in Africa in adults from age 20-79 years is found in the island of Reunion (13.8%), followed by Comoros (11.9%) and the Seychelles (10.6%). Some of Africa's most populous countries have the highest numbers of people with diabetes, including Ethiopia (2.6 million), South Africa (1.8 million), Democratic Republic of Congo (1.7 million), and Nigeria (1.7 million) (IDF, 2017) About 45.1% of all adults aged 20-79 years with diabetes in the region live in these four countries.

Thus, strategies to mitigate both the human and economic burden are urgently needed. One of the strategies includes simple lifestyle interventions to further harness the effectiveness of the medical endeavors to eliminate Type 2 diabetes. According to

Fletcher et al. (2002), Genetic, environmental, and metabolic risk factors are interrelated and contribute to the development of type 2 diabetes mellitus. A strong family history of diabetes mellitus, age, obesity, and physical inactivity identify those individuals at highest risk. Women with a history of gestational diabetes as well as their children are at greater risk for progressing to type 2 diabetes mellitus. Insulin resistance increases a person's risk for developing impaired glucose tolerance and type 2 diabetes.

1.2 Statement of the Problem

In Kenya, the prevalence of diabetes in adults is estimated to be 4.56% according to IDF, amounting to almost 750,000 persons and 20,000 annual deaths. There is a disparity in distribution with an estimate of approximately 10.7% among urban and 2.7% among rural dwellers (Diabetes Atlas, 2014). This figure is likely to be an underestimation as over 60% of people diagnosed to have diabetes in Kenya usually present to the health care facility with seemingly unrelated complaints. As the prevalence of Diabetes mellitus is escalating, patients face an even greater threat from long term complications like foot, cardiovascular, eye, nerve and renal complications that are the hall mark of diabetes and its impact. Owing to poor glycemic control, a majority of patients referred for specialized end organ damage treatment at the national referred hospitals and outside the country are diabetes patients.

Interventions majorly focus on mitigating the risk factors that include; obesity, physical inactivity, and unhealthy diets. One of such interventions for unhealthy diet is Medical Nutrition Therapy (MNT) which aims at providing individualized diet for specified medical conditions, in this case to diabetes patients. It aims at preventing or reducing the complications associated with diabetes. The American Diabetes Association (ADA), 2010 clinical practice recommendations state that “individuals who have pre-diabetes or diabetes should receive individualized MNT as needed to achieve treatment goals, preferably provided by a registered dietitian familiar with the components of diabetes MNT.” (ADA, 2010). Furthermore, the ADA's position statement titled “Nutrition Recommendations and Interventions for Diabetes” emphasizes the importance of MNT

in preventing diabetes, managing existing diabetes, and preventing and slowing the onset of diabetes-related complications (Bantle *et al.*, 2008). The integration of MNT into diabetes care has the potential to improve patients' diabetes management and to lessen the burden on physicians to provide nutrition information.

Despite the fact that Medical Nutrition Therapy (MNT) plays a critical role in the management of diabetes, no study has been conducted to find out the factors affecting MNT among Type 2 Diabetes patients attending Diabetes Clinic at Kenyatta National Hospital. This study was therefore, carried out to find out the factors affecting MTN in order to champion for increased uptake of MTN.

1.3 Justification

Given the fact that the incidence of type 2 diabetes is increasing worldwide, The International Diabetes federation report showed that 425 million people had diabetes in 2017, with 16 million of those with diabetes living in Sub-Saharan Africa. This number is expected to rise to 629 million by the year 2045 (IDF, 2017). In Kenya, the prevalence of diabetes in adults is estimated to be 4.56% according to IDF, amounting to almost 750,000 persons and 20,000 annual deaths. There is a disparity in distribution with an estimate of approximately 10.7% among urban and 2.7% among rural dwellers (Diabetes Atlas, 2014).

Despite the much publicized awareness of the condition and associated complications, both care givers and patients face a number of challenges in bringing the disease under control. One of the ways of controlling diabetes is Medical Nutrition Therapy (MNT) which is a therapeutic approach to treating medical conditions and their associated symptoms via the use of a specifically tailored diet devised and monitored by a dietician. The diet is based upon the patient's medical and psychosocial history, physical examination and dietary history.

The role of MNT is to reduce the risk of developing complications in pre-existing conditions such as diabetes as well as ameliorate the effects of any existing conditions such as high cholesterol. Many medical conditions either develop or are made worse by an improper or unhealthy diet (Copperman & Jacobson, 2003).

In the management of Diabetes in Kenya, MTN has not been much utilized despite the fact that it has been found to control the condition and the many complications associated with it. The study has provided an insight into the socio-economic and demographic factors affecting uptake of MNT, improved the understanding about patient related factors affecting MNT attitudes towards lifestyle changes and also promoted coherence between the goal and objectives of professional care givers and those of patients. Because there is scanty data available in Kenya on the effectiveness of MNT, findings from the study will go a long way in enhancing the management of diabetes.

1.4 Research Questions

- i) What is the effect of socio-economic and demographic factors on adherence to MNT by Type 2 Diabetes patients attending the Diabetes Clinic at Kenyatta National Hospital.?
- ii) What are the patient related factors affecting Medical Nutrition Therapy among Type 2 patients attending the Diabetes Clinic at Kenyatta National Hospital?
- iii) What are the Diabetic Clinic related factors affecting adherence to MNT by Type 2 Diabetes patients attending the Diabetes Clinic at Kenyatta National Hospital?

1.5 Null Hypotheses

- i. Socio-economic and demographic factors have no effect on adherence to MNT by Type 2 Diabetes patients attending clinic the Diabetes Clinic at KNH.
- ii. Patient related factors have no effect on the adherence to MNT by Type 2 Diabetes patients attending the Diabetes Clinic at KNH.

- iii. Diabetes Clinic related factors have no effect on adherence to MNT by Type 2 Diabetes patients attending the Diabetes Clinic at KHN.

1.6 Objectives

1.6.1 General objective

The objective of this study was, to assess factors affecting MNT among type 2 diabetes patients attending diabetes clinic at Kenyatta National Hospital.

1.6.2 Specific objectives

The specific objectives of the study were;

- i. To determine the effect of socio-economic and demographic factors on adherence to MNT by Type 2 Diabetes patients.
- ii. To determine patient related factors affecting Medical Nutrition Therapy among Type 2 Diabetes patients.
- iii. To determine Diabetes clinic related factors affecting adherence to MNT by Type 2 Diabetes patients.

1.7 Scope of the study

The study was limited to the Diabetes Clinic at the Kenyatta National Hospital, Nairobi County.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Inappropriate weight gain leading to obesity is one of the major risk factors for type 2 diabetes and risk of the disease increase steadily with increasing body mass index – BMI (IDF Diabetes Atlas, 2006). In Western countries, around 90% of type 2 diabetes mellitus cases are attributable to overweight (IDF Diabetes Atlas, 2006). Evidence suggest that obesity (especially central obesity), physical inactivity, high fat diet, diet rich in saturated fatty acids, low intake of dietary fibers, low glycaemic carbohydrates, and whole grain cereals increases the risk of type 2 diabetes (Uusitupa, 2002; Bazzano *et al.*, 2005). Similarly, individuals with a diet at the highest level of the glycaemic index or glycaemic load are more likely to develop type 2 diabetes mellitus than those at the lowest levels (Bazzano *et al.*, 2005). These factors are potentially reversible with strict adherence to lifestyle modification recommendations.

However, modest weight reduction through dietary improvement and gentle aerobic exercise can substantially reduce the development of type 2 diabetes, if not prevent it completely; among at risk populations i.e. those with impaired glucose tolerance and impaired fasting glucose, and that weight loss (for overweight people) can substantially reverse type 2 diabetic state (Thent *et al.*, 2013). This intervention also prevents and/or delays the development of associated complications amongst individuals with diagnosed type 2 diabetes. The Diabetes Prevention Programme Research (DPPR) Group (2002) has convincingly demonstrated that modest weight loss and increased physical activity (for example, brisk walking 3 hours per week) would significantly reduce the proportion of individuals with impaired glucose tolerance developing type 2 diabetes.

There is a close association between obesity and type 2 diabetes. The likelihood and severity of type 2 diabetes are closely linked with body mass index (BMI). There is a

seven times greater risk of diabetes in obese people compared to those of healthy weight, with a threefold increase in risk for overweight people (Abdullah *et al.*, 2010), hence healthy dietary habits and increase physical activity do play a tremendous role in the prevention and management of type 2 diabetes. Engaging in regular physical activity is known to improve glucose, blood pressure, and lipid abnormalities that serve as the principal risk factors for the associated microvascular and macrovascular complications of diabetes (Boule *et al.*, 2001; Nazimek-Siewniak *et al.*, 2002). Encouraging more physical activity among patients with type 2 diabetes is a known standard of practice and should be part of routine patient education programs in all primary care settings across the globe, but requires an understanding of individual exercise preference(s) and potential barriers.

2.2 Prevalence of Type 2 Diabetes Mellitus

According to International Diabetes Federation (IDF) 425 million people had diabetes in 2017; by 2045 this will have risen to 629 million. The number of people with type 2 diabetes is increasing in every country. Most of them (80%) live in low-and middle-income countries. It has been estimated that 50% of the diabetes people aged 20-79 years are unaware of their condition and it was estimated to have caused 4. million deaths in 2017 in this age group. In Sub Saharan Africa 16 million adults are estimated to have diabetes. This number is expected to rise to 41 million by 2045(IDF 2017). An estimated 16 million adults aged 20-79 years have diabetes in Africa, representing a regional prevalence of 6%.

The highest prevalence of diabetes in Africa is between ages 55 and 64. Africa has the highest proportion of undiagnosed diabetes; over two-thirds (69.2%) of people with diabetes are unaware they have the disease. More than half (55.3%) of people with diabetes live in cities, even though the population in the region is predominantly (60.3%) rural. The highest prevalence of diabetes in Africa in adults from age 20-79 years is found in the island of Reunion (13.8%), followed by Comoros (11.9%) and the Seychelles (10.6%). Some of Africa's most populous countries have the highest numbers

of people with diabetes, including Ethiopia (2.6 million), South Africa (1.8 million), Democratic Republic of Congo (1.7 million), and Nigeria (1.7 million) (IDF 2017) About 45.1% of all adults aged 20-79 years with diabetes in the region live in these four countries.

2.3 Complications of Diabetes Mellitus

The symptoms of diabetes most times are insidious because insulin production decreases over time. They include; polyuria, increased thirst and nocturia due to hyperglycaemia as well as fatigue due to inability to use glucose as a source of energy. These symptoms are sometimes accompanied by a rapid, unhealthy weight loss due to protein and fat breakdown as alternative sources of energy. Some patients may experience blurred vision while others may experience infections (candidiasis and urinary tract infections)

Persistent elevations of blood glucose may lead to long term complications that include macrovascular damage (e.g. ischemic heart disease, stroke, and amputation), and microvascular damage. Microvascular damage may lead to diabetic nephropathy, diabetic retinopathy, diabetic neuropathy and sexual dysfunction. However, short-term complications include hypoglycemia, hyperglycemia, superinfection and diabetic ketoacidosis. The rate of developing heart disease and stroke among diabetic patients is 2 to 4 times higher than that of general population (non-diabetic groups), possibly due to the unstable atherosclerosis. Cardiovascular disease is the leading cause of death among patients with diabetes, and both diseases share similar risk factors namely; unhealthy dietary habits, sedentary lifestyle and smoking (Welschen *et al.*, 2007). Although, a few diabetic patients die from acute metabolic complications (ketoacidosis and hypoglycemia), the major problem is the excess mortality and serious morbidity suffered as a result of the long-term complications of diabetes, the factors associated with these are duration of diabetes, early age at onset of diabetes, high glycosylated hemoglobin (HbA1c).

Overall cardiovascular disease (CVD) is the most significant cause of death in the diabetic population (Einarson *et al.*, 2018; 2005; Otieno *et al.*, 2003). Among persons with diabetes, part of the increased likelihood of cardiovascular disease seems to be a consequence of the increased frequency of such risk factors as hypertension, high lipids in the blood, and physical inactivity. Diabetic retinopathy is a leading cause of adult blindness. Diabetics are six times more prone to cataracts and 1.4 times more susceptible to open-angle glaucoma when compared to the general population (Mash *et al.*, 2007) Diabetic neuropathy may present with no symptoms or pain, sensory loss, weakness, or autonomic dysfunction.

A study conducted at Kenyatta National Hospital showed that foot ulcers was found to be a significant complication (Nyamu *et al.*, 2003). The risk factors attributed to the ulcers were poor glycemic control, diastolic hypertension, infection, dyslipidemia, and poor self-care, which are modifiable and manageable. Diabetic ketoacidosis (DKA) develops when absolute insulin deficiency and an absolute increase in contra-insulin hormones, increasing hepatic glucose production, decreasing peripheral glucose utilization, and stimulating release of fatty acids from fat cells and production of ketones by the liver are present (Mbugua *et al.*, 2005).

Another study conducted at Kenyatta National Hospital found that diabetic ketoacidosis occurred in 8% of the hospitalized diabetic patients, and almost 29.8% of the patients died within 48 hours of presentation (Mbugua *et al.*, 2005). A study in Tanzania, Kenya's southern neighbor, showed that 50% of the deaths in the patients requiring insulin were due to diabetic ketoacidosis. It has been shown that the complications and associated morbidity, as well as mortality, can be lowered by strict glycemic control (Otieno *et al.*, 2003) In Africa, infection and acute metabolic complications have been reported as the most common causes of death in the diabetic population, in contrast to Western countries where renal and cardiovascular complications are considered to be the common causes.

2.4 Management of diabetes and quality of care

In the past, numerous guidelines and standards have been issued to manage diabetes in an outpatient setting. Both the American Diabetes Association (ADA) and the American College of Endocrinology (ACE) recommend critically ill patients keep their glucose levels as close to 110 mg/dL (6.1 mMol/L) as possible. In the none critically ill patients, The ADA recommends to keep pre-meal blood glucose as close to 90 to 130 mg/dL (5-7 mMol/L). Recent evidence has also led the Joint Commission on Accreditation of Healthcare Organizations to develop standards for voluntary certification in the management of the patient with diabetes in the inpatient setting. It is also important that food and nutrition professionals familiarize themselves with these recommendations and implement nutrition interventions in collaboration with other members of the health care team to achieve these new glycemic controls. Food and nutrition professionals have a key role in developing screening tools, and in implementing nutrition care guidelines, nutrition interventions, and medical treatment protocols needed for inpatient glycemic control (Boucher, 2007). According to the report card on diabetes care published by the Centers for Disease Control and Prevention in 2004, millions of diabetes patients are not receiving optimal care. 18% of diabetes patients aged 18 and 75 had poor glycemic control and 34% had a high blood pressure.

2.5 Evidence based prevention

Given the complexities of large scale nutritional intervention studies which are required to produce such clinical endpoints as low glucose hemoglobin among others, it is often necessary to base recommendations on surrogate endpoints (Mann, 2006). Surrogate endpoints relevant to diabetes and which are used in nutrition studies involving people with diabetes include fasting plasma glucose, body weight, BMI, total cholesterol, insulin sensitivity and renal functions e.g. the glomerular filtration rate. These are also in line with the benchmarks identified by standards for diabetes care and Diabetes Quality Improvement Program (DQIP) in assessing the quality of diabetes care.

A number of studies have shown the benefit of healthy dietary habits and regular exercise in the prevention and management of type 2 diabetes mellitus (Knowler *et al.*, 2002; Diabetes Prevention Research group, 2002; Harris *et al.*, 2003) Adherence to prescribed lifestyle changes have also been shown to improve glucose levels, to lead to decreased blood pressure and to correct lipid abnormalities which are factors associated with the micro and macro-vascular complications of diabetes

Since most community assessments involve some population based data, morbidity and mortality cases due to diabetes and associated complications become one of the key areas that have elicited the interests of many healthcare institutions and support groups. The American Diabetic Association has over the years given out nutrition guidelines that are evidence based. The implementation part lies mostly on the patients or those who are at risk.

The nutrition recommendations are meant to delay the onset of diabetes for those at risk or reduce the severity of the symptoms of those who have already been diagnosed with the disease. In a study of the evaluating the effects of a brief computer assisted diabetes self-management intervention on the dietary, biological and quality of life outcomes, (Glasgow, 2005), there is need for more broad based practical and efficient diabetes self-management interventions that can lead to changes in lifestyle behavior changes such as eating behavior and physical exercise which are predisposing factors for diabetes. In this study computer aided interventions were evaluated using comparisons. One group of diabetes primary care patients were randomized to social cognitive theory based tailored self-management or computer aided enhanced usual care. Intervention consisted of computer assisted self-management assessment and feedback, tailored goal setting, barrier identification, and problem solving, followed by health counselor interaction and follow up calls. Outcomes were changes in dietary behaviors (levels of fat and vegetable intake), hemoglobin, lipids, weight, quality of life, and depression levels. The results showed that the patients reduce their fat intake and reduced weight significantly at the end of the two-month follow-up. This low-intensity intervention was well implemented and appealed to a relatively large representative sample thus producing the desired end-

points. Further research into the reasons that made part of the group under the study not to conform to the intervention methods, are some of the key questions that were raised so that future behavior change efforts are geared in such a manner to produce significant results.

The gap between current medical knowledge and its applications in chronic disease management is especially apparent in diabetic care. Although research over the last decade has shown that adherence to standards of care can prevent or delay the onset of devastating diabetic complications, little more than one-third of patients achieve adequate glycemic control (Nobel, 2006).

2.6 Medical Nutrition Therapy

MNT is defined as “nutritional diagnostic, therapy, and counseling services for the purpose of disease management, which are furnished by a registered dietitian (RD) or nutrition professional” (U.S. Department of Health and Human Services, 2001). The American Dietetic Association, the professional organization of registered dietitians (RDs), defines the nutrition counseling component of MNT as “a supportive process to set priorities, establish goals, and create individualized action plans which acknowledge and foster responsibility for self-care.” (American Dietetic Association).

In general, MNT consists of multiple, one-on-one sessions between an RD and a patient, in which the RD performs the nutrition assessment, diagnosis, counseling, and other therapy services according to the American Dietetic Association's “MNT Evidence-Based Guide for Practice/Nutrition Protocol” or according to the best available current evidence in the nutrition community (American Dietetic Association). After an RD receives a referral from a physician, the framework of counseling is standardized and documented as part of the American Dietetic Association's Nutrition Care Process (nutrition assessment, nutrition diagnosis, nutrition intervention, nutrition monitoring, and evaluation). (Lacey & Pritchett, 2003). Because of the direct correlation between diet and diabetes management, medical nutrition therapy (MNT) provided by a

registered dietitian is a key complement to traditional medical interventions in diabetes treatment.

The link between diabetes and diet has been well documented, as has the importance of diet in conjunction with medical interventions for diabetes. Patients often look to their primary care physicians for advice about general diabetes care, including diet, but survey studies have revealed that doctors feel uncomfortable advising patients on the sensitive issues of weight loss and diet (Gans *et al.*, 2003). Research is increasingly demonstrating that medical nutrition therapy (MNT), administered by a registered dietitian (RD) or nutrition professional, is a key component of diabetes management and a complement to treatment of diabetes by physicians.

The American Diabetes Association (ADA) (2010) clinical practice recommendations state that “individuals who have pre-diabetes or diabetes should receive individualized MNT as needed to achieve treatment goals, preferably provided by a registered dietitian familiar with the components of diabetes MNT (American Diabetes Association, 2010). Furthermore, the ADA's position statement titled “Nutrition Recommendations and Interventions for Diabetes” emphasizes the importance of MNT in preventing diabetes, managing existing diabetes, and preventing and slowing the onset of diabetes-related complications (Bantle *et al.*, 2008). The integration of MNT into diabetes care has the potential to improve patients' diabetes management and to lessen the burden on physicians to provide nutrition information.

The components of MNT provided by an RD, according to the Nutrition Care Process for any nutrition-related disease (not just diabetes), are; 1) Nutrition screening/referral 2) Nutrition assessment 3) Nutrition diagnosis 4) Nutrition intervention 5) Nutrition monitoring and evaluation 6) Nutrition documentation (supports all steps in nutrition care process) and 7) Outcome management systems (Daly *et al.*, 2009). Initially, the dietitian performs a nutrition assessment of the patient's dietary patterns. This assessment, in conjunction with information about laboratory testing, medications, and any other conditions that the Registered Dietician (RD) would have received with the

physician referral, allows the RD to evaluate such factors as the patient's macronutrient needs versus intake, the consistency of meals, the amount and consistency of carbohydrate intake, and the general quality of the patient's diet. The RD can then issue a coded, standardized nutrition diagnosis and tailor future individual counseling to help the patient meet goals related to the diagnosis and nutrition needs.

As an example, after reviewing a patient's physician referral information and dietary patterns, a Registered Dietitian (RD) might issue the following diagnostic statement: "Inconsistent carbohydrate intake related to inadequate meal planning as evidenced by meals and snacks containing a range from 0 to 150 g of carbohydrates on a daily basis." The nutrition intervention for this diagnostic statement might consist of the RD teaching the patient to plan meals and carbohydrate intake using the diabetes plate model or the carbohydrate exchange methods, helping the patient set goals related to consistent intake, and then using motivational interviewing or problem solving to address any barriers the patient has to meeting nutritional goals (Diabetes care and Education Dietetic Practice Group, 2005).

2.6.1 Medical Nutrition Therapy for Diabetes Mellitus patients

As part of nutrition monitoring and evaluation, registered dietitians (RD) monitors biochemical factors such as glycosylated hemoglobin (A1C) and serum lipid levels, as well as lifestyle factors such as dietary intake among diabetes patients. Depending on how many sessions the RD has with the patient, these factors are used to evaluate the effectiveness of interventions in meeting goals. Diagnoses and interventions might then be revised based on nutrition-related outcomes. Therefore, MNT for nutrition-related disorders such as diabetes is not necessarily a linear process. Counseling in MNT is individualized and tailored to a patient's clinical and lifestyle needs.

MNT is not synonymous with diabetes self-management training (DSMT). DSMT is an education and training program that helps patients manage their diabetes, whereas MNT

consists of more individualized diagnosis, therapy, and counseling related to nutrition (Daly *et al.*, 2009)

According to the American Dietetic Association's (2009) White Paper on Nutrition Services that distinguishes between the delivery of DSMT and MNT services, the DSMT curriculum that is accredited by Medicare consists of 1 hour of individualized assessment and 9 hours of group classes (Daly *et al.*, 2009). One of the content areas outlined in the DSMT curriculum is “incorporating nutritional management into lifestyle,” but others are less nutrition related, such as “using medications safely and for maximum therapeutic effectiveness” (Daly *et al.*, 2009).

MNT for patients with diabetes is administered in several sessions with an RD, who provides “more intensive nutrition counseling and a therapy regimen that relies heavily on follow-up and feedback to assist patients with changing their behavior(s) over time” (Daly *et al.*, 2009). Furthermore, although MNT for diabetes patients can be administered only by a licensed/certified RD or nutrition professional, DSMT can be administered by a registered nurse, dietitian, or pharmacist (Daly *et al.*, 2009). Sometimes it may be most helpful for patients to receive DSMT first, followed by MNT. Other patients may receive DSMT and MNT simultaneously.

2.6.2 Effectiveness of Medical Nutrition Therapy in Diabetes Treatment and Prevention

Research has shown MNT to be effective for the treatment of both Type 1 and Type 2 diabetes. The American Dietetic Association reviewed 18 studies that involved the provision of MNT by an RD as part of treatment for either Type 1 or Type 2 diabetes. Of the 18 studies, all 8 of the randomized controlled trials reviewed demonstrated a positive effect of MNT in diabetes management, measured by improvement in A1C levels (Diabetes 1 and 2 evidence analysis project, 2009). Based on this review, the American Dietetic Association reports strong support for the effectiveness of MNT provided by RDs in the management of Type 1 and Type 2 diabetes and suggests that MNT has the

greatest potential for impact when diabetes is first diagnosed (Diabetes 1 and 2 Evidence Analysis Project, 2009).

Several studies in which MNT was included in diabetes treatment interventions showed that MNT successfully affected metabolic and behavioral outcomes (ADA, 2010). The studies varied in design and length (from 3 months to 9 years), and some were conducted before MNT for diabetes was as well defined as it is today. However, all studies listed implemented at least one study group that received individual counseling from an RD, with number of sessions ranging from two total sessions to monthly sessions for 6 months or more. These studies reported improvements in A1C ranging from 0.9 to 1.9% for groups receiving MNT and generally reported a greater improvement in A1C when compared to study groups that received less intensive or basic nutrition education (Pastors *et al.*, 2002). In general, Pastors *et al.*, summarize that “randomized controlled nutrition therapy outcome studies have documented decreases in A1C of ~1% in newly diagnosed type 1 diabetes, 2% in newly diagnosed type 2 diabetes, and 1% in type 2 diabetes with an average duration of 4 years” (Pastors *et al.*, 2002).

MNT has also been shown to be effective in the prevention of type 2 diabetes. Although the onset of type 1 diabetes is not considered to be preventable, the onset of Type 2 diabetes can be delayed or prevented with lifestyle modifications, including changes to diet. Based on its review of seven studies that implemented nutrition therapy and 16 studies that implemented intensive lifestyle interventions including nutrition therapy, the American Dietetic Association concluded that MNT is “effective at reducing the incidence of Type 2 diabetes” (Diabetes 1 and 2 Evidence Analysis Project, 2009).

The same review concluded that pharmacotherapy is also effective at reducing incidence of type 2 diabetes, but stated that in all but one of seven studies reviewed; lifestyle interventions were more effective than pharmacotherapy at reducing incidence (Diabetes 1 and 2 Evidence Analysis Project, 2009). Regarding pharmacotherapy, it should be noted that although the ADA clinical practice recommendations do endorse the use of

medications to treat certain complications of diabetes, they also endorse MNT and lifestyle changes as alternatives and complements to pharmacotherapy (Gans *et al.*, 2003).

A notable prevention study is the Diabetes Prevention Program, reported in 2002 (Daly *et al.*, 2009). In this randomized, controlled trial of 1,079 participants aged 25-84 years, a 58% reduction in incidence of diabetes over 3 years was reported in subjects treated with an intensive lifestyle intervention that included MNT.

Based on the results of this prevention intervention, the Look AHEAD (Action for Health in Diabetes) study was conducted to test the effects of similar lifestyle interventions in the treatment of 5,145 men and women who have already been diagnosed with type 2 diabetes (Wadden *et al.*, 2006). Although this trial was planned to extend for 11.5 years, the researchers' published 1-year results reported that the intensive lifestyle intervention group lost 8.6% of initial weight compared to 0.7% in the control group (Wadden *et al.*, 2006).

The intensive lifestyle intervention included comprehensive diet counseling from an RD, whereas the control group received basic, or “usual,” care for diabetes. The experimental group also had significantly greater decreases in A1C, systolic and diastolic blood pressure, and triglyceride levels in the first year, compared to the control group. (Wadden *et al.*, 2006)

2.6.3 Barriers to Medical Nutrition Therapy in Diabetes Management

Serour *et al.* (2007) reported that understanding the barriers to adherence to lifestyle changes can help family physicians to plan and implement more intensive interventions to assist patients facing the long-term task of achieving beneficial lifestyle changes. Non-adherent patients may be experiencing some sort of barriers to adhering to the recommended lifestyle modifications as part of the interventions in managing chronic diseases including type 2 diabetes mellitus. The barriers may include lack of

communicative relationship between the patient and health care providers, lack of psychosocial and emotional supports, health beliefs and perceptions that are incompatible with the recommendations, socio-economic factors, and stressful environment

Factors influencing diet adherence may include frequent gatherings with extended families and friends; whereby patients consume more fat, meat, sugar, rice and wheat flour than usual pattern, and over-dependent on fast meals. Climatic conditions like dry desert with intensely hot summers and brief, cool winters may also discourage patients from adhering to the recommended physical activity (Serour *et al.*, 2007). Botswana's climate is like that of dry desert with about 2-3 months of intense and cool winter, which may discourage individuals from engaging in preventive and therapeutic exercise recommendations. Serour *et al.* (2007) identified the following as barriers to adherence to diet- unwillingness (48.6%); difficulty in following a diet regimen different from that of the rest of the family (30.2%); high frequency of social gatherings (13.7%); no advice given by health care providers (4.2%); workload (3.3%) and other causes (6.9%). Similarly, barriers to adherence to regular exercise include lack of time - always being busy (39.0%); coexisting disease-mainly osteoarthritis and asthma (35.6%); intensely hot summer whether (27.8%); lack of exercise partner (3.7%); cultural difficulties for Kuwait's women (3.7%); and other causes (2.8%) (Serour *et al.*, 2007). While overall factors influencing adherence to lifestyle measures (both diet and exercise) are; traditional Kuwaiti food, which is high in fat and calories (79.9%); stress (70.7%); a high consumption of fast food (54.5%); high frequency of social gatherings (59.6%); abundance of maids (54.1%), and excessive use of cars (83.8%).

Ganiyu *et al.* (2013) study, the reasons given for non-adherence to diet recommendations were poor self-discipline (63.4%; 95% CI, 53.6–72.2), lack of information on a healthy diet (33.3%; 95% CI, 24.0–42.2), eating out, e.g. in restaurants (31.7%; 95% CI, 23.03–40.97) and financial constraints in accessing the diet recommended by health care practitioners (28.8%; 95% CI, 20.3–37.7). The reason least mentioned was their home situation – ingesting unhealthy diets when alone (6.7%; 95%

CI, 2.1–11.9). From the same study, Fifty-two percent did not exercise regularly, because of a lack of information about the benefit of exercise and how it should be done (65.7%; 95% CI, 56.1–75.0), the notion that exercise exacerbated diabetes mellitus (57.6%; 95% CI, 48.5–67.5), lack of an exercise partner (24%; 95% CI, 15.8–32.2), going from home, e.g. to cattle posts, on official trips, or to other areas (18%; 95% CI, 10.6–25.4), and extreme weather conditions (very cold winters and very hot summers) (15.4%; 95% CI, 8.1–21.8). The least mentioned reason for not adhering to exercise was criticism by others (friends and family members) (1.9%; 95% CI, -0.69–4.69), with the confidence interval crossing the line of no difference (1.00).

Results from a study by Wens *et al.* (2005) suggest patient's deficient knowledge and diabetes; lack of communication skills by the attending physician; lack of multidisciplinary support; over-reliance on modern/alternative medicine; fear of social isolation; minimizing of the disease i.e. patients underestimating diabetic conditions; opposition to change; and lack of patient's motivations as some of the barriers to treatment adherence including therapeutic diets and exercise in people living with type 2 diabetes. Patient's knowledge; attitude towards diabetic conditions; ideas; belief and experiences; as well as those of family members and friends; have also been shown to correlate with adherence (Wens *et al.*, 2005). However, scheduled consultations based on patient-centeredness; multi-disciplinary teamwork; shared decision making based on patient's participation and partnership; and motivational counseling have been proven to encourage better adherence to treatment including diets and exercise in people with type 2 diabetes (Wens *et al.*, 2005).

In another study by Thomas *et al.*, (2004), the main factors influencing physical activity include lack of confidence- 60%; poor weather-56%; tiredness-54%; other plans with friends-50%; lack of local facilities-26%; lack of spare time-25%; cost of exercise-23%; associated serious illness-20%; changing job-9%; having children-4%; lack of exercise partner; distraction by good television programmes; and fear of hypoglycemia. Patient's knowledge; attitude towards diabetic conditions; ideas; belief and experiences; as well as those of family members and friends; have also been shown to correlate with adherence

(Wens *et al.*, 2005). However, scheduled consultations based on patient-centeredness; multi-disciplinary teamwork; shared decision making based on patient's participation and partnership; and motivational counseling have been proven to encourage better adherence to treatment including diets and exercise in people with type 2 diabetes (Wens *et al.*, 2005). Adherence level is directly proportional to the degree of patient's attitude, for example, patient with more adherence levels had more favorable attitudes toward diabetes

Hudon *et al.* (2008) shows that levels of physical activity are lower among low income earners; low socioeconomic status, low educational status; decrease with age; and among people with functional incapacities. Finally, physical activity is directly related to psychological distress perceived health status and employment (Hudon *et al.*, 2008).

Wadden *et al.* (2006) demonstrates lack of self-monitoring; injuries from physical activity; on-going medical problems i.e. concurrent medical and surgical illness; and emotional or psychiatric problems as reasons for not adhering to therapeutic lifestyle interventions. However, counseling using cognitive re-structuring and motivational interviewing techniques based on inter-disciplinary approach may help people with type 2 diabetes mellitus to cope with exercise and dietary recommendations. Similarly, patient non-adherence can be changed by improving diabetic education, perception, motivation and self-management.

2.7 Conceptual Framework

Understanding the barriers to adherence to lifestyle changes can help family physicians to plan and implement more intensive interventions to assist patients facing the long-term task of achieving beneficial lifestyle changes (Serour *et al.*, 2007). Non-adherent patients may be experiencing some sort of barriers to adhering to the recommended lifestyle modifications as part of the interventions in managing chronic diseases including type 2 diabetes mellitus.

The barriers may include lack of communicative relationship between the patient and health care providers, lack of psychosocial and emotional supports, health beliefs and perceptions that are incompatible with the recommendations, socio-economic factors, frequent gatherings, unwillingness no advice given by healthcare providers, eating out, financial constraints and patient attitude (Serours *et al.*, 2007; Wens *et al.*, 2005; Ganiyu *et al.*, 2003)

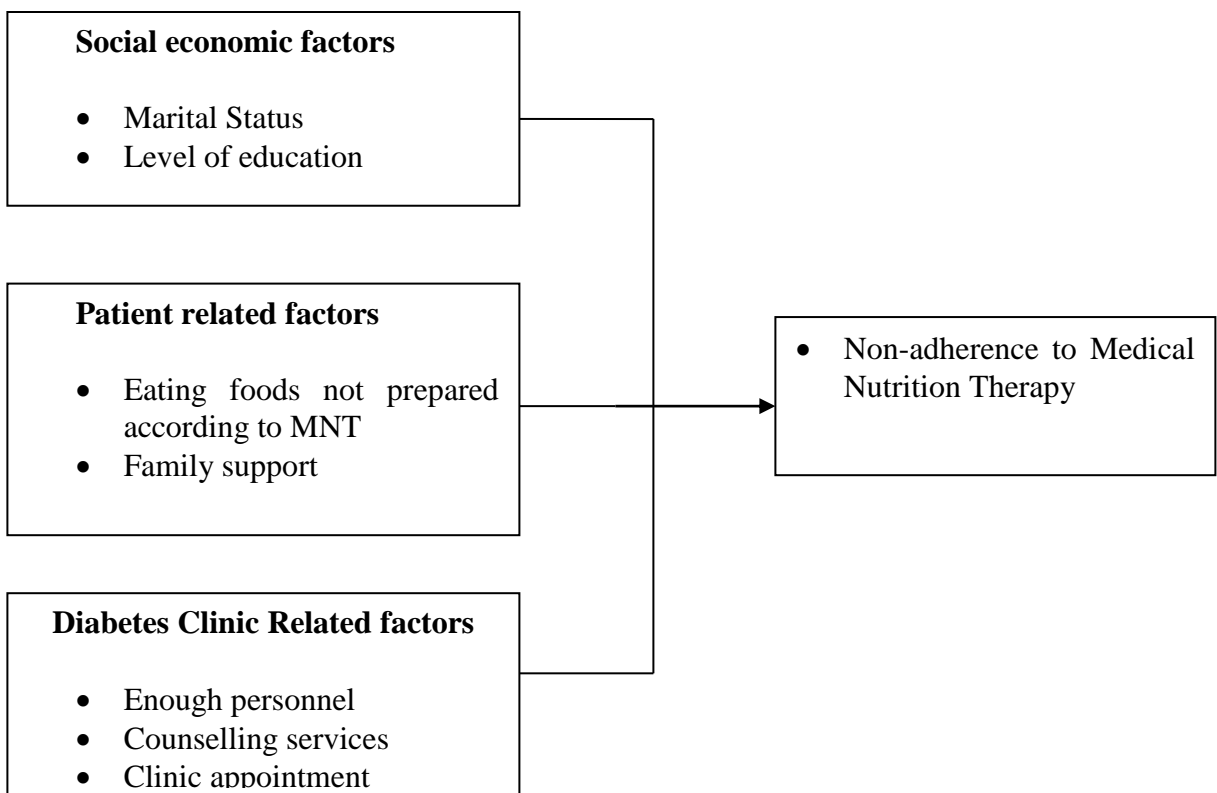


Figure 2.1: Conceptual framework on factors affecting medical nutrition therapy among type 2 diabetes patients at Kenyatta National Hospital, Nairobi Kenya.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Study Design

The study was a facility based descriptive cross-sectional study which recruited diabetes patients attending the Kenyatta National Hospital Diabetes Clinic as well as Professional Healthcare providers attending to these patients. The study sought to establish the factors affecting uptake of Medical Nutrition Therapy from these two groups.

3.2 Study site

The study was conducted at Kenyatta National Hospital located in Nairobi City, the capital city of Kenya (Appendix ix). It is the largest public health facility in the country and is also a national referral hospital. The Hospital was chosen for the study because it has a mini diabetes clinic which runs from Monday to Thursday with a major (consultant) clinic on Friday. The facility serves as a teaching centre for University of Nairobi medical students (undergraduate and post graduate). It also serves patients referred from different parts of the country. It hence had sufficient number of patients to get the required sample size while at the same time it has all levels of professional healthcare providers (consultants, clinical officers, nutritionist and nurses) who were instrumental as key informants in this study.

3.3 Study population

The study population were patients with Type 2 diabetes patients who had been attending the diabetes clinic at Kenyatta National Hospital for more than three months (time sufficient enough to offer them Medical Nutrition Therapy). Health care professionals attending to the Type 2 diabetes patients at the diabetes clinic were also recruited into the study.

3.3.1 Inclusion criteria

- i. Type 2 Diabetes patients attending Diabetes clinic at Kenyatta National Hospital.
- ii. Type 2 Diabetes patients who had been attending the clinic for 3 or more months. (3 months is the minimum time to measure glycosylated hemoglobin and recruit the patients as per this study)
- iii. Type 2 Diabetes patients who gave informed consent.
- iv. Healthcare professionals (Doctors, Nutritionists, Clinical officers and Nurses) who attended to Type 2 diabetes patients at Kenyatta National Hospital and who accepted to take part in the study.

3.4 Sampling and sample size

Systematic sampling technique was employed where a total of 422 patients were recruited from among those attending the diabetes clinic at KNH. Additionally, seven professional healthcare providers who attended to these patients including physician, Nurse, clinician and Nutritionist were purposively recruited

Sample size determination

Being a Cross-sectional study, Fisher et al (1998) formula was used to determine the sample size of the patients to be included in the study;

$$n = \frac{Z^2_{1-\alpha/2} P (1-P)}{d^2}$$

Where; n = minimum sample size required

α = Level of significance (0.05)

p= uptake to medical nutritional therapy by Type 2 diabetes patients. Because the level of uptake is not known, this is assumed to be 50%

d =Absolute precision (5%)

$Z_{1-\alpha/2}$ =Standard normal deviate at 95% CI (1.96)

$n=384$

10% of 384 was added on the minimum sample size to account for respondent biasness, bringing the sample population to 422.

Sampling procedure

Systematic sampling technique was employed to select patients from Kenyatta National Hospital diabetes clinic, where every 3rd patient was selected for the interview. An estimate of daily turnover of clients was determined from the hospital management in order to calculate the expected total number of patients to be accessed within the study duration (sampling frame). From the information gathered from the hospital management, the clinic runs for 5 working days each week (Monday to Friday). On average the clinic served 24 clients in a day from Monday to Thursday (mini-clinic days). Friday is usually an open day clinic where the number went up to 70 patients.

Hence there was a total of 166 patients attending the clinic in one week. On each day of the interview, the first client was randomly selected. Every 3rd client thereafter was selected to fill the questionnaire. If they consented, they filled the questionnaire with the help of trained research assistants. This went on until all the planned 422 patients were interviewed.

3.5 Data Collection Methods

Questionnaires and key informant interview schedules were used to collect quantitative and qualitative data, respectively. The questionnaire was divided into sections (socio-demographic factors, therapy related factors and patient related factors) that helped bring out factors affecting uptake of MNT from the patient's perspective. (Appendix II).

The questionnaires were administered by the researcher and 2 trained research assistants. For the interview schedules, health care professionals (consultant doctors, clinical officers, nurse and nutritionist) who attend to Type 2 Diabetes patients constituted the sampling frame. They were interviewed using an interview guide (Appendix III) and the interview went on till the researcher could not any new information. A total of 7 health care professionals (2 consultant doctors, 3 clinical officers, 1 nurse and 1 nutritionist) were interviewed.

3.6 Data Management and Analysis

3.6.1 Data Management

Quantitative data from the field was captured through questionnaires administered by the researcher and 3 trained research assistants. It was coded and double entered into a computer database designed using MS-Access application. Data cleaning and validation was performed using EPI Info in order to achieve a clean dataset that was then exported into a Statistical Package format (SPSS). The data were analyzed using bivariate and multivariate logistic regression. The degree of association between dependent and independent variables was assessed using the adjusted odds ratio with a 95% confidence interval and variables with p-value ≤ 0.05 were considered significant.

3.6.2 Data analysis

Quantitative data analysis was conducted using SPSS statistical software. Exploratory data techniques were used at the initial stage of analysis to uncover the structure of data and identify outliers or unusual entered values.

Univariate analysis: Descriptive statistics was used to summarize categorical variables while measures of central tendency was used for continuous variables.

Bivariate Analysis: Pearson's Chi-square test or Fisher Exact Test was performed to test for the strength of association between categorical variables. All exposure variables (Independent factors) were associated with the dependent variable (*uptake of medical nutritional therapy*) to determine which ones had significant association. Odds Ratio (OR) and 95% Confidence Interval (CI) was used to estimate the strength of association between independent variables and the dependent variable. The threshold for statistical significance was set at $p < 0.05$.

Multivariate Analysis: All independent variables identified to significantly associate with '*medical nutritional therapy*' at bivariate analysis were considered together in a Multivariate analysis. This was performed using Binary logistic regression where backward conditional method was specified in order to identify confounders and/or effect modifiers. Adjusted odds Ratios (AOR) together with their respective 95% Confidence Interval (CI) were used to estimate the strength of association between the retained independent predictors of '*uptake of medical nutritional therapy*'.

Qualitative data was captured through interview schedules with key informants. The responses were then transcribed and stored in word format before they were then analysed according to themes.

3.7 Ethical Considerations

Permission to conduct the study was sought from the KEMRI Ethical Clearance Committee; Protocol SSC no 2231- (Appendix 6) and National Ethical committee (Ref: KNH-ERC/A/327) because the research was to be carried out at Kenyatta National Hospital (Appendix VII). Professional healthcare providers' and patients', consent was sought first and they were free to withdraw at any stage of the study (Appendix 3). Confidentiality was maintained during the interview and to maintain the same the questionnaires and schedule interviews were coded.

CHAPTER FOUR

RESULTS

4.1 Characteristics of the study respondents

4.1.1 Demographic characteristics of the study participants

A total of 422 patients completed the study. Table 4.1 presents demographic characteristics of the study respondents. The proportion of female respondents (55.9%) was slightly higher compared to that of males. Close to half of the respondents (47.9%) were aged between 40 - 59 years, with the lowest proportion aged less than 30 years (4.5%). Majority of the respondents (74.4%) were married, with lowest proportion separated or divorced (3.1%). Most of the respondents were businessmen or women (33.6%) with very few students (1.2%) and retired persons (4.0%) interviewed.

Comparatively, a relatively high proportion of the respondents had attained secondary school level of education (35.6%) while 11.6% had no formal education.

Table 4.1: Demographic characteristics of respondents

Variables	n=422	%
Gender		
Male	186	44.1
Female	236	55.9
Age		
<30 years	19	4.5
30 – 39 years	53	12.6
40 – 49 years	102	24.2
50 – 59 years	100	23.7
60 – 69 years	90	21.3
70 years or more	58	13.7
Marital status		
Single	48	11.4
Married	314	74.4
Separated/divorced	13	3.1
Widowed	47	11.1
Occupation		
Farmer	92	21.8
Businessman/woman	142	33.6
Casual laborer	53	12.6
Formal employment	71	16.8
Student	5	1.2
Housewife	42	10.0
Retired	17	4.0
Highest level of education		
No formal education	49	11.6
Primary	120	28.4
Secondary	154	36.5
University/College	99	23.5

4.1.2 History of diabetes and accessibility to diabetes Clinic

History of diabetes and accessibility to the diabetes clinic was assessed using four factors as presented in Table 4.2. When probed on the duration of being diabetic, the highest proportion of the respondents (30.3%) indicated that they had been diabetic for less than 5 years.

The most commonly mentioned mode of transport to the clinic was public transport (78.9%). Other specific modes of transport accounted for less than 13% each.

Table 4.2: History of diabetes and accessibility of the diabetes clinic

Variables	n=422	%
Duration of being diabetic		
<5 years	128	30.3
5 - 9 years	115	27.3
10 - 14 years	89	21.1
15 years or more	90	21.3
Distance to the nearest diabetic clinic from the client's home		
<10 kilometers	181	42.9
10 – 19 kilometers	128	30.3
20 – 29 kilometers	53	12.6
30 kilometers or more	60	14.2
Mode of transport to the clinic (<i>Multiple response</i>)		
Walk	51	12.1
Motor cycle (Boda-boda)	20	4.7
Public motor vehicle	333	78.9
Personal vehicle	30	7.1

4.1.3 Counseling services at the diabetes clinic

Table 4.3 presents the counseling services at the diabetes clinic as reported by the study respondents. Nearly all respondents (98.3%) indicated that they received counseling about the foods they should eat. Most (93.9%) also reported that the instructions given on what to eat was easy to follow.

Less than half (40.8%) of the respondents visited the clinic regularly, while 11.1% reported irregular visits when feeling sick. A relatively high proportion of the respondents (56.0%) reported that it took more than one hour to be served from the time of arrival at the clinic up to the time the client was through with the treatment. Approximately half of the respondents (50.5%) indicated that duration of time taken during treatment determines how serious the client takes the treatment.

Overall, most of the respondents (95.5%) indicated that reception of clients by the hospital staff was friendly.

Table 4.3: Counseling services at the diabetes clinic

Variables	n=422	%
Client received counseling about the foods s/he should eat		
Yes	412	97.6
No	10	2.4
The instructions given on what to eat easy to follow		
Yes	387	93.9
No	25	6.1
Not applicable	10	
Frequency of coming for review		
Very frequent (on all appointment dates)	43	10.2
Frequent (Missed a few appointment dates)	129	30.6
Somewhat frequent (at least half of appointments)	186	44.1
Less frequent (less than half of the appointments)	17	4.0
Irregular (When sick)	47	11.1
Time taken since arrival at the clinic up to the time the client is through with the treatment		
<30 Minutes	114	27.0
30 – 60 Minutes	72	17.1
61 – 120 Minutes	56	13.3
121 – 180 Minutes	70	16.6
>180 Minutes	110	26.1
Duration of time taken during treatment determines how serious the client take the treatment		
Yes	213	50.5
No	209	49.5
Perception of reception of clients by the hospital staff		
Friendly	403	95.5
Unfriendly	19	4.5

4.1.4 Availability of Recommended Nutritional Therapy

Availability of recommended medical nutritional therapy and is presented in Table 4.4.

A relatively high proportion of the respondents (78.2%) reported that recommended foods were readily available.

Upon further probing on the source of food, the most commonly mentioned sources included purchase (87.4%) and farming (27.5%).

About half (51.2%) of the respondents prepared their own food, while for one third, the food was prepared by their spouses.

Majority of the respondents (89.1%) indicated that they received support from family members in adhering to the recommended diet.

About half of the respondents (51.9%) reported that they consumed 3 meals per day,

Upon probing on their usual eating time, 58.1% of the respondent indicated that they ate at specific intervals. Majority of the respondents indicated that they occasionally ate food that was not prepared according to recommended diet, with 5.5% reporting that they did so regularly.

The most commonly mentioned occasion when the respondents consumed foods that were not recommended in their diets was '*when away from home*' (70.6%).

Almost every respondent (95.7%) agreed to the fact that individualized diet has benefited them.

Table 4.4: Availability of Recommended Medical Nutritional Therapy

Variables	n=422	%
Foods that were recommended readily available		
Yes	330	78.2
No	92	21.8
How the client obtains most of the foods (<i>Multiple response</i>)		
From the farm	116	27.5
Purchase	369	87.4
Donation	2	0.5
Who prepares client's food most of the time (<i>Multiple response</i>)		
Self	216	51.2
Spouse	131	31.0
My children	83	19.7
Relative	16	3.8
House help	54	12.8
Client receives support from family members/friends for diet adherence		
Yes	376	89.1
No	46	10.9
Frequency of meals in a day		
<3 times	32	7.6
3 times	219	51.9
>3 times	171	40.5
Eating time		
Eats at specific intervals	245	58.1
Eats when hungry	177	41.9
Frequency of eating food not prepared according to recommended diet		
Occasionally	83	19.7
Regularly	23	5.5
Not at all	316	74.9
Occasions when the client eats foods that are not tailored to diet needs (<i>Multiple response</i>)		
During family functions	83	19.7
During office functions	31	7.3
When away from home	298	70.6
Individualized diet has benefited the client		
Yes	404	95.7
No	18	4.3

4.1.5 Non-Adherence to recommended Medical Nutritional Therapy

Figure 4.1 presents information on adherence to recommended Medical Nutritional Therapy (MNT). Non-adherence to Medical Nutritional Therapy according to this study was based on the number of times a patient consumed foods they were advised not to eat. Any patient who consumed such foods more than three times over seven days was considered not to be adhering to recommended Medical Nutritional Therapy. Over one third of the respondents (n=151 =35.8%) were not adhering to the recommended Medical Nutritional Therapy in this study. Out of this, 61 (40.4%) were men whereas 90 (59.6) were women.

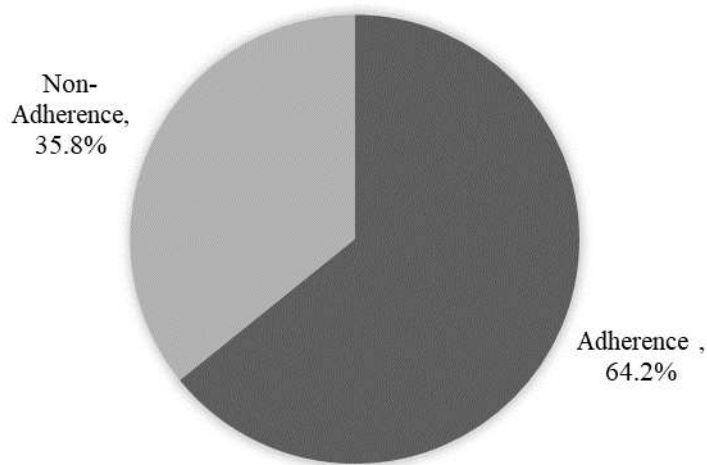


Figure 4.1: Adherence to Recommended Medical Nutritional Therapy (MNT)

4.2 Factors affecting non adherence to recommended Medical Nutritional Therapy (MNT)

Non adherence to recommended Medical Nutritional Therapy (MNT) was analyzed in relation to (1) selected demographic characteristics, (2) history of diabetes and accessibility to the diabetes clinic, (3) counseling services at the diabetes clinic, and (4) availability of Recommended Medical Nutritional Therapy.

4.2.1 Association of demographic characteristics with non-adherence to recommended Medical Nutritional Therapy (MNT) practices.

Table 4.5 presents the association of non-adherence to recommended Medical Nutritional Therapy (MNT) practices with demographic characteristics among the study respondents. Four factors namely Age, Marital status, Occupation, Highest level of education were significantly associated with non-adherence of recommended Medical Nutritional Therapy (MNT) among the study respondents.

Respondents aged 40 – 49 years were associated with significantly higher non adherence level to recommended Medical Nutritional Therapy (MNT) (43.1%) compared to those aged 70 or more (25.9%), (OR=2.17; 95% CI: 1.07 – 4.41; p=0.031). Similarly, those aged 30 – 39 years were associated with a significantly higher rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (45.3%) compared to those aged 70 or more (25.9%), (OR=2.37; 95% CI: 1.07 – 5.27; p=0.034).

Being single was associated with a significantly higher rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (45.8%) compared to being Separated/ divorced/ widowed (25.0%), (OR=2.54; 95% CI: 1.12 – 5.73; p=0.025).

Being a student was associated with a significantly higher rate of not adhering to Medical Nutritional Therapy (MNT) (80.0%) compared to being a housewife/retired (20.3%), (OR=15.67; 95% CI: 1.60 – 153.35; p=0.018). Similarly, being a businessman/woman was significantly associated with increased number of respondents

not-adhering to recommended Medical Nutritional Therapy (MNT) (43.0%) compared to being a housewife/retired (20.3%), (OR=2.95; 95% CI: 1.44 – 6.03; p=0.003).

Having a secondary education was associated with a significantly higher rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (34.4%) compared to having no formal education (18.4%), (OR=2.33; 95% CI: 1.05 – 5.17; p=0.037). Similarly, having tertiary education was associated with a significantly higher rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (52.5%) practice compared to having no formal education (18.4%), (OR=4.92; 95% CI: 2.16 – 11.21; p<0.001).

Table 4.5: Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with demographic characteristics

Variables	Non adherence (n=151)		Adherence (n=271)		OR	95% CI		p value
	N	%	N	%		Lower	Upper	
Sex								
Male	61	32.8	125	67.2	0.79	0.53	1.18	0.256
Female	90	38.1	146	61.9	1.00			
Age in years								
<30	9	47.4	10	52.6	2.58	0.88	7.56	0.084
30 – 39	24	45.3	29	54.7	2.37	1.07	5.27	0.034
40 – 49	44	43.1	58	56.9	2.17	1.07	4.41	0.031
50 – 59	35	35.0	65	65.0	1.54	0.75	3.16	0.235
60 – 69	24	26.7	66	73.3	1.04	0.49	2.21	0.914
70 or more	15	25.9	43	74.1	1.00			
Marital status								
Single	22	45.8	26	54.2	2.54	1.12	5.73	0.025
Married	114	36.3	200	63.7	1.71	0.91	3.20	0.094
SDW*	15	25.0	45	75.0	1.00			
Occupation								
Student	4	80.0	1	20.0	15.67	1.60	153.35	0.018
Businessman/woman	61	43.0	81	57.0	2.95	1.44	6.03	0.003
Formal employment	25	35.2	46	64.8	2.13	0.96	4.73	0.064
Farmer	32	34.8	60	65.2	2.09	0.97	4.49	0.059
Casual labourer	17	32.1	36	67.9	1.85	0.78	4.36	0.160
Housewife/Retired	12	20.3	47	79.7	1.00			
Highest level of education								
No formal Education	9	18.4	40	81.6	1.00			
Primary	37	30.8	83	69.2	1.98	0.87	4.50	0.102
Secondary	53	34.4	101	65.6	2.33	1.05	5.17	0.037
Tertiary	52	52.5	47	47.5	4.92	2.16	11.21	<0.001

SDW* - Separated/ divorced/ widowed

4.2.2 Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with history of diabetes and accessibility to the diabetes clinic

The results of the association between non adherence to recommended Medical Nutritional Therapy (MNT) with history of diabetes and accessibility to the are presented in Table 4.6. Walking to the clinic was significantly associated with non-

adherence to recommended Medical Nutritional Therapy (MNT) among the study respondents in comparison to getting to the clinic by other means other than walking (38.0%) compared to walking to the clinic (19.6%), (OR=2.50; 95% CI: 1.22 – 5.26; p=0.010)

Table 4.6: Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with history of diabetes and accessibility of the diabetes clinic

Variables	Non-adherence (n=151)		Adherence (n=271)		OR	95% CI		p value
	N	%	N	%		Lower	Upper	
Duration of being diabetic								
<5 years	49	38.3	79	61.7	1.45	0.81	2.57	0.207
5 - 9 years	48	41.7	67	58.3	1.67	0.93	3.00	0.084
10 - 14 years	27	30.3	62	69.7	1.02	0.54	1.92	0.961
15 years or more	27	30.0	63	70.0	1.00			
When started attending the diabetic clinic??Omit								
<2000	21	25.3	62	74.7	1.00			
2000 – 2004	25	29.1	61	70.9	1.21	0.61	2.39	0.582
2005 – 2009	55	42.6	74	57.4	2.19	1.20	4.02	0.011
2010 – 2013	50	40.3	74	59.7	1.99	1.08	3.68	0.027
Distance to the nearest diabetic clinic from the client's home								
<10 kilometres	72	39.8	109	60.2	1.82	0.95	3.46	0.070
10 – 19 kilometres	47	36.7	81	63.3	1.60	0.81	3.14	0.175
20 – 29 kilometres	16	30.2	37	69.8	1.19	0.52	2.70	0.679
30 kilometres or more	16	26.7	44	73.3	1.00			
Walking to the diabetes clinic								
Yes	10	19.6	41	80.4	1.00			
No	141	38.0	230	62.0	2.50	1.22	5.26	0.010
Take boda-boda to the clinic								
Yes	9	45.0	11	55.0	1.50	0.61	3.70	0.378
No	142	35.3	260	64.7	1.00			
Take PSV to the clinic								
Yes	118	35.4	215	64.6	0.93	0.57	1.51	0.774
No	33	37.1	56	62.9	1.00			
Take Personal vehicle to the clinic								
Yes	15	50.0	15	50.0	1.88	0.89	3.97	0.092
No	136	34.7	256	65.3	1.00			
Client received counseling about the foods s/he should eat								
Yes	146	35.4	266	64.6	0.55	0.16	1.93	0.342
No	5	50.0	5	50.0	1.00			

4.2.3 Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with counseling service indicators at the diabetes clinic

Table 4.7 presents the results of the analysis of the association non adherence to recommended Medical Nutritional Therapy (MNT) with various counseling service indicators at the diabetes clinic. Three indicators namely Frequency of review, Time taken since arrival at the clinic up to the time the client is through with the treatment, and Duration of time taken determine how serious the client take the treatment were significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) among the study respondents.

Irregular visits to the clinic (When sick) was significantly associated with a high rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (63.8%) compared to Somewhat/ Less frequent visits to the clinic (34.0%), (OR=3.43; 95% CI: 1.77 – 6.64; $p<0.001$).

Spending 30 – 60 minutes to get attended at the clinic since arrival was significantly associated a higher rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (33.3%) compared to spending less than 30 minutes (17.5%), (OR=2.35; 95% CI: 1.18 – 4.67; $p=0.015$). Similarly spending over two hours since arrival to get attended at the clinic significantly associated with a higher rate of non-adherence among respondents in comparison to spending less than 30 minutes (17.5%), (OR=4.70; 95% CI: 2.40 – 9.21; $p<0.001$).

This is in agreement to the fact that time taken before one receives treatment from the time they arrived at the clinic determines how serious the client take the treatment was significantly associated with increased number of respondents not adhering to recommended Medical Nutritional Therapy (MNT) (44.6%) compared to non-agreement (26.8%), (OR=2.20; 95% CI: 1.46 – 3.31; $p<0.001$).

Table 4.7: Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with counseling service indicators at the diabetes clinic

Variables	Non-adherence (n=151)		Adherence (n=271)		OR	95% CI		p value
	N	%	N	%		Lower	Upper	
Client received counselling about the foods s/he should eat								
Yes	137	35.4	250	64.6	0.97	0.42	2.26	0.952
No	9	36.0	16	64.0	1.00			
Frequency of review								
Very frequent	19	44.2	24	55.8	1.54	0.79	3.00	0.207
Frequent	33	25.6	96	74.4	0.67	0.41	1.09	0.106
Somewhat/ Less frequent	69	34.0	134	66.0	1.00			
Irregular (When sick)	30	63.8	17	36.2	3.43	1.77	6.64	<0.001
Time taken since arrival at the clinic up to the time the client is through with the treatment								
<30 Minutes	20	17.5	94	82.5	1.00			
30 – 60 Minutes	24	33.3	48	66.7	2.35	1.18	4.67	0.015
61 – 120 Minutes	16	28.6	40	71.4	1.88	0.88	4.00	0.101
121 – 180 Minutes	35	50.0	35	50.0	4.70	2.40	9.21	<0.001
>180 Minutes	56	50.9	54	49.1	4.87	2.65	8.97	<0.001
Duration of time taken determine how serious the client take the treatment?? Omit								
Yes	95	44.6	118	55.4	2.20	1.46	3.31	<0.001
No	56	26.8	153	73.2	1.00			
Reception of clients by the hospital staff								
Friendly	142	35.2	261	64.8	0.60	0.24	1.52	0.281
Unfriendly	9	47.4	10	52.6	1.00			

4.2.4 Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with availability, food source and preparation

The association of non-adherence to recommended Medical Nutritional Therapy (MNT) with food source and preparation is presented in Table 4.8. Two factors namely Clients' food prepared most of the time by children, and Clients' food prepared most of the time by house help were significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) among the study respondents.

Food prepared most of the time by children was significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) (47.0%) compared to preparation by others (33.0%), (OR=1.80; 95% CI: 1.10 – 2.92; p=0.017).

Similarly, food prepared most of the time by house help was associated with a significantly higher rate of non-adherence to recommended Medical Nutritional Therapy (MNT) (55.6%) compared to preparation by others (32.9%), (OR=2.55; 95% CI: 1.43 – 4.55; p=0.001).

Table 4.8: Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with availability, food source and preparation

Variables	Non-adherence (n=151)		Adherence (n=271)		OR	95% CI		p value
	N	%	n	%		Lower	Upper	
Recommended foods readily available								
Yes	121	36.7	209	63.3	1.20	0.73	1.95	0.473
No	30	32.6	62	67.4	1.00			
Foods obtained mainly from farm								
Yes	42	36.2	74	63.8	1.03	0.66	1.60	0.911
No	109	35.6	197	64.4	1.00			
Foods mainly Purchased								
Yes	133	36.0	236	64.0	1.10	0.60	2.01	0.768
No	18	34.0	35	66.0	1.00			
Self-food preparation most of time								
Yes	70	32.4	146	67.6	0.74	0.50	1.10	0.139
No	81	39.3	125	60.7	1.00			
Food prepared most of the time by spouse								
Yes	44	33.6	87	66.4	0.87	0.56	1.34	0.528
No	107	36.8	184	63.2	1.00			
Food prepared most of the time by children								
Yes	39	47.0	44	53.0	1.80	1.10	2.92	0.017
No	112	33.0	227	67.0	1.00			
Food prepared most of the time by relative								
Yes	7	43.8	9	56.3	1.42	0.52	3.88	0.498
No	144	35.5	262	64.5	1.00			
Food prepared most of the time by house help								
Yes	30	55.6	24	44.4	2.55	1.43	4.55	0.001
No	121	32.9	247	67.1	1.00			

Table 4.9 presents a continuation of non-adherence to recommended Medical Nutritional Therapy (MNT) in relations to availability of recommended Medical Nutritional Therapy. Two factors namely Frequency of eating food that is not prepared according to recommended diet, and agreement to the fact that individualized diet has benefited the client were significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) among the study respondents.

Regular eating of food that is not prepared according to recommended diet was significantly associated with increased number of respondents not adhering to recommended Medical Nutritional Therapy (MNT) (65.2%) compared to not eating at all (30.1%), (OR=4.35; 95% CI: 1.42 – 8.42; p=0.006).

Disagreement to the fact that individualized diet has benefited the client was significantly associated with increased number of respondents not adhering to recommended Medical Nutritional Therapy (MNT) (61.1%) compared to agreement (34.7%), (OR=2.94; 95% CI: 1.12 – 7.69; p=0.022).

Table 4.9: Association of non-adherence to recommended Medical Nutritional Therapy (MNT) with dietary habits of the respondents

Variables	Non-adherence (n=151)		Adherence (n=271)		OR	95% CI		p value
	N	%	n	%		Lower	Upper	
Client receives support from family members/friends for adherence								
Yes	135	35.9	241	64.1	1.05	0.55	2.00	0.881
No	16	34.8	30	65.2	1.00			
Frequency of meals per day								
<3 times	13	40.6	19	59.4	1.04	0.48	2.24	0.927
3 times	70	32.0	149	68.0	0.71	0.47	1.08	0.110
>3 times	68	39.8	103	60.2	1.00			
Eating time intervals								
Eats at specific intervals	91	37.1	154	62.9	1.15	0.77	1.73	0.493
Eats when hungry	60	33.9	117	66.1	1.00			
Frequency of eating food that is not prepared according to recommended diet								
Regularly	15	65.2	8	34.8	3.46	1.42	8.42	0.006
Occasionally	25	30.1	58	69.9	0.79	0.47	1.35	0.392
Not at all	111	35.1	205	64.9	1.00			
Eating food not tailored to diet needs during family functions								
Yes	33	39.8	50	60.2	1.24	0.75	2.02	0.399
No	118	34.8	221	65.2	1.00			
Eating food not tailored to diet needs during office functions								
Yes	13	41.9	18	58.1	1.32	0.63	2.78	0.458
No	138	35.3	253	64.7	1.00			
Eating food not tailored to diet needs when away from home??								
Yes	105	35.2	193	64.8	0.92	0.60	1.43	0.716
No	46	37.1	78	62.9	1.00			
Individualized diet has benefited the client								
Yes	140	34.7	264	65.3	1.00			
No	11	61.1	7	38.9	2.94	1.12	7.69	0.022

4.3 Factors associated with Non adherence to recommended Medical Nutritional Therapy (MNT)

Multivariate analysis was performed to identify factors associated with non-adherence to of recommended Medical Nutritional Therapy (MNT). Thirteen factors which associated with non-adherence to recommended Medical Nutritional Therapy (MNT) at $p < 0.05$ during bivariate analysis were considered together in a multivariate analysis. They include; (1) Age in years, (2) Marital status, (3) Occupation, (4) Highest level of education, (5) When started attending the diabetic clinic, (6) Walking to the diabetes clinic, (7) Frequency of coming for review, (8) Time taken since arrival at the clinic up to the time the client is through with the treatment, (9) Duration of time taken determine how serious the client take the treatment, (10) Clients food prepared most of the time by children, (11) Clients food prepared most of the time by house help, (12) Frequency of eating food that is not prepared according to recommended diet, and (13) Individualized diet has benefited the client. Upon fitting the factors using Binary logistic regression and specifying '*backward conditional*' method with removal at $p < 0.05$, six factors (Reduced model) were retained in the final analysis as shown in Table 10. The full model of potential factors associated with non-adherence to recommended Medical Nutritional Therapy (MNT) is presented in Appendix I.

Adjusting for other factors, and relative to non-formal education, non-adherence to recommended Medical Nutritional Therapy (MNT) was significantly associated with Primary (AOR=3.44; 95% CI: 1.35 – 8.82; $p=0.010$), Secondary (AOR=3.48; 95% CI: 1.40 – 8.66; $p=0.007$), and Tertiary (AOR=6.97; 95% CI: 2.69 – 18.05; $p < 0.001$) levels of education.

Non-adherence to recommended Medical Nutritional Therapy (MNT) was significantly associated with getting to the diabetes clinic by other means other than walking (AOR=3.49; 95% CI: 1.56 – 7.80; $p=0.002$).

Irregular visits based on doctor's appointment or when sick was significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) (AOR=3.65; 95% CI: 1.73 – 7.71; p=0.001).

Relative to spending less than 30 minutes since arrival at the clinic up to the time the client is through with the treatment, spending 121 – 180 minutes was significantly associated with non-adherence to following recommended Medical Nutritional Therapy (MNT) (AOR=3.21; 95% CI: 1.53 – 6.72; p=0.002). Similarly, spending more than 180 minutes was significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) (AOR=2.58; 95% CI: 1.31 – 5.08; p=0.006).

Non adherence to recommended Medical Nutritional Therapy (MNT) was significantly associated with agreement to the fact that '*duration of time taken determines how serious the client take the treatment*' (AOR=1.75; 95% CI: 1.09 – 2.82; p=0.020). Regular eating of food that is not prepared according to recommended diet was significantly associated with non-adherence to recommended Medical Nutritional Therapy (MNT) (AOR=3.78; 95% CI: 1.29 – 11.08; p=0.016).

Table 4.10: Multi variate analysis of factors associated with non-adherence to recommended Medical Nutritional Therapy (MNT)

Variables	AOR	95% CI		p value
		Lower	Upper	
Highest level of education				
Non-formal	1.00			
Primary	3.44	1.35	8.82	0.010
Secondary	3.48	1.40	8.66	0.007
Tertiary	6.97	2.69	18.05	<0.001
Walking to the diabetes clinic				
Yes	1.00			
No	3.49	1.56	7.80	0.002
Frequency of going for review				
Very frequent	1.60	0.75	3.42	0.226
Frequent	0.82	0.47	1.42	0.481
Somewhat/ Less frequent	1.00			
Irregular (When sick)	3.65	1.73	7.71	0.001
Time taken since arrival at the clinic up to the time the client is through with the treatment				
<30 Minutes	1.00			
30 – 60 Minutes	1.66	0.78	3.53	0.187
61 – 120 Minutes	1.13	0.49	2.63	0.768
121 – 180 Minutes	3.21	1.53	6.72	0.002
>180 Minutes	2.58	1.31	5.08	0.006
Duration of time taken determines how serious the client take the treatment				
Yes	1.75	1.09	2.82	0.020
No	1.00			
Frequency of eating food that is not prepared according to recommended diet				
Regularly	3.78	1.29	11.08	0.016
Occasionally	0.94	0.52	1.68	0.822
Not at all	1.00			

4.4 Factors affecting Medical Nutritional Therapy as perceived by professional healthcare providers.

Most of the healthcare providers interviewed felt that there weren't enough professionals at the clinic to attend to patients either through clinical consultation or nutritional counselling. They also noted that most of the patients came in when the disease had progressed (middle or late stages). With the patients paying out of pocket for the services at the diabetic clinic, the professionals further observed that the financial status of the patients indeed did affect the treatment outcomes. However, they also observed that most of the patients followed recommended Medical Nutritional diet. The patients' financial ability was hence a notable factor affecting uptake of Medical Nutritional Therapy.

All the healthcare professionals noted that diabetes complications posed a challenge in managing the disease.

CHAPTER FIVE

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Discussion.

In this study, non-adherence to recommended Medical Nutrition Therapy was 35.8% which is much lower than that from a study in Ethiopia (51.4%) and 37.2% from a study carried out in Botswana (Worku *et al.*, 2015; Ganiyu *et al.*, 2013). This also concurs with information by most of the healthcare providers during this study who felt that majority the patients followed recommended diet. This percentage could be attributed to the fact that Kenyatta National Hospital being a hospital that is ISO certified has better standard in patient management.

In this study, having a formal education was found to be associated with non-adherence to recommended medical nutrition therapy contrary to a study conducted at in Northwest Ethiopia where not having a formal education had was associated with non-adherence (Ayele *et al.*, 2018). This perhaps could be due to the fact that the educated in this study are busy fending for their families right in the city of Nairobi leaving no time for them to take care of their specialized nutritional needs. Also the differences in the setting of the study as well as the differences in socioeconomics may be the reasons for this difference.

This study shows statistically significant difference between travelling to the diabetes clinic by means other than walking in relation to uptake of recommended diet ($p=0.002$). In a study conducted in Nepal, it was found out that the adherence to dietary advice was higher among respondents who are nearer to hospital than those who are far with a statistically significant difference ($p=0.013$) (Parajuli *et al.*, 2014). This may be for similar assumptions that patients who are nearer have frequent visits to the hospital with better follow up than those who are far.

Irregular visits to the diabetes clinic on doctor's appointment or when sick and taking long time waiting to be treated at the hospital, were found to be contributing factors. A study conducted in Bahrain showed that lack of proper professional dietary assessment follow-up and advice by health care providers were influencing factors on dietary practice of type 2 diabetic patients (Shamsi *et al.*, 2013). Irregular appointments, means there is no regular follow up on the patient which impacts negatively as the patient does not get regular medical check-up as well as nutritional assessment and advice. Taking so long at the clinic is always perceived as time wasting by patients hence the reason why some patients may not be taking the advice given seriously. The issue could be as a result of the hospital not having adequate healthcare providers as stated by majority of the healthcare providers during in-depth interviews. A study conducted in India showed that those who visited a dietician were more likely to follow recommended diet than those who had merely been advised by the physicians (Kapur *et al.*, 2008).

The patients who were regularly consuming food that was not prepared according to their nutritional advice according to this study had a high chance of non-adherence to recommended diet. A study conducted in Botswana showed that lack of self-discipline was associated with non-adherence (Ganiyu *et al.*, 2013). This could be as a result difficult in revealing that one is diabetic especially when going for meals at work place or during social gatherings.

5.2 Conclusions

According to this study the main socioeconomic factor affecting adherence to Medical Nutrition Therapy was the level of educations. According to this study the level of education plays a role in uptake of MNT as having a formal education was significantly associated with non-adherence to recommended MTN in comparison to not having a formal education.

The patient related factors affecting Medical Nutrition Therapy were; eating food that is prepared according recommended MNT which is mostly during special occasions when

the patients are away from home and going to the clinic by other means other than walking as well as going to the clinic when sick

Lastly the Diabetes Clinic related factors according to this study that were found to affect the uptake of Medical Nutrition Therapy were; overstaying at the diabetes clinic and not having enough healthcare professionals

5.3 Recommendations

Following the identification of the factors affecting uptake of recommended Medical Nutrition Therapy, the researcher recommends the following;

Patients should be put on regular clinic appointment so that their progress can be monitored to ensure they keep to the recommended diet.

The hospital management should ensure that patients are not kept at the clinic for too long as it negatively affects how serious the patients take the recommended treatment.

As a way of ensuring patients stick to recommended diet, the researcher recommends that family members should be involved in ensuring the patient's food is prepared according to the nutritionist's advice. Patients should be encouraged to disclose their special nutrition needs when attending functions.

From this research, the healthcare professionals deployed to attend to the patients admitted that they are not enough to meet the high number of patients. The researcher recommends that more healthcare providers be employed.

Once these recommendations are adopted, further research should be conducted to check on their impact on uptake of recommended Medical Nutrition Therapy.

REFERENCE

- Abdullah, A., Peeters, A., de Courten, M., & Stoelwinder, J. (2010). The magnitude of association between overweight and obesity and the risk of diabetes: a meta-analysis of prospective cohort studies. *Diabetes research and clinical practice*, 89(3), 309-319.
- American Diabetes Association: (2010). Medical nutrition therapy: a key to diabetes management and prevention. *Clinical diabetes*, 28(1), 12-18.
- American Dietetic Association: Comparison of the American Dietetic Association (ADA) Nutrition Care Process for nutrition education services and the ADA. (2009). *Nutrition Care Process for medical nutrition therapy (MNT) services 2009 Retrieved from www.eatright.org/advocacy/mnt.*
- Anderson R.N. & Smith B.L., (2003). Deaths: leading causes for 2001. *In: National Vital Statistics Reports*, 52, 1-85.
- Ayele, A. A., Emiru, Y. K., Tiruneh, S. A., Ayele, B. A., Gebremariam, A. D., & Tegegn, H. G. (2018). Level of adherence to dietary recommendations and barriers among type 2 diabetic patients: a cross-sectional study in an Ethiopian hospital. *Clinical diabetes and endocrinology*, 4(1), 1-7.
- Bantle, J. P., Wylie-Rosett, J., Albright, A. L., Apovian, C. M., Clark, N. G., Franz, M. J., ... & American Diabetes Association. (2008). Nutrition recommendations and interventions for diabetes: a position statement of the American Diabetes Association. *Diabetes care*, 31, S61-S78.
- Bazzano, L. A., Serdula, M., & Liu, S. (2005). Prevention of type 2 diabetes by diet and lifestyle modification. *Journal of the American College of Nutrition*, 24(5), 310-319.

- Boucher, J. L., Swift, C. S., Franz, M. J., Kulkarni, K., Schafer, R. G., Pritchett, E., & Clark, N. G. (2007). Inpatient management of diabetes and hyperglycemia: implications for nutrition practice and the food and nutrition professional. *Journal of the American Dietetic Association*, *107*(1), 105-111.
- Boulé, N. G., Haddad, E., Kenny, G. P., Wells, G. A., & Sigal, R. J. (2001). Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus: a meta-analysis of controlled clinical trials. *Jama*, *286*(10), 1218-1227.
- Williamson, D. F., Vinicor, F., & Bowman, B. A. (2004). Primary prevention of type 2 diabetes mellitus by lifestyle intervention: implications for health policy. *Annals of internal medicine*, *140*(11), 951 - 958.
- Copperman, N., & Jacobson, M. S. (2003). Medical nutrition therapy of overweight adolescents. *Adolescent Medicine Clinics*, *14*(1), 11.
- Daly, A., Michael, P., Johnson, E. Q., Harrington, C. C., Patrick, S., & Bender, T. (2009). Diabetes white paper: Defining the delivery of nutrition services in Medicare medical nutrition therapy vs Medicare diabetes self-management training programs. *Journal of the American Dietetic Association*, *109*(3), 528-539.
- Raynor, H. A., Davidson, P. G., Burns, H., Nadelson, M. D. H., Mesznik, S., Uhley, V., & Moloney, L. (2017). Medical nutrition therapy and weight loss questions for the evidence analysis library prevention of type 2 diabetes project: systematic reviews. *Journal of the Academy of Nutrition and Dietetics*, *117*(10), 1578-1611.
- Ross, T., Boucher, J., & O'Connell, B. S. (Eds.). (2005). *American Dietetic Association guide to diabetes medical nutrition therapy and education*. American Dietetic Association.

- Diabetes Prevention Program (DPP) Research Group. (2002). The Diabetes Prevention Program (DPP): description of lifestyle intervention. *Diabetes care*, 25(12), 2165–2171.
- Einarson, T. R., Acs, A., Ludwig, C., & Panton, U. H. (2018). Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007–2017. *Cardiovascular diabetology*, 17(1), 1-19.
- Fletcher, B., Gulanick, M., & Lamendola, C. (2002). Risk factors for type 2 diabetes mellitus. *Journal of Cardiovascular Nursing*, 16(2), 17-23.
- Ganiyu, A. B., Mabuza, L. H., Malete, N. H., Govender, I., & Ogunbanjo, G. A. (2013). Non-adherence to diet and exercise recommendations amongst patients with type 2 diabetes mellitus attending Extension II Clinic in Botswana. *African journal of primary health care and family medicine*, 5(1), 33-39.
- Gans, K. M., Ross, E., Barner, C. W., Wylie-Rosett, J., McMurray, J., & Eaton, C. (2003). REAP and WAVE: new tools to rapidly assess/discuss nutrition with patients. *The Journal of nutrition*, 133(2), 556S-562S.
- Glasgow, R. E., Nutting, P. A., King, D. K., Nelson, C. C., Cutter, G., Gaglio, B., ... & Whitesides, H. (2005). Randomized effectiveness trial of a computer-assisted intervention to improve diabetes care. *Diabetes care*, 28(1), 33-39.
- Harris, S. B., Petrella, R. J., & Leadbetter, W. (2003). Lifestyle interventions for type 2 diabetes. Relevance for clinical practice. *Canadian family physician Medecin de famille canadien*, 49, 1618–1625.
- Hudon, C., Soubhi, H., & Fortin, M. (2008). Relationship between multimorbidity and physical activity: secondary analysis from the Quebec health survey. *BMC Public Health*, 8(1), 1-8.

- International Diabetes Federation. (2017). *IDF Diabetes Atlas*,(8th ed.), Brussels, Belgium: International Diabetes Federation.
- Kapur, K., Kapur, A., Ramachandran, S., Mohan, V., Aravind, S. R., Badgandi, M., & Srishyla, M. V. (2008). Barriers to changing dietary behavior. *Journal of Association of Physicians of India*, 56(1), 27-32.
- Knowler, W. C., Barrett-Connor, E., Fowler, S. E., Hamman, R. F., Lachin, J. M., Walker, E. A., & Nathan, D. M. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England journal of medicine*, 346(6), 393-403.
- Lacey, K., & Pritchett, E. (2003). Nutrition care process and model: ADA adopts road map to quality care and outcomes management. *Journal of the American Dietetic Association*, 103(8), 1061-1072.
- Mann, J.I. (2006). Nutrition recommendations for the treatment and prevention of type 2 diabetes and the metabolic syndrome: An evidence based review. *Nutrition in Clinical Care*, 422-427.
- Mash, B, Plessis, D, Vuuren, U, Michalowska, M, & Levitt, N. (2007). Screening for diabetic retinopathy in primary care with a mobile fundal camera--evaluation of a South African pilot project. *South African Medical Journal* 97(12), 1284-8
- Mbugua, P.K, Otieno, C.F, Kayima, J.K, Amayo, A.A, McLigeyo, S.O. (2005). Diabetic Ketoacidosis; clinical presentation and precipitating factors at Kenyatta National Hospital, Nairobi. *East African Medical Journal*, 82(12), S184-S190.

- Nazimek-Siewniak, B., Moczulski, D., & Grzeszczak, W. (2002). Risk of macrovascular and microvascular complications in Type 2 diabetes: results of longitudinal study design. *Journal of Diabetes and its Complications*, 16(4), 271-276.
- Nobel, J. (2006). Bridging the knowledge—action gap in diabetes: Information technologies, physician incentives and consumer incentives converge. *Chronic Illness*, 2(1), 59-69.
- Nyamu, P. N., Otieno, C. F., Amayo, E. O., & McLigeyo, S. O. (2003). Risk factors and prevalence of diabetic foot ulcers at Kenyatta National Hospital, Nairobi. *East African medical journal*, 80(1), 36-43.
- Otieno, C. F., & Kariuki, M. (2003). Quality of glycaemic control in ambulatory diabetics at the out-patient clinic of Kenyatta National Hospital, Nairobi. *East African medical journal*, 80(8), 406-410.
- 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.
- Parajuli, J., Saleh, F., Thapa, N., & Ali, L. (2014). Factors associated with nonadherence to diet and physical activity among Nepalese type 2 diabetes patients; a cross sectional study. *BMC research notes*, 7(1), 1-9.
- 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), 291-295.
- Shamsi, N., Shehab, Z., AlNahash, Z., AlMuhanadi, S., & Al-Nasir, F. (2013). Factors influencing dietary practice among type 2 diabetics. *Bahrain Med Bull*, 35(3), 1-14.

- Thent, Z. C. (2013). Srijit Das and Leonard Joseph Henry. *Hamid Raza Bradran: Role of Exercise in the Management of Diabetes Mellitus: Global Scenario PLoS One*, 8(11).
- Thomas, N., Alder, E., & Leese, G. P. (2004). Barriers to physical activity in patients with diabetes. *Postgraduate medical journal*, 80(943), 287-291.
- U.S. Department of Health and Human Services (2001). Final MNT regulations. CMS-1169-FC. *Federal Register*, 1 November 2001. 42 CFR Parts 405, 410, 411, 414, and 415.
- Uusitupa, M. (2002). Lifestyles matter in the prevention of type 2 diabetes. *Diabetes Care*, 25(9), 1650-1651.
- Look AHEAD Research Group. (2006). The Look AHEAD study: a description of the lifestyle intervention and the evidence supporting it. *Obesity*, 14(5), 737-752.
- Welschen, L. M., Van Oppen, P., Dekker, J. M., Bouter, L. M., Stalman, W. A., & Nijpels, G. (2007). The effectiveness of adding cognitive behavioural therapy aimed at changing lifestyle to managed diabetes care for patients with type 2 diabetes: design of a randomised controlled trial. *BMC Public Health*, 7(1), 1-10.
- Wens, J., Vermeire, E., Van Royen, P., Sabbe, B., & Denekens, J. (2005). GPs' perspectives of type 2 diabetes patients' adherence to treatment: A qualitative analysis of barriers and solutions. *BMC family practice*, 6(1), 1-10.
- Worku, A., Abebe, S. M., & Wassie, M. M. (2015). Dietary practice and associated factors among type 2 diabetic patients: a cross sectional hospital based study, Addis Ababa, Ethiopia. *SpringerPlus*, 4(1), 1-8.

APPENDICES

Appendix I: Full Model on Potential Factors Associated with Non-adherence to Recommended Medical Nutritional Therapy (MNT)

Variables	OR	95% CI		p value
		Lower	Upper	
Age in years				
<30	0.77	0.17	3.54	0.738
30 – 39	1.02	0.33	3.13	0.967
40 – 49	1.18	0.45	3.11	0.731
50 – 59	0.85	0.33	2.23	0.747
60 – 69	0.78	0.32	1.90	0.580
70 or more	1.00			
Marital status				
Single	1.55	0.54	4.51	0.418
Married	1.75	0.82	3.76	0.149
Separated/ divorced/ widowed	1.00			
Occupation				
Student	4.57	0.28	73.80	0.285
Businessman/woman	1.25	0.52	3.00	0.615
Formal employment	0.64	0.22	1.82	0.399
Farmer	1.30	0.55	3.08	0.554
Casual labourer	0.76	0.27	2.15	0.604
Housewife/Retired	1.00			
Highest level of education				
Non-formal	1.00			
Primary	3.67	1.35	9.98	0.011
Secondary	3.31	1.20	9.10	0.020
Tertiary	7.37	2.37	22.93	0.001
When started attending the diabetic clinic				
<2000	1.00			
2000 – 2004	1.23	0.56	2.73	0.608
2005 – 2009	1.80	0.87	3.72	0.116
2010 – 2013	1.61	0.75	3.47	0.223
Walking to the diabetes clinic				
Yes	1.00			
No	3.45	1.47	8.33	0.005
Frequency of coming for review				
Very frequent	1.24	0.55	2.83	0.604
Frequent	0.73	0.41	1.32	0.299
Irregular/ On doctor's appointment/ When sick	3.51	1.56	7.86	0.002
Somewhat/ Less frequent				

Time taken since arrival at the clinic up to the time the client is through with the treatment				
<30 Minutes				
30 – 60 Minutes	1.64	0.74	3.63	0.223
61 – 120 Minutes	0.80	0.32	1.99	0.636
121 – 180 Minutes	2.96	1.32	6.61	0.008
>180 Minutes	1.92	0.91	4.04	0.088
Duration of time taken determine how serious the client take the treatment				
Yes	1.64	1.00	2.70	0.051
No	1.00			
Clients food prepared most of the time by children				
Yes	2.00	1.06	3.78	0.031
No	1.00			
Clients food prepared most of the time by house help				
Yes	1.70	0.83	3.47	0.147
No	1.00			
Frequency of eating food that is not prepared according to recommended diet				
Regularly	4.17	1.29	13.53	0.017
Occasionally	0.86	0.46	1.61	0.643
Not at all	1.00			
Individualized diet has benefited the client				
Yes	1.00			
No	2.50	0.75	8.33	0.136

Appendix II: Questionnaire

TITLE: Factors affecting adherence to Medical Nutrition Therapy for Type 2 Diabetics

Questionnaire no.....

Name of interviewer.....

Date of interview.....

SOCIO-DEMOGRAPHIC FACTORS

1. Sex

1) Male

2) Female

2. Age in years.....

3. What is your marital status?

1. Single

2. Married

3. Separated/divorced

4. Widowed

4. What is your occupation?

1. Farmer

2. Businessman/Woman

3. Casual laborer

4. Civil servant

Other (specify).....

5. What is your highest level of education?

1.) No formal education
2. Primary education
3. Secondary education
4. Tertiary education (college/university)

6. For how many years have you had diabetes?

7. When did you start attending the diabetic clinic?

8. What is the distance in kilometers to the nearest diabetic clinic from your home?

9. How do you travel to the clinic?

1) Walk

2) Motor cycle

3) Passenger Service Vehicle

4) Personal vehicle

Therapy related factors

10. Have you received counseling about the foods you should eat?

1) Yes

2) No

11. Were the instructions given on what to eat easy to follow?

1) Yes

2) No

12. If not, in what way do you think be simplified for easy understanding.
13. How often do you come for review?
14. Does the hospital staff check to find out your adherence to the recommended diet during you visits to the clinic?
- 1) Yes
 - 2) No
15. How many hours do you wait before you are attended?
16. Does the waiting time determine how serious you take the treat meant?
- 1. Yes
 - 2. No
17. How do you find the hospital staff?

Patient related factors

18. What types of foods were recommended?
- 1) Cereals and other whole grain products
 - 2) Vegetables
 - 3) Fruits
 - 4) Low fat dairy products
 - 5) Any other foods (specify)
19. What types of foods were you advised to avoid?

20. Are the foods that were recommended readily available?

1) Yes

2) No

21. If not, why?

1) Cost

2) Not grown locally

3) Others (specify)

22. How do you obtain most of your foods?

1) From the farm

2) Purchase

3) Donation

4) Others (specify)

23. Who prepares your food?

1) Self

2) Spouse

3) My children

4) Relative

5) House help

24. Do you receive support from your family members/friends when it comes to adherence?

1) Yes

2) No

25. How many meals do you take in a day?

26. Do you eat at specific intervals or when you feel hungry?

1) I eat at specific intervals

2) I eat when am hungry

27. How often do you eat food that is not prepared according to your recommended diet?

28. During what occasions do you eat such foods that are not tailored to your diet needs?

29. Has individualized diet benefited you in any way?

1) Yes

2) No

30. If Yes, how?

Appendix III: Interview Guide

The following is part of a research study that is being undertaken to understand healthcare professionals' perception on factors affecting Medical Nutritional Therapy for Type 2 diabetes patients. Taking part in the interview schedule is optional, but your participation will be greatly appreciated. Confidentiality will be maintained throughout the survey.

1. Professional experience

- a) How many years have you practiced diabetes education management in type 2 Diabetes?
- b) Do you carry out your practice elsewhere apart from Kenyatta National Hospital? Where? Who are your clients? (*Probe: the corporate or individual patients*)
- c) Do you think we have enough professionals to educate the patients?

(Probe: why?)

- d) Do you think the recommendations are standard and up to date?

Probe: why?

2. The Patients

- a) What is the average age of your type 2 Diabetes patients?
- b) What do majority of your patients complain about at the initial stages that prompts them to seek treatment; (*Prompt: tiredness, frequent urination, increased thirst, Increased hunger, Probe for any other complaint*)
- c) At what stage do your patients seek treatment? (*Probe: early stages, late stages, none of those, Probe when else?*)
- d) Does the stage at which your patients seek treatment affect the outcome of treatment? (*Probe: how?*)

- e) What is the most common acute complication among your patients? (*Prompts*: Diabetic ketoacidosis, Hyperosmolar ketonic coma, Hypoglycemia, hyperglycemia, *Probe*: Why?)
- f) What is the most common chronic complication among your patients? (*Prompts*: Cataract, Retinopathy, Neuropathy, Nephropathy, Macroangiopathy, *Probe*: why do you say so?)
- g) How do your patients pay for your services? (*Probe*: through government plans, private insurance, out of pocket or you are not sure? *Probe* why do you think they chose that mode of payment?)
- h) Does the patient's financial status affect the outcome of treatment? (*Probe* how?)
- i) Where do your patients come from? (*Prompts* do they live around your place of practice or do they travel from far and wide?)

3. The services offered

- a) What are the main services offered to the diabetic patients?
 - b) Do these services include nutritional counseling?
 - c) If yes, what is usually recommended during the nutritional counseling?
-
- i. What is your observation about uptake of recommended foods by most patients? (*Prompts*: Most follow, about half, very few follow)
 - ii. What are the main challenges affecting uptake of recommended diet? (*prompts*: Cost, Food not available, Food not acceptable, and what of the patients' financial ability? And do chronic and acute complications associated with diabetes pose a challenge? If yes, how?)

Appendix IV: Informed Consent Form

Project Title: Factors Affecting Medical Nutritional Therapy Among Type 2 Diabetics

Introduction

My name is Joseph Son Asati, an MSC student in Public Health at Jomo Kenyatta University of Agriculture and Technology (JKUAT). I am working with my research assistants in the project named above. You are kindly requested to participate in this study because you meet the basic inclusion criteria for the study. We would like to collect information on factors affecting medical nutrition therapy among Type 2 Diabetics

Purpose of the study

The main aim of the study is to determine the factors affecting Medical Nutritional Therapy as perceived by Type 2 Diabetics and Professional Healthcare providers.

Procedure

If you volunteer to participate in this study both verbally and by signing the section at the end of this form, you will be interviewed by trained personnel who will fill the collected information into a questionnaire.

Potential risks and discomfort

There is no risk associated with your participation in this research. There will be no monetary benefits associated with participating in this study except gathering information on the factors affecting adherence to Medical Nutrition Therapy as perceived by Type 2 Diabetics. Some questions might be uncomfortable and you don't have to answer them if they are causing any discomfort.

Benefits of the study to the Patients.

There will be no monetary benefits associated with participating in this study except gathering information on the factors affecting adherence to Medical Nutritional therapy among Type 2 Diabetics.

Benefits of the study to the principal investigator

This study is expected to yield results on the factors affecting adherence to Medical Nutrition therapy as perceived by the Type 2 diabetes patients and the health care providers.

Confidentiality of the records

Any record relating to the patients will be treated with the utmost confidentiality. Your names will not appear in any of the reports from this study. No identity of any specific individual will be disclosed in any public reports or publications.

Obtaining additional information

You are encouraged to ask any questions to clarify any issues at any time or ask questions at any time during your participation in the study. If you later think you need more information you may call:

JOSEPH SON ASATI

0722-440933/0738704463

P.O BOX 524-00200

NAIROBI.

Any concerns or questions regarding the study and you would like to talk to any other person other than the researcher, you are encouraged to contact:

Director ITROMID

P.O. Box 62000-00200

itromid@nairobi.mincom.net

OR

The Chairman,

KEMRI, National Ethical Review Committee

P.O. Box 59840-00200

Basis of Participation

- You are being requested to participate in this study.
- Participation is entirely voluntary.
- You are free to withdraw the consent to participate in this study at any time.
- You are free to ask any questions regarding the study which may not be clear to you after the consent has been explained to you.

Signatures

I, the undersigned have understood the above information which has been read and explained to me by the researcher and I voluntarily consent to participate. I have had the opportunity to ask questions and all of my questions have been answered satisfactorily.

Name of Respondent **Date.....**

Signature.....

I, the researcher/research assistant declare that the above has agreed to voluntarily participate in the study.

Name of the Investigator.....

Date.....

Signature

Name of research assistant.....

Date.....

Signature.....

Appendix V: Request Letter for Participation in Survey

Hello,

My name is **Joseph Son Asati** and I am a postgraduate student working towards my Masters of Science in Public Health at Jomo Kenyatta University of Agriculture and Technology in collaboration with the Institute of Tropical Medicine and Infectious Diseases (ITROMID). For my Masters research, I am conducting a survey to assess *health cares professionals' perception of factors affecting uptake of Medical Nutritional Therapy among Type 2 diabetes patients*. I am hoping you will be able to spare 10 minutes of your time for an interview. If you are willing to participate, please schedule an appointment for the same.

You can reach me using any of the contacts listed below. Thanks in advance.

Joseph son asati

Po Box 524-00200

Nairobi.

Email: asatijoe@yahoo.com

Mobile no. 0722440933/0738704463

I have scheduled an interview for you on;

Date.....

Time.....

Appendix VI: KEMRI Ethical Approval


KENYA MEDICAL RESEARCH INSTITUTE

P.O. Box 54840-00200, NAIROBI, Kenya
Tel: (254) (020) 2722541, 2713349, 0722-306901, 0733-400003; Fax: (254) (020) 2720030
E-mail: director@kemri.org info@kemri.org Website: www.kemri.org

KEMRI/RES/7/3/1 **October 15, 2012**

TO: MR. JOSEPH SON ASATI (PRINCIPAL INVESTIGATOR)

THROUGH: DR. YERI KOMBE,
THE DIRECTOR, CPHR,
NAIROBI

Dear Sir,

RE: SSC PROTOCOL No. 2213 – REVISION 2 (RE-SUBMISSION): FACTORS AFFECTING MEDICAL NUTRITIONAL THERAPY AMONG TYPE 2 DIABETICS (VERSION DATED SEPTEMBER 2012)

Reference is made to your letter dated August 16, 2012. The ERC Secretariat acknowledges receipt of the revised proposal on August 24, 2012:

This is to inform you that the Committee determines that the issues raised at the 206th meeting of 21st August 2012 are adequately addressed. Consequently, the study was granted approval for implementation effective this **15th day of October 2012** for a period of one year. Please note that authorization to conduct this study will automatically expire on **October 17, 2013**.

If you plan to continue data collection or analysis beyond this date, please submit an application for continuation approval to the ERC Secretariat by **September 2, 2013**. The regulations require continuing review even though the research activity may not have begun until sometime after the ERC approval.

You are required to submit any proposed changes to this study to the SSC and ERC for review and the changes should not be initiated until written approval from the ERC is received. Please note that any unanticipated problems resulting from the implementation of this study should be brought to the attention of the ERC and you should advise the ERC when the study is completed or discontinued.

Work on this project may begin.


Sincerely,

**DR. CHRISTINE WASUNNA,
ACTING SECRETARY,
KEMRI ETHICS REVIEW COMMITTEE**


In Search of Better Health

Appendix VII: KNH/UON Ethical Approval


APPROVED
ETHICS & RESEARCH COMMITTEE



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P.O BOX 19676 Code 00202
Telegrams: varsity
(254-020) 2726300 Fax 44355
Ref. KNH-ERC/A/327



KNH/UON-ERC
Email: uonknh_erc@uonbi.ac.ke
Website: www.uonbi.ac.ke
Link: www.uonbi.ac.ke/activities/KNH/UON



KENYATTA NATIONAL HOSPITAL
P.O BOX 20723 Code 00102
Tel: 726380-9
Fax: 725272
Telegrams: MEDSUP, Nairobi
6th December 2012

Joseph Son Asati
TM310-1283/2010
JKUAT

Dear Joseph

RESEARCH PROPOSAL: FACTORS AFFECTING MEDICAL NUTRITION THERAPY AMONG TYPE 2 DIABETICS (P653/12/2012)

This is to inform you that the KNH/UoN-Ethics & Research Committee (KNH/UoN-ERC) has reviewed and **approved** your above cited proposal. The approval periods are 6th December 2012 to 5th December 2013.

This approval is subject to compliance with the following requirements:

- a) Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- b) All changes (amendments, deviations, violations etc) are submitted for review and approval by KNH/UoN ERC before implementation.
- c) Death and life threatening problems and severe adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH/UoN ERC within 72 hours of notification.
- d) Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH/UoN ERC within 72 hours.
- e) 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*).
- f) Clearance for export of biological specimens must be obtained from KNH/UoN-Ethics & Research Committee for each batch of shipment.
- g) Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/or plagiarism.

For more details consult the KNH/UoN ERC website www.uonbi.ac.ke/activities/KNH/UON

Appendix VIII: Certificate of Publication



Appendix IX: Map of Kenyatta National Hospital

