

**INFLUENCE OF RISK PERCEPTIONS ON DIET ADHERENCE, IN DIETARY
MANAGEMENT OF TYPE 2 DIABETES IN CLINIC ATTENDEES AT JARAMOGI
OGINGA ODINGA TEACHING AND REFERRAL HOSPITAL, KENYA**

BY

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DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been presented in any other institution. No part of this thesis may be reproduced without the prior permission of the author and/ or Maseno University.

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DEDICATION

To my ‘late’ father, Jacob

To my husband John and my children Abigail, Caesar, Angel and Aliyah

ABSTRACT

There is a rise in prevalence of Type 2 diabetes in Kenya, and an increase in related complications, which lead to disability and death. Diet modification to control blood sugar, lipid levels and pressure are vital in lowering risk and complications development in the management of Type 2 diabetes. Adherence to diet on the other hand, is a behaviour, influenced by among others, socio-economic factors and perceptions. Studies indicate that adherence to diet therapy is below average, even when patients understand the importance of the therapy. Kisumu, which was in the year 2000 elevated to a city status, has experienced rapid urbanisation, which has aggravated “unhealthy” eating practices, posing a challenge to diet adherence. Information on diet adherence in the management of Type 2 diabetes in Kenya is in most cases lacking, making it difficult to make focused recommendations. Studies to assess factors influencing diet adherence in the management of Type 2 diabetes are inadequate, and those done, have focused mainly on socio-economic factors leaving out perceptions. The objectives of this study were to assess; the level of diet adherence, the influence of socio-economic factors on diet adherence and finally the influence of risk perceptions on diet adherence in dietary management of Type 2 diabetes. The study, done in a period of three months, adopted a cross sectional study design. A sample of 240 adults (Yamane's formula) 35 years and above, who had been diagnosed and had been managing Type 2 diabetes, for at least six months, were selected, through systematic random sampling, where every second patient was picked. Information on dietary behaviour was collected using a dietary habit assessment form, while each risk perception was inferred using eight closed ended questions, in a risk perception assessment form. Principle factor analysis was done to derive possible adherence and risk perception factors among the study population. Linear regression was used to derive an adherence pattern, and to assess the relationship between adherence, risk perceptions and socio-economic factors. The study revealed that majority of the participants (73.9%) had a diet adherence level of 80%, and only 22.3% had 100% diet adherence. It identified an adherence pattern focused mainly on controlling blood glucose and reducing development of complications, adherence one; replacing cooking oils with fats ($R^2=0.976$, $p<0.001$), adherence two; reduce intake of sugar, margarine, butter and salt ($R^2=0.952$, $p<0.001$) and adherence three; reduce salt and increase whole grain intake ($R^2=0.768$, $p<0.001$). It also revealed that diet adherence is influenced by four risk perceptions. These were perceived severity ($\beta=0.225$, $p=0.006$), perceived susceptibility ($\beta=0.305$, $p<0.001$), perceived behaviour control ($\beta=0.229$, $p=0.015$) and perceived benefits ($\beta=0.242$, $p=0.009$), and socio-economic factors, age ($\beta=0.163$, $p=0.041$), affordable diet ($\beta=0.170$, $p=0.048$) and diet available in the locality ($\beta=0.224$, $p=0.008$). In conclusion, there is need to improve diet adherence in order to control and reduce complications development in Type 2 diabetes management. Recommendations were that during counselling sessions, efforts should address the identified factors and risk perceptions, in order that they positively influence diet adherence in the management of Type 2 diabetes in Kenya.

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ACRONYMS

ADA- American Diabetes Association

CDC- Centre for Disease Control

CVD- Cardio Vascular Disease

DASH- Dietary Approaches to Stop Hypertension

FDA- Food and Drugs Administration

HBM- Health Belief Model

JOOTRH- Jaramogi Oginga Odinga Teaching and Referral Hospital

JOOTRH-ERC-Jaramogi Oginga Odinga Teaching and Referral Hospital, Ethical Review Committee

MNT- Medical Nutrition Therapy

MUERC- Maseno University Ethics Review Committee

NCGMD- National Clinical Guidelines in the Management of Diabetes Mellitus

NIDDM-Non-Insulin Dependent Diabetes Mellitus

OARAC-Office of AIDS Research Advisory Council

SGS- School of Graduate Studies

TPB- Theory of Planned Behaviour

DEFINITION OF OPERATIONAL TERMS

Diet adherence: the extent to which patients follow the recommended diet for Type 2 diabetes

Diet adherence pattern: the extent to which patients will follow the recommended diet for Type 2 diabetes as directed by their health concerns

Dietary management options: Guidelines on food consumption in the management of a condition. In this case, advice to consume complex carbohydrates, foods with a low glycemic index, polyunsaturated fats, monounsaturated fats, fruits and vegetables, reduced salt and sugar, and consistency in following a diet plan, in the management of Type 2 diabetes.

Glycemic index: In this study, foods with high glycemic index are those that tend to rapidly increase blood sugar when consumed. They include commonly consumed foods; Irish potatoes, sweet potatoes, water melon, ripe bananas

Perceptions: These are beliefs held by an individual, which will determine how they will behave or motivate them to behave in a certain way. For this study, they will be limited to constructs from the Theory of planned behaviour (TPB) and the Health belief model (HBM) that determine if an individual will adopt a behaviour, based on motivation and the extent, magnitude and timing of consequences, of not adopting the behaviour. They will include perceived severity, perceived susceptibility, attitude, subjective norm, perceived behaviour control and perceived benefits of the behaviour. They could have a positive or negative influence on behaviour.

Risk perceptions: These are perceptions that influence behaviour, and if not addressed, will have a negative influence on adherence to dietary management options in the management of Type 2 diabetes.

Type 2 diabetes: The most common form of diabetes, that develops in adulthood and is often associated with poor eating habits and poor weight management. It is also known as adult onset or non-insulin dependent diabetes mellitus (NIDDM)

Saturated fats and trans fats: in this study, they refer to fats that increase levels of low-density lipoprotein due to their structure. They include animal fats such as butter and lard (saturated) and plant oils which have been solidified (trans fats) such as margarine and cooking fats “*kimbo, chipo, chipsy, mallo*” among others

Whole grain carbohydrate: in this study, it refers to foods made from unrefined flour. That is maize, wheat, sorghum and millet flour that has been ground without removing the outer ‘skin’.

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CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Diabetes is defined as a metabolic disorder, characterised by chronic high blood sugar levels, with disturbances of carbohydrates, fat and protein metabolism, resulting from deficits in insulin secretion, insulin action or both (ADA, 2010). Generally classified as Type 1 diabetes and Type 2 diabetes, Type 1 diabetes occurs when the pancreas does not produce insulin, and requires insulin replacement. In Type 2 diabetes, there is a reduced action of the beta cells responsible for insulin production (Donath & Halban, 2004; Steyn, Lambert, & Tabana, 2009) and the body cannot effectively produce or secrete the insulin that it needs in relation to rising blood sugar (Gannon & Nuttall, 2006). In the course of time, untreated diabetes results in blindness, kidney failure and lower limb amputation, and also leads to the onset of cardiovascular disease, the leading cause of death in diabetes patient's (Roglic & Unwin, 2010; Boyle, Theodore, Gregg, Barker, & Williamson, 2010; Gregg *et al.*, 2007).

Studies indicate that non-communicable diseases such as diabetes will in future contribute to more deaths than communicable diseases (Shaw, Sicree, & Zimmet, 2009; Mario & Sridavi, 2008). Predictions based on a number of studies indicate a growth in disease burden of diabetes especially in developing countries with indications that between 2010 and 2030, there will be a 69% increase in the number of people with diabetes (Shaw *et al.*, 2009; Motala & Ramaiya, 2010). Kenya, a developing country, has not been spared, with statistics showing an increase in Type 2 diabetes prevalence, from 3.3% in 2010 to an expected 4.5% in 2025 (National Diabetes

Control Programme, 2010; McFerran, 2008) and a growth in the disease burden (Kayima, 2002; Dropkin, 2010; Mario & Sridavi, 2008).

While management for Type 1 diabetes is purely reliant on insulin therapy, Type 2 diabetes can be controlled and prevented through lifestyle changes that include weight and diet management (Crandall, Knowler & Kahn, 2008; Gilles *et al.*, 2007; Makrilia & Katsilambros, 2008). Studies show that weight and diet management, improve metabolic outcome and reduce the risk of complications development, in Type 2 diabetes (Chorzempa, 2006; Cornier *et al.*, 2008; Steyn, 2009; Parillo, 2004; Kayima, 2002; Miller *et al.*, 2002; Gutschall *et al.*, 2009; Copell *et al.*, 2010). This implies a relation in the management of Type 2 diabetes using diet to reduce complications and death from untreated diabetes. Yet, studies show, that the extent to which patients follow the recommended diet regime given by a health care provider, also defined as adherence to diet (Sabate, 2003), is below optimal in most cases, ranging from 22% to 70% (Broadbent *et al.*, 2011; Adewale, Langalibalele, Malete, Govendar, & Ogunbanjo, 2013; Peyrot *et al.*, 2005).

The indication is that there is a high rate of non-adherence to treatment in the management of Type 2 diabetes in different parts of the world (Emilio *et al.*, 2013). This is the case, even when patients managing the condition have the knowledge on the recommendations given. There is evidence that if patients adhere to the diet recommendations given in the management of Type 2 diabetes, they are able to control blood glucose and manage the development and treatment of complications (Bantle, Wylie-Rosett, Albright, Apovian, & Clark, 2008; Bloomgarden, 2009;

Boden, Sargrad, Homko, Mozzoli, & Stein, 2005). This will assist to reduce cost of diabetes management and improve the general economy, as it will ensure a healthy working population.

Diet adherence, which is vital in the management of Type 2 diabetes, is below average in studies carried out, mostly in developed countries, even with indications of a growing disease burden in developing countries. In order to improve dietary management of Type 2 diabetes, it is important to establish the diet adherence levels, to allow initiation of interventions that improve or maintain these adherence levels. This is so, especially in developing countries, like Kenya, where this information is currently inadequate. To compound on this, Kisumu town in Kenya, having recently been elevated to a city status is most likely to experience the challenges faced by other communities undergoing urbanisation. These include an increase in fast food outlets and the number of supermarkets selling ‘ready to eat’ foods. The availability of these foods, rich in processed fats, sugar and carbohydrates, pose a challenge to adherence to diet recommendations in the management of Type 2 diabetes (Misra & Khurana, 2008; Fagherazzi *et al.*, 2013; Ramachandra, Mary, Yamuna, Murungasan, & Snehalatha, 2008). This study sought to assess the level of adherence to diet for clinic attendees in Kisumu, Kenya, managing Type 2 diabetes.

In Africa, non-adherence to diet in the management of conditions has been associated with several socio-economic factors. These include gender, urbanisation, cost of food, irregular follow up by primary care giver, poor patient-health giver relations, lack of information or not well understood information, level of education, tendency to eat out and lack of self-discipline (Khan, Al-Abdul, Al Aithan, Bu-Khamseen, Al Ibrahim& Khan, 2012; Kalyango, Owino & Nambuya, 2008; Adewale *et al.*,2013). In Kenya, non-adherence to treatment has been associated with

among other things, poverty, since 46% of Kenyans live on less than a dollar per day and may not afford the recommended diet (National Diabetes Control Programme, 2010), taste of the food, diet monotony and sharing of food rations with other family members (Dibari *et al.*, 2012)

The indication here is that several socio-economic reasons have been cited for non-adherence in different parts of Kenya and of the world. Unless the real issues affecting adherence are identified, they can not be addressed. The studies reviewed focused mainly on factors that cause non-adherence, yet it would also be important to identify those factors that facilitate adherence, in order that they can be addressed or promoted in cases where non-adherence is realised. This study therefore sought to identify the socio-economic factors affecting diet adherence in clinic attendees managing Type 2 diabetes in Kisumu, Kenya, in order that they may be handled to improve or maintain diet adherence levels in the management of Type 2 diabetes.

Diet is considered a lifestyle behaviour, and adoption of a recommended diet requires a change in behaviour (Omondi, Walingo, Mbagaya, & Othuon, 2010; Yannakoulia, 2006). As Yannakoulia (2006) points out “the overall act of eating not only includes nutrient and food intake, but also eating behaviour in relation to preferences, selection and consumption of food”(p.12). This gives a reference to the fact that eating as a behavioural practice may be influenced by, not only our knowledge of the nutritional benefits of the food, but also by our likes and dislikes, which can be a product of our beliefs. In this regard, some studies have tried to demonstrate that the beliefs held by individuals may influence diet behaviour (Blue, 2010; Brekke, Sunesson, Axelsen & Lenner, 2004; Brewer, Cuite, Herrington& Weinstein, 2004; Gardener & Housenblas, 2004; Astrom & Okullo, 2004; Gellar, Schrader, & Nanse, 2007).

These beliefs held by patients, and which may influence diet adherence behaviour, are manifested in their perceptions (Blue, 2010; Ajzen, 2006). These perceptions, drawn from two behaviour models, the Theory of Planned Behaviour (TPB) and Health Belief Model (HBM), include attitude, subjective norm, perceived behaviour control, perceived susceptibility, perceived severity and perceived benefits among others (Ratanusuwan, Indharapakdi, Promrerk, Komolviphat, & Thanami, 2005; Ajzen, 2006). Some studies have demonstrated that these perceptions influence behaviour (Blue, 2010; Brekke *et al.*, 2004; Brewer *et al.*, 2004; Astrom & Okullo, 2004; Gellar *et al.*, 2007) while some have demonstrated failure of the beliefs to influence behaviour (Gardener & Housenblas, 2004).

In application of the Health Belief Model (HBM) in dietary behaviour, the assumption is that if one considers themselves susceptible to a condition (perceived susceptibility), they are more likely to adopt behaviour that will reduce this susceptibility. In the same way, if they believe that a condition has serious negative consequences (perceived severity); they are more likely to adopt positive behaviour to avoid these negative consequences. It is also assumed that if one believes that they will have better outcomes if they adopt behaviour (perceived benefits), they will adopt it. Some studies have shown that it is not always the case. Perceived susceptibility to a condition, in some cases, does not result to adoption of appropriate behaviour (Edberg, 2007). The bottom line is that these beliefs will influence behaviour, either, to adopt good eating practices, based on the dietary recommendations given by the health care providers or not, in dietary management of Type 2 diabetes. It is therefore important to assess how these beliefs will influence dietary behaviour, given that Type 2 diabetes is on the increase.

Studies have shown that there is a low adherence, to long-term therapy for chronic illnesses such as diabetes (Adewale *et al.*, 2013; Ayieko, 2011; Kalyango *et al.*, 2008; Khan *et al.*, 2012). Most of the existing studies to identify the reasons for non-adherence have followed a single line of investigation focusing on either socio-economic, environmental or physical factors (Adewale *et al.*, 2013; Ayieko, 2011), while others have investigated the influence of perceptions (Adedimeji, Omolulu, & Odutolu, 2007; Blue, 2010; Gardener & Housenblas, 2004; Gellar *et al.*, 2007). Other studies have demonstrated that perceptions drawn from theTPB and HBM, may have influence on behaviour (Blue, 2010; Ajzen, 2006; Courneya, Plotnikoff, & Birkett, 2000; Brekke *et al.*, 2004; Conner, Norman, & Bell, 2002; Nagelkerk, Reick, & Meengs, 2006), yet still, some studies have demonstrated that the same variables may not influence behaviour (Blue, 2010; Edberg, 2007; Rothman *et al.*, 2008).

As studies continue to indicate a rise in the disease burden of Type 2 diabetes, and an increase in deaths related to its complications (ADA, 2008; Boyle *et al.*, 2010; Dropkin, 2010; Engalgau *et al.*, 2004; Maina, 2011), there is a need to intensify efforts towards its management, by exploring all the available options. Studies on non-adherence to diet, in Africa, are yet to focus on the role of perceptions, and yet it is clear, that the levels of non-adherence to treatment and nutrition therapy regimes, is still wanting (Adewale *et al.*, 2013; Ayieko, 2011; Dibari *et al.*, 2012; Saboate, 2003). In addition, information on diet adherence, which is vital for the management of Type 2 diabetes, is inadequate in Kenya, and may hamper efforts for improvement. It is for this reasons that this study sought to assess diet adherence levels, and investigate the influence of perceptions, among other socio-economic factors, on adherence to diet in the management of

Type 2 diabetes in Kenya, in order that they may become an area of focus in Diabetic education and counselling sessions

1.2 Statement of the Problem

In Kenya, an estimated 1.2 million people have diabetes, in which Type 2 diabetes accounts for 85-90% of this disease burden (National Diabetes Control Programme, 2010; McFerran, 2008). The consequences for unmanaged diabetes are eyes, heart, kidney, feet, blood vessels complications, and finally death. The implication is that there will be an increase in the health care costs of managing diabetes (ADA, 2008; Zhang, Zhang, & Brown, 2010; Zhang, Dall, & Mann, 2009). To reduce this cost and improve health and productivity in individuals with Type 2 diabetes, there is an advocacy for lifestyle changes, which include diet modification, as adoption of a healthy diet has shown to improve blood glucose (Jenkins *et al.*, 2008; Hu *et al.*, 2001). However, diet being a behaviour, and like other behaviours, is not easy to control, and changes made in its modification are barely sustained, derailing the efforts to control blood glucose and manage complications (Copell *et al.*, 2010). To compound on this, Kisumu, the main city in Nyanza region, has experienced a rapid growth since its elevation to city status in the year 2000, causing an increase in supermarkets and street food vendors, offering ‘ready to eat’ and processed foods, rich in fats, refined carbohydrates and sugars, a potential risk in dietary management of Type 2 diabetes. This study recognizes that diet plays an important role in the management of Type 2 diabetes (Jenkins *et al.*, 2008; Hu *et al.*, 2001) and that adherence to diet therapy is below average in most conditions (Adewale *et al.*, 2013; Ayieko, 2011; Saboate, 2003), Type 2 diabetes included. Yet, there is inadequate information on the level of diet adherence for clinic attendees with Type 2 diabetes in Kisumu, Kenya, to give a platform to address its improvement in case it is low, or maintenance in case it is adequate. This study also

recognizes that diet adherence, being a behaviour, can be influenced by individual beliefs or perceptions (Blue, 2010; Nagelkerk *et al.*, 2006; Rothman *et al.*, 2008) and other factors (Khan *et al.*, 2012; Kalyango *et al.*, 2008; Adewale *et al.*, 2013; Ayieko, 2011; Saboate, 2003). Yet still, no studies have been published on the influence of these beliefs and factors on diet adherence, in the management of Type 2 diabetes in adults in Kisumu, Kenya, in order that they may be addressed to improve or maintain adherence. This study sought to establish the level of adherence to diet in the management of Type 2 diabetes in Kisumu, and the socio-economic factors and perceptions that influence diet adherence. This, in order to provide a basis to improve or maintain diet adherence levels in dietary management of Type 2 diabetes in clinic attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital (JOOTRH) in Kisumu, Kenya.

1.3 General Objective

The general objective of this study was to investigate the influence of risk perceptions on diet adherence in dietary management of Type 2 diabetes in clinic attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital

1.3.1 Specific Objectives

The specific objectives of this study were:

1. To assess the level of adherence to diet in dietary management of Type 2 diabetes in clinic attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital
2. To assess the influence of socio-economic factors on diet adherence in dietary management of Type 2 diabetes

3. To assess the influence of risk perceptions on diet adherence in dietary management for Type 2 diabetes clinic attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital

1.4 Research Questions

This study sought to answer the following questions:

1. What is the level of adherence to diet, in dietary management for Type 2 diabetes clinic attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital?
2. What socio-economic factors influence diet adherence in dietary management of Type 2 diabetes?
3. What risk perceptions influence adherence to diet in dietary management for Type 2 diabetes clinic attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital?

1.5 Significance of the Study

It is an assumption that because patients with diabetes receive advice on dietary management, they will put in place efforts to ensure that they manage their diet. This study considered a growing disease burden and that diet adherence in management is vital in preventing and reducing complications. The study also considered that information on diet adherence levels in Kenya, more so in Type 2 diabetes management, which is necessary to make focused recommendations is inadequate. It sought to assess the level of adherence to diet in the management of Type 2 diabetes, to provide a basis for improving it if low or maintaining it if adequate. This study also recognizes that different socio-economic factors will influence diet adherence and sought to establish those socio-economic factors that influence diet adherence in JOOTRH, in Kisumu. This will provide a basis for action implementation to address those socio-economic factors that derail or improve diet adherence. Finally, this study recognizes that

adherence to diet being behaviour, can be influenced by beliefs and sought to establish these beliefs. Once established, these beliefs will be addressed in counselling sessions to improve or maintain diet adherence. These findings therefore, will provide the information needed to improve adherence to diet, which will enable patients to manage and control the development of complications in the management of Type 2 diabetes. In the end, this will improve quality of life and reduce healthcare costs for people with Type 2 diabetes in Kenya.

1.6 Assumptions of the Study

The study was based on the assumption that the respondents had been receiving advice on standardized dietary management of Type 2 diabetes based on the national guidelines.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This section discusses literature related to the study. It addresses areas that other scholars have highlighted, gaps and conflicting study results

2.2 Adherence to Diet in Management of Type 2 diabetes

Type 2 diabetes, which can be managed by diet adherence, is currently on the rise, and so is the medicare cost and loss of productive population (National Diabetes Control Programme, 2010; Crandall *et al.*, 2008; Gilles, Abrams, & Lambert, 2007; Copell *et al.*, 2010). The efforts to manage diabetes are categorised as primary and secondary prevention. In primary prevention, individuals at risk of developing diabetes are identified in order to manage their condition. This is because Type 2 diabetes is preventable through lifestyle changes, which also play a role in reducing other communicable diseases such as heart diseases and high blood pressure. Secondary prevention of diabetes involves the early detection and prevention of complications, which in turn reduces the need for treatment and related costs of hospitalisation, and is more beneficial in terms of quality of life protected (National Diabetes Control Programme, 2010; Crandall *et al.*, 2008; Gilles *et al.*, 2007). There is evidence that good control of blood glucose levels through dietary interventions can substantially reduce the risk of developing complications and slow their progression in all types of diabetes (Copell *et al.*, 2010).

Dietary management of Type 2 diabetes is part of the Medical Nutrition Therapy (MNT), whose focus is to maintain blood glucose levels to as near normal as possible. In addition, it strives to maintain a lipid and lipoprotein level that reduces the risk for vascular diseases, a major complication in Type 2 diabetes management. Finally, efforts are made to maintain blood

pressure levels in the normal range or as close to normal as possible (Bantle *et al.*, 2008). The general agreement is that patients should receive dietary counselling by a professional nutritionist, and have their diets tailored to suit individual needs, taking into consideration individual preferences, cultural practices and the willingness to change (Bantle *et al.*, 2008; CDC, 2004; Esposito, Kastorini, Panagiotakas, & Giugliano, 2010).

Diet recommendations for Type 2 diabetes are tailored from the goals of MNT, and are dependent on whether the need is primary, secondary or tertiary prevention. In primary prevention, the focus is to identify individuals at risk of developing Type 2 diabetes and prescribe a diet mostly aimed at weight reduction. In secondary prevention, the focus is to prevent the development of complications in individuals with Type 2 diabetes. In tertiary management, the focus is to control the microvascular and macro vascular complications of Type 2 diabetes (National Diabetes Control Programme, 2010). Patients are guided to modify their diets depending on whether they are in primary, secondary or tertiary levels of management.

All the reviewed studies, give recommendations for dietary management of Type 2 diabetes based on guidelines given for MNT. In this case, the general agreement is that dietary counselling has to be carried out by a dietician or nutritionist preferably with an interest in diabetes mellitus. They also agree that restrictions on calorie intake should be minimal, to provide the required energy and avoid the breakdown of protein by the body for energy needs. In all cases, diets have to be tailored to suit individual needs, preferences and cultural practices. (Bantle *et al.*, 2008; Klein *et al.*, 2004; Copell *et al.*, 2010; Savoca & Miller, 2001; Thomas &

Elliot, 2010; Davis & Miller, 2006; Boden *et al.*, 2005; Schulze *et al.*, 2004; Wardlaw, 2003; Jenkins *et al.*, 2008; National Diabetes Control Programme, 2010).

In Kenya, the National Clinical Guidelines for Management of Diabetes Mellitus (NCGMD) provides in comprehensive details how to manage the condition, borrowing heavily from MNT on dietary management aspects. However, in some areas, they seemed to conflict with American Diabetes Association (ADA), as seen in the advice given for intake of simple sugars in food, alcohol and artificial sweeteners. While the NCGMD recommends that they be avoided (National Diabetes Control Programme, 2010) the ADA has no restrictions for as long as their intake is within the Food and Drugs Administration (FDA) limits (Bantle *et al.*, 2008). The ADA also cautions on food restrictions, unless there is scientific evidence that it is detrimental to the management of Type 2 diabetes (Bantle *et al.*, 2008).

All the reviewed diet recommendations suggest that after a series of tests is done to ascertain blood sugar, blood pressure and lipid levels, then, a diet plan is drawn, in agreement with the patient's needs. Generally, it includes increased replacement of simple carbohydrates with whole grain carbohydrates and legumes. In addition, it calls for increased consumption of fruits and vegetables, reduced salt, saturated and trans fat intake (Bantle *et al.*, 2008; CDC, 2004; Copell *et al.*, 2010; Gouveri *et al.*, 2011; Greenwood *et al.*, 2013; Hodge, English, O'dea, & Giles, 2004; Hu *et al.*, 2012; Hu & Malik, 2010; Jenkins *et al.*, 2008; Savoca & Miller, 2001; Steyn *et al.*, 2009; Wardlaw, 2003; Cho, Qi, Fahey& Klurfed, 2013). The recommendation is in the type of fat, where polyunsaturated and monounsaturated fats found in plant oils are more favourable, compared to saturated and trans fats found in animal sources and solidified oils. This

recommendation is because trans fat and saturated fats increase low-density lipoprotein in the body predisposing individuals to cardiovascular diseases (Wardlaw, 2003; Hu & Willet, 2002).

According to the Centre for Disease Control (CDC) fact sheet, diabetes is a major cause for heart disease and stroke. It further states that control of low-density lipoprotein cholesterol, found in animal fats sources, helps reduce cardiovascular complications in diabetes by 12% (CDC, 2011). It is for this reason that dietary management advice focuses on control of low-density lipoprotein cholesterol, which increases with intake of saturated (found in fats from animal sources) and trans fats (solidified plant oils) (Hu & Willet, 2002; Wardlaw, 2003). Several studies have proved that increased consumption of simple sugars increases risk and complications in Type 2 diabetes management, and instead advocate for consumption of complex sugars (InteAct consortium, 2013; Fagherazzi *et al.*, 2013; Xi *et al.*, 2014; Koning, Malik, Rimm, Willet, & Hu, 2011; Malik *et al.*, 2010; Greenwood *et al.*, 2013). The CDC fact sheet states that higher percentages of adults with diabetes have high blood pressure or use prescriptions for hypertension (CDC, 2011). Studies indicate that the DASH (Diet Approach to Stop Hypertension) diet and consumption of whole grain carbohydrates, are associated with a lower risk of developing complications for Type 2 diabetes (ADA, 2008; Gouveri *et al.*, 2011; Hu, Pan, Malik, & Sun, 2012; Greenwood *et al.*, 2013; Liese, Nicholas, Xuezheng, D'Agostino, & Haffner, 2009; Fung *et al.*, 2008). Different studies have been able to demonstrate that these options for dietary management are useful in reducing risk and controlling Type 2 diabetes (InteAct consortium, 2013; Koning *et al.*, 2011; Schulze *et al.*, 2004; Esposito *et al.*, 2010; Hu *et al.*, 2012; Gonzalez, Barcadi, & Jimenez, 2011; Fara *et al.*, 2012; Gouveri *et al.*, 2011).

As seen in the above discussion, the main goal in managing Type 2 diabetes is to achieve near normal blood sugar levels, in addition to preventing and controlling the development of complications, which are more difficult and expensive to manage. Patients managing Type 2 diabetes will need to undergo regular check-up and have their diets drawn to suit each individual based on the three levels of management, primary, secondary and tertiary. The implication is that diet plans will be drawn which are geared towards preventing the onset of Type 2 diabetes (primary management), managing Type 2 diabetes (secondary management) or managing the complications of Type 2 diabetes (tertiary management). It is important therefore to go a mile further and assess the levels and focus of diet adherence for Type 2 diabetes patients who have been managing these condition in order to improve or maintain them if adequate.

The literature on diet, in the management of Type 2 diabetes clearly highlights its importance in blood glucose control, the main goal in managing the condition. It also takes into account the focus to manage other cardiovascular conditions associated with Type 2 diabetes. A critical look at the different guidelines also indicates deliberate efforts to make the diet recommendations appealing. It is therefore possible to say that even though people with Type 2 diabetes require a modified diet, other factors may determine what they eventually eat.

Adherence is the extent to which a person's behaviour, e.g. following a diet, corresponds with recommendations from a health care provider (OARAC, 2013; Saboate, 2003). Incidentally, different authors agree that there is no 'state of the art' measurement of adherence and the method chosen has to be reliable and valid (Saboate, 2003; Lewin *et al.*, 2009). The Self-care inventory, is one such measurement tool developed to assess patients perception of the degree to which they adhere to treatment recommendations for diabetes self care. Self care was then defined as the daily regime tasks done by patients to manage diabetes. Although it was

specifically designed for Type 1 diabetes, the tool contains several aspects used for Type 2 diabetes management. Since it is not based on an ideal regime, it allows for the possibility of varying treatment across individual and evaluates their perception of how well they adhere to their prescriptions (La Greca, 2004). Several studies have used this tool, testing it for validity and reliability, and found satisfactory internal consistency and strong test-retest reliability (Davies *et al.*, 2008; Lewin *et al.*, 2009).

There is a general concern about the scarcity of diet adherence data in diabetes management more so for developing countries, Kenya included (Sabate, 2003), with most studies on adherence done in developed countries (Broadbent *et al.*, 2011; Boden *et al.*, 2005; Emilio *et al.*, 2013; Peyrot *et al.*, 2005; Sabate, 2003). The few studies on diet adherence in the management of Type 2 diabetes done in developing countries (Adewale *et al.*, 2013; Khan *et al.*, 2012) barely focused on Kenya, which is among the African countries experiencing a rise in the prevalence and disease burden of Type 2 diabetes (Kayima, 2002; Maina, 2011; Mario & Sridavi, 2008). The few studies done to assess adherence to treatment regimes, in developing countries, have revealed high non-adherence levels, especially in developing countries, and in Kenya (Ayieko, 2011; Saboate, 2003; Dibari *et al.*, 2012; Adewale *et al.*, 2013). This happened even when patients understood the importance of adhering to treatment or diet regimes (Dibari *et al.*, 2012). Most of the studies carried out have described diet adherence as “below sub-optimal”, or below average (Broadbent *et al.*, 2011; Adewale *et al.*, 2013; Peyrot *et al.*, 2005). Moreover, such patients on a treatment regime who fail to adhere, risk hospitalisation and death (Ho *et al.*, 2006). Studies in other countries, except Africa, have attributed adherence to perceptions of illness and treatment, which have to be changed or enforced to enhance adherence (Broadbent *et al* 2011;

Harvey & Lawson, 2009). All the reviewed studies agree, and give diverse reasons on low adherence to diet therapy.

The NCGMD in Kenya, borrow heavily from the ADA statement on diet management, and in both cases, the agreement is that all personnel involved in diabetes care should be knowledgeable about MNT. They also agree that a registered dietitian or nutritionist should carry out nutrition care. However, they provide conflicting statements on simple sugars, alcohol and sweeteners intake, with the NCGMD recommending that they need to be avoided, while the ADA allows intakes that do not exceed the FDA limits. In addition, the ADA cautions on unnecessary restrictions unless otherwise there is proof that they are detrimental to management of blood glucose. The NCGMD, prohibit the intake of sugar, alcohol and sweeteners probably because most cases in Kenya are diagnosed when they are already in the complications stage (Kayima, 2002; Dropkin, 2010), while in developed countries, a more advanced medical care system allows for early detection and treatment. However, even with all the guidelines and efforts to manage Type 2 diabetes using diet, cases of non-adherence are still high, implying that there are other reasons hindering adherence. Furthermore, a larger percentage of the studies on adherence levels have been done in developed countries, with a few being done in developing countries. Yet there are indications that the disease burden for Type 2 diabetes in Africa and Kenya is increasing. It is therefore necessary to assess the level of adherence to diet to understand if the efforts made in MNT are bearing fruit, since dietary management of Type 2 diabetes is key to its control.

2.3 Socio-economic Factors in the Management of Type 2 Diabetes

The American Diabetes Association (ADA) and the Kenya National Clinical Guidelines in the Management of Diabetes Mellitus (NCGMD), mention as part of the dietary management of Type 2 diabetes, considering other factors such as individual needs and preferences, traditional eating and cultural practices, palatability and affordability of the food, dietary counselling and deliberate efforts made to enhance adherence (Bantle *et al.*, 2008; National Diabetes Control Programme, 2010). Several studies have attributed non-adherence to factors such as diet monotony, taste preferences, cost, poverty, eating out, long visit intervals, poor health provider-patient relationship, poor self discipline, lack of information or not understanding the information well (Adewale *et al.*, 2013; Ayieko, 2011; Khan *et al.*, 2012).

A study, to identify perceived barriers and strategies to effective diabetes management, revealed barriers that included lack of knowledge of a specific diet plan, lack of understanding of the plan of care and helplessness and frustration from lack of glycemic control and continued disease progression despite adherence (Nagelkerk *et al.*, 2006). In other studies, barriers included unavailability of healthy foods and lack of healthy recipes in restaurants (Brekke *et al.*, 2004) and the amount of time one could spend on preparing healthy foods (Gellar *et al.*, 2007). In another study carried out in Africa, to identify barriers to effective treatment and prevention of malaria, focusing more on East and West Africa countries, Kenya included, other barriers were cited. These were, among others, the cost and ease of use of preventive and treatment measures, the side effects, use of ineffective preventive measures, beliefs in the wrong causal agents, efficacy and use of conventional medicine and traditional therapies, distance to health facilities (Maslove *et al.*, 2009; McFerran, 2008).

In Africa, and Kenya, non-adherence is attributed more, to socio-economic factors, with little or no focus on perceptions, yet studies in other countries have shown that perceptions play a role in adherence to diet therapy. This, even when studies in Kenya have shown non-adherence where patients received information and were given food rations (Ayieko, 2011), implying that there could exist underlying reasons for non-adherence in such cases. It is in this faith that this study seeks to explore the perceptions in the presence of socio-economic factors, held by patients with Type 2 diabetes in Jaramogi Oginga Odinga Teaching and Referral hospital, and how they influence adherence to diet.

In all the reviewed studies, the focus has been on identifying the reasons for diet non-adherence, being that diet is key in the management of Type 2 diabetes. This gives an assumption that even though patients undergo the MNT there are still other factors affecting adherence to diet. Unfortunately, the key focus has been on factors that lead to non-adherence with little focus on those that promote adherence to diet. It is also important to identify the facilitators of diet adherence to harness them and use them to enhance adherence.

2.4 Influence of Risk Perceptions in Dietary Management of Type 2 Diabetes

The Theory of planned behaviour (TPB) seeks to explain why people perform certain actions (Ajzen, 2006) while the Health belief model (HBM) is based on the underlying concept that health behaviour is determined by personal beliefs or perceptions (Edberg, 2007). In the management of diabetes, diet recommendations have been made based on nutrition information and scientific findings about the benefits of different nutrients. They are meant to improve outcomes by enhancing blood glucose control (Ellis *et al.*, 2005), and require that patients adhere to these recommendations. Different studies have used constructs from both the TPB and the HBM, independently, to try and explain or predict dietary behaviour (Aljasem, Peyrot, Wissow,

& Rubin, 2001; Blue, 2010; Brekke *et al.*, 2004; Conner *et al.*, 2002; Walker, Flynn, Wylie-Rosett, Mertz, & Kalten, 2003; Fischoff, Bostrom, & Quadrel, 2002; Fisher *et al.*, 2002; Gellar *et al.*, 2007). They include attitude, subjective norm, perceived behaviour control, perceived susceptibility, perceived severity and perceived benefits among others (Ratanusawan *et al.*, 2005; Ajzen, 2006)

Attitude is a manifestation of the belief held by one, that the results of the action they take could be good or bad. Subjective norm on the other hand is the belief one holds, that someone close to them approves or disapproves what they do, while perceived behaviour control, is the belief held by one, that they would face obstacles and be able to overcome them as they try to change or adopt behaviour. Perceived susceptibility refers to the belief held by one that if they do not adopt healthy behaviour they are more likely to develop a condition based on e.g. family history of the condition. Perceived severity on the other hand, is the belief held by one that they will suffer dire consequences of a condition if they do not adopt or change behaviour and finally, perceived benefits refer to one's belief, that the outcome of adopting a behaviour would be good (Blue, 2010; Edberg, 2007; Fishbein & Ajzen, 2010; Harvey & Lawson, 2009).

Attitude in this study, is defined as one's belief of whether what they achieve by performing behaviour is positive or negative (Blue, 2010; Omondi *et al.*, 2010). In the application of the TPB, a person's attitude and perceived behaviour control have shown a strong association with the intention to behave in a certain way (Armitage & Conner, 2001). Other studies have also shown that there is a relation between attitude and the intention to eat healthy (Brekke *et al.*, 2004; Conner *et al.*, 2002; Nejad, Wertheim, & Greenwood, 2004). In this case, a person may

decide to eat or not to eat depending on what they feel is good to them. In other words, even if they had been taken through the MNT and have all the information about the benefits of diet adherence, unless they convince themselves that the recommended diet is good for them, they may not adhere. It is therefore important to find out how attitude influences diet adherence, how patients managing Type 2 diabetes perceive the recommended diet, if they think it is good for them or not, and how this influences their adherence to this diet.

Perceived Susceptibility refers to the belief that one is at risk of developing a condition based say on family history of that condition. Perceptions of illness were shown to influence adherence to diet and other recommendations in diabetes management (Harvey & Lawson, 2009; Broadbent *et al.*, 2011; Nagelkerk *et al.*, 2006). In another study, carried out on diabetic patients, it was shown that good risk communication played a role in improving patients' choice and self-management in health care (Macadam & Clarke, 2006). Another study revealed that people, who believe that they are at risk for a particular condition, will engage in behaviour that will reduce that risk (Fischoff *et al.*, 2002; Brewer *et al.*, 2004). On the other hand, a study carried out in Nigeria to assess the effect of perceived risk of HIV infection on sexual behaviour, found a negative correlation, in that perceived risk did not result to adoption of appropriate behaviour (Adedimeji *et al.*, 2007).

In other words, the assumption is that, if a person feels that they are more at risk of a condition, they will engage in behaviour that will reduce the risk. The implication is that if patients managing Type 2 diabetes believe that they are at risk of suffering from complications, and that they can avoid these complications if they adhere to the recommended diet, then they will

adhere. As seen in the reviewed studies, they may or may not adhere, and it is therefore important that the communication they get be tailored to what they believe. Before tailoring this information, it is thus important to understand what perceived susceptibility does to diet adherence, if it enhances it or not.

Perceived benefits refer to the belief that one has, that they will achieve good results if they behave in a certain way. Studies have demonstrated that there is a relationship between perceived benefits and undertaking of exercise in management of Type 2 diabetes (Ratanusuwan *et al.*, 2005). In another study, a meta-analysis of health beliefs and diabetes care, self-efficacy, beliefs about personal consequences of adherence (also perceived benefits) and perceiving a positive relationship with the care givers, were strongly associated with adherence (Gherman *et al.*, 2011). In this case, it is assumed that if someone believes that they will get better if they adhere to the recommended diet, then they will adhere. It is important to assess how this perception influences adherence in order that messages given during counselling are tailored around getting well. This has also to be carefully done depending on the stages of management. For example in primary prevention where persons at risk of Type 2 diabetes are identified, communication on the benefits of diet can be used to make them adhere and escape the condition. In cases of secondary prevention, where Type 2 diabetes has set in, and can no longer be prevented, then the benefits of reducing complications by diet adherence can be communicated. Finally, in tertiary prevention, where the complications of Type 2 diabetes are being managed, then it is also important to stress the importance of diet adherence in managing the complications for a longer and more productive life. Before such communication is given, it is important that its influence on diet adherence be assessed to enable it to be manipulated to increase diet adherence.

Perceived behaviour control on the other hand is seen as an individual's belief of how easy or difficult it would be to carry out behaviour (Blue, 2010; Omondi *et al.*, 2010). In one study, people who were more adherent to self-care behaviours like exercising, eating healthy, taking insulin were more confident that they could perform these behaviours as recommended (Gherman *et al.*, 2011). Diet adherence has been described as a behaviour (Yannakoulia, 2006) which a person may or may not carry out. In this case, a person may understand that they will face barriers in their adoption of a behaviour, but believe that they will overcome those barriers and adopt the behaviour. It would be important to understand how people with Type 2 diabetes perceive the ease with which they will be able to adopt the recommended diet. This will enable the tailoring of information and counselling sessions geared towards confidence building and self-belief, in case this perception enhance diet adherence

Subjective norm is defined as the belief that people close to one will influence their behaviour. The influence of relevant people in dietary behaviour has been demonstrated in different studies. In this case, barriers to healthy eating included the social situation (Gellar *et al.*, 2007), and fear of being scolded (Maslove *et al.*, 2009; McFerran, 2008). On the other hand, facilitators of healthy eating were cited as parental behaviour such as monitoring food choices and positive modelling (Gellar *et al.*, 2007). The indication here is that the decision to or not to adhere to diet recommendations may be influenced by someone close to the patient. In this case, therefore, during counselling sessions, the facilitators of diet adoption have to be identified and if possible made part of the session. Efforts also have to be made to disassociate the patient to people who

will inhibit adherence to the recommended diet. It is therefore important to identify if people close to the patient will enhance or inhibit adherence so that they can be addressed.

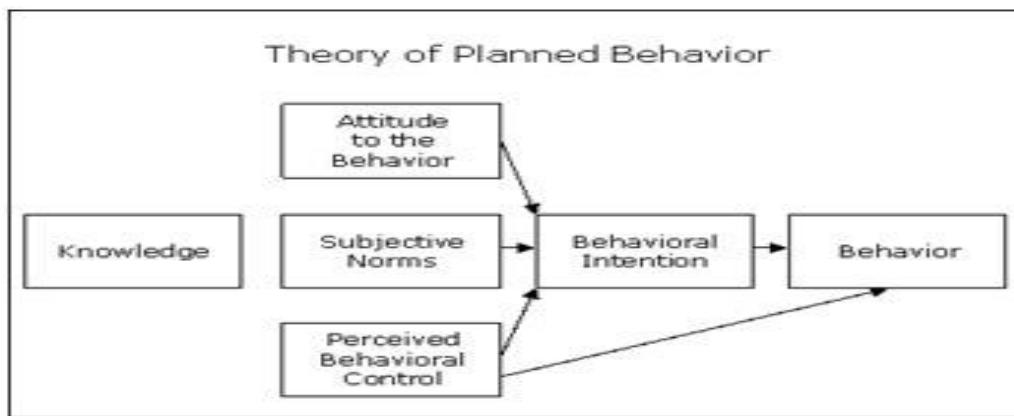
Effort has been made in education and providing information about dietary management of Type 2 diabetes, with patients going through elaborate counselling sessions to understand the importance of adherence. The agreement here is that it still takes more than just education to enhance and sustain adherence to diet plans. The implication is that existing perceptions might influence the management of Type 2 diabetes, regardless of existing guidelines on its management. These studies demonstrate that dietary behaviour, like any other health behaviour, is affected by the existence of socio-economic and psychosocial factors such as attitude, subjective norm among other different perceptions. It is also possible that the same perceptions such as perceived risk, held by different people will not necessarily influence them to behave in the same way.

In Kenya, few studies on the role of perceptions on behaviour have been done, with most studies focusing on socio-economic and physical factors. The management of Type 2 diabetes by lifestyle changes, diet included, require a life long commitment. Diet change, being a behaviour is a result of an individual doing what they believe is good or bad for their overall well being. This change can be facilitated by availability of the recommended diet options and also by beliefs held by individuals about the adoption of these recommended diet. Based on the information that adherence to diet recommendations remain low (Adewale *et al.*, 2013; Ayieko, 2011; Dibari *et al.*, 2012; Saboate, 2003) even when information is availed there is need to investigate how other factors such as beliefs among other socio-economic and patient factors can

influence diet behaviour in adults managing Type 2 Diabetes in Kisumu. This, in an effort to improve or maintain diet adherence, which has been seen to be below average in most studies, yet is vital in the management of the condition (Ayieko, 2011; Emilio *et al.*, 2013; Khan *et al.*, 2012; Maina, 2011).

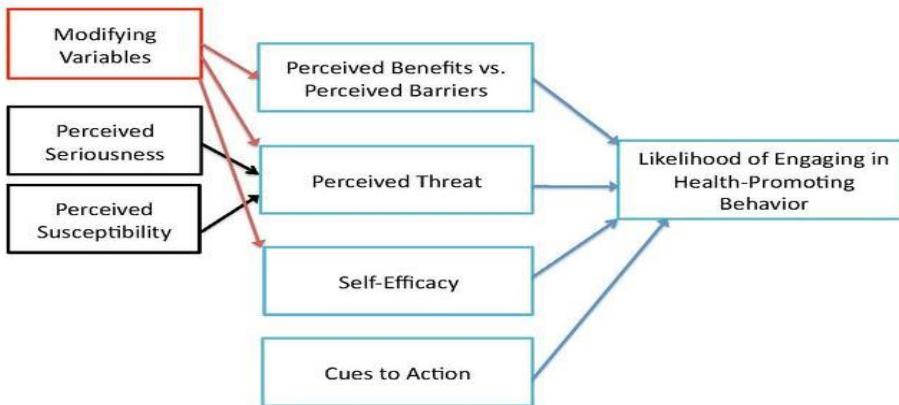
It therefore calls for a different dimension, in the face of a growing disease burden, to assess existing perceptions and if they are likely to play a role in adherence to diet in the management of Type 2 diabetes. It was therefore necessary to assess risk perceptions held by different individuals, and how they affect adherence to diet, in the management of Type 2 diabetes. Incidentally, not much had been done in identifying the interaction and influence of different perceptions and how they would eventually influence dietary behaviour. This study sought to assess the influence of different perceptions, drawn from the Theory of Planned Behaviour and Health Belief Model on diet adherence in the management of Type 2 diabetes.

2.5 Conceptual Frameworks



Adapted conceptual framework: The Theory of Planned Behaviour Model (Ajzen, 1988)

Figure 2.1: Theory of Planned Behaviour Model



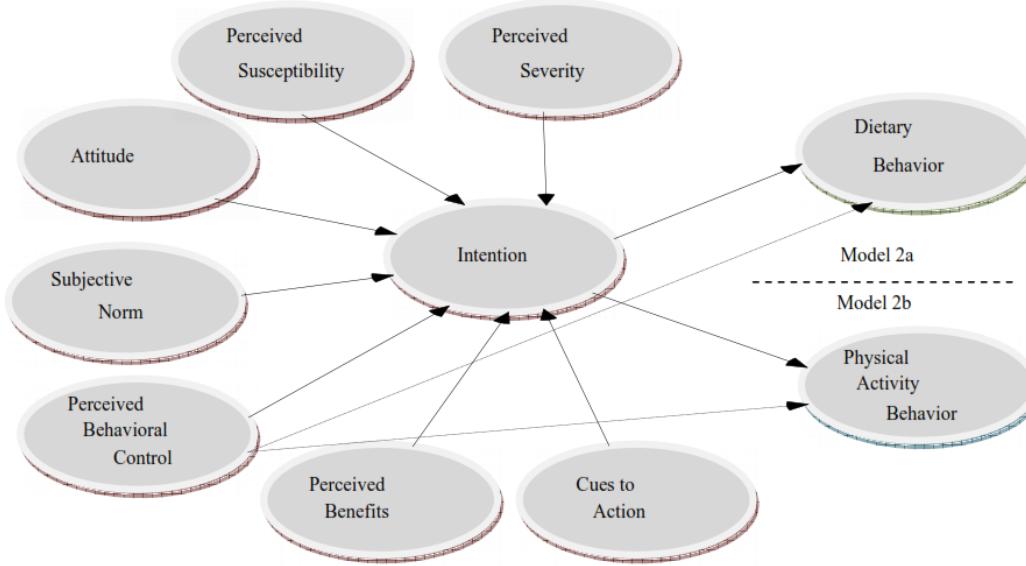
Adapted Conceptual framework: Health Belief Model (Rosenstock, 1974)

Figure 2.2: Health Belief Model

In the TPB, the best single predictor of a person's behaviour is the intention to perform that behaviour. These intentions on the other hand are a function of the persons attitude (positive or negative evaluation of performing a behaviour), subjective norm (perception of whether relevant others think one should or should not perform a behaviour) and perceived behaviour control (perception of the ease or difficulty of carrying out a behaviour) (Ajzen, 1988). The HBM is based on motivation to adopt positive behaviour in order to avoid negative health consequences. It states that; perceived susceptibility (factors such as family history that make individuals more at risk to certain conditions), perceived severity (concerns about the seriousness of the condition), perceived barriers (an individual's own perception of the obstacles to adoption), perceived benefits (the belief that the advised action will reduce risk or seriousness of impact), cues to action (strategies that support action) and self-efficacy (confidence that they will act) will motivate a person to adopt positive behaviour (Rosenstock, 1974; Edberg, 2007).

In an attempt to improve the original Theory of Planned Behaviour (TPB) model, and explain that other than attitude, subjective norm and perceived behaviour control, other intervening

factors drawn from the Health Belief Models may have an effect on the original model, another model was proposed (Omondi *et al.*, 2010). In his proposed model, Omondi *et al.*, 2010, sought to improve the TPB model by adding four more variables, perceived severity, perceived susceptibility, perceived benefits and cues to action (Omondi *et al.*, 2010).



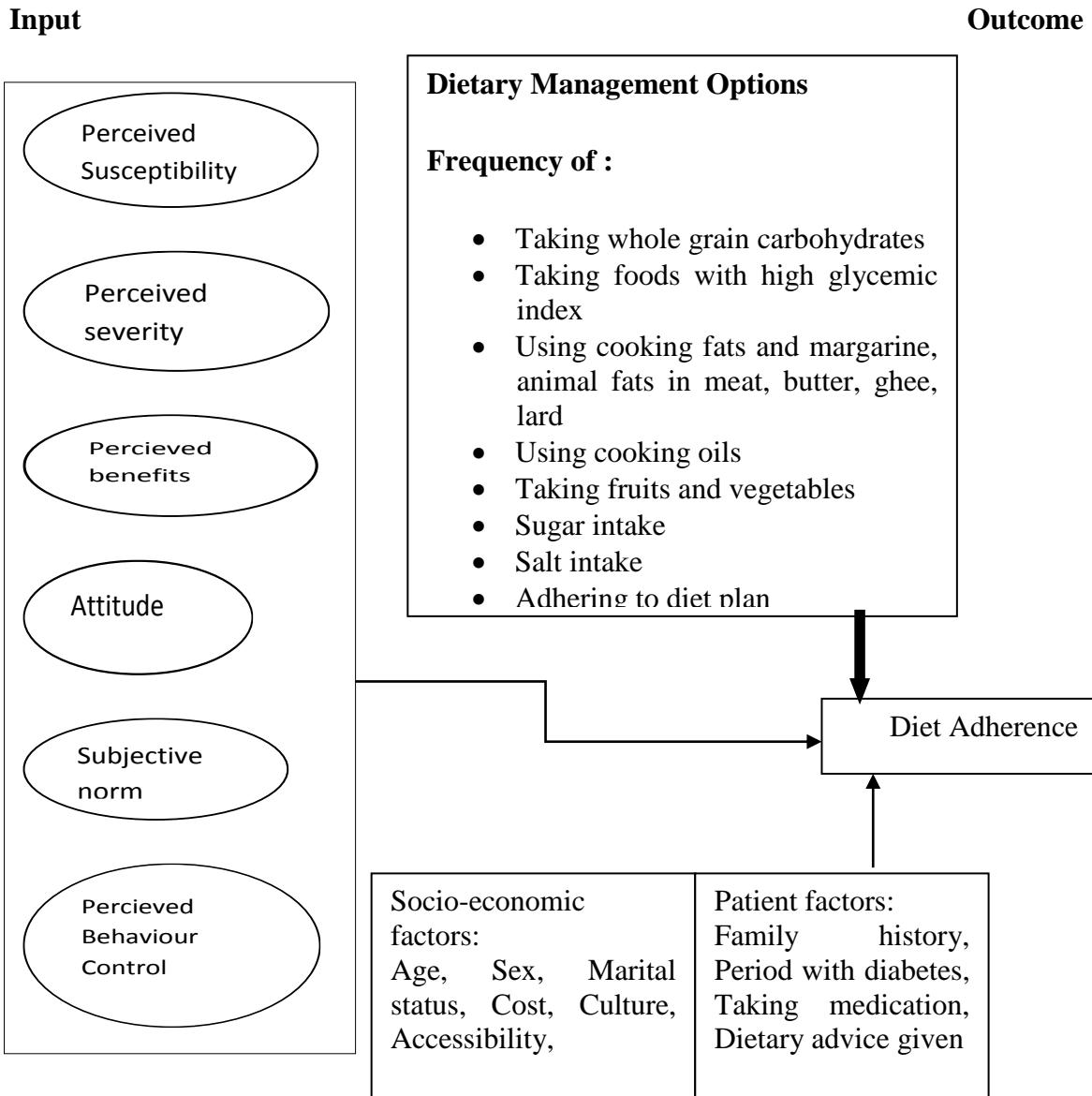
Adapted Conceptual framework: Modified Theory of Planned Behaviour Model (Omondi *et al.*, 2010)

Figure 2.3: Modified Theory of Planned Behaviour Model (MTPB)

2.6 Operational Framework

The operational framework (figure 2.4) was guided by the Modified TPB model (MTPB), which includes as predictors of behaviour, other factors that were not in the original TPB model. In this framework, the influence of risk perceptions was limited to perceived susceptibility, perceived severity, perceived benefits from the health belief model and attitude, subjective norm and perceived behaviour control from the theory of planned behaviour model. The intention to adopt was left out, and instead adherence to diet management options for Type 2 diabetes, against an

individual's perceptions was measured, while cues to action was not a perception as defined by my study, though it may have an impact on beliefs. The influence of each of these perceptions that presumably influence adherence to dietary intake was measured against adherence factors derived from a combination of dietary management option statements. The overall influence of these perceptions on adherence to dietary management was determined, while considering economic, cultural and environmental factors. On the other hand, adherence to dietary management of Type 2 diabetes was derived from evaluating the average score from the 12 statements that describe the diet recommendations given by the different bodies, based on MNT for management of Type 2 diabetes. Other factors that could affect diet management were considered under socio-economic factors. All this was considered in relation to the goal of Type 2 diabetes management which is to control blood glucose



Adapted from “Advancing the Theory of Planned Behaviour within Dietary and Physical Domains among Type 2 Diabetes: A Mixed Method Approach (Omondi *et al.*, 2010)

Figure 2.4: Influence of risk perceptions and socio-economic factors on diet adherence

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This section consists of steps the researcher used to accomplish the study. It includes a description of the study design, setting and population, the sample size and sampling procedure, data collection procedures and data analysis, a description of the research instruments, and ethical consideration measures.

3.2 Study Setting

This study was carried out at Jaramogi Oginga Odinga Teaching and Referral Hospital, which is the major referral hospital in Nyanza, Western and North Rift, serving over 12 districts in Nyanza alone and with a catchment population of over 5 million people in the three provinces (PPOA, 2010). Located along the Kisumu- Kakamega highway, the healthcare facility is a level five hospital, funded by the government of Kenya. The coordinates for the hospital are 34.77053°E -0.08923°N . It has approximately 400 operational in-patient beds and 4 outpatient clinics. The hospital holds a diabetic clinic every day of the week from Monday to Friday, receiving an average of eight patients every day. During the study, it was observed that a doctor specifically trained to manage diabetes, visits on Wednesday. To consult with him, the patients pay 100 Kenya shillings, and are required to wait for 15 minutes, as the doctor attends to other patients. On every visit, all patients attending the diabetic clinic have their weight, height, blood pressure and fasting blood glucose taken by a nurse. Each patient has a file with records on their age, weight, height, medication, and dates for the next clinic visit. All patients are advised on their diet by a nurse, who as part of the diabetes care team, has knowledge about nutrition and is able to educate patients about diet modification (National Diabetes Control Programme, 2010)

and only those who are admitted get the services of a nutrition counsellor, who visits the wards. One of the major challenges faced by the hospital is poor logistical support for outreach programmes such as Diabetes Care and the high cost of treatment for such conditions (PPOA, 2010).

3.3 Study Design

This study adopted a cross sectional study design to assess the association between an outcome (adherence) and its possible influencers (perceptions and socio-economic factors). The aim of this study was to describe people managing Type 2 diabetes in respect to adherence, and how it is influenced by risk perceptions and socio-economic factors. Interviews were conducted for 238 patients with Type 2 diabetes attending the diabetic clinic, gathering all the necessary information to assess diet adherence, socio-economic factors and perceptions.

3.4 Study Population

The population of this study was made up of all Type 2 Diabetics aged 35 years and above, attending the Diabetes clinic in Jaramogi Oginga Odinga Teaching and Referral Hospital. Type 2 diabetes, being mainly an adult onset condition, an adult in this study was considered as aged 35 years and above according to the Kenya government category. This age group was chosen based on statistics that show that they are more independent in terms of decision-making, which may include what and how they eat (Zepeda, Leigh, Ndirangu, Omollo, & Wainaina, 2013). In one month, about 160 of such individuals attend the diabetic clinic, which is held every week, from Monday to Friday, and in addition, the hospital receives an average of five new cases daily. These patients come from within the catchment of the facility, which include Nyanza, Western and North Rift

3.4.1 Inclusion Criteria

Male and female patients aged 35 years and above, with diabetes and had been managing Type 2 diabetes for at least 6 months.

Those patients who were able to hear and talk.

Those patients who agreed to sign the consent form and participate in the study.

3.4.2 Exclusion Criteria

All male and female in-patients managing Type 2 diabetes, since their diet is pre-determined.

3.5 Sample Size and Sampling Procedures

The sample, which consisted of 238 diabetic patients, was determined by the formula proposed by Yamane in 1967. The formula is as shown below;

$$n=N/1+N(e)^2$$

Where n is sample size

N is population size and

e is the level of precision:

$$n=N/1+N(e)^2=480/1+480(0.05)^2=218 \text{ patients}$$

The sample size was increased by 10% to account for contingencies such as non-response and recording error.

Therefore, $10/100$ of $218=21.8=22$, giving a total sample size of $218+22=240$ individuals (Yamane, 1967)

The population of 480 was arrived at based on the average number of individual patients who visit the clinic every day and the length of time it would take before they made their second visit. On average, eight individuals visit the diabetic clinic, which, is held every day of the week except on weekends, that is five days a week and about 20 days in a month. This means eight

individuals for 60 days or three months, after which they would be making a return visit, making a population of 480 individual patients. A sampling interval of every second patient was picked and interviewed based on calculations from the population size of 480 divided by the sample size of 240 to give two patients, and allow an even distribution. Two of the sampled patients declined to respond, even after signing the consent form and the study used responses from 238 patients. The researcher engaged the assistance of the health worker in charge to identify the patients required for this study, based on their records at the diabetes clinic. The health worker, after serving the patients directed those within the inclusion criteria to the waiting area, as opposed to the normal scenario where they would be allowed to leave for home. In cases where the second patient picked declined to participate in the study, or had been interviewed earlier, the immediate patient after him/her was picked and the process was repeated until the one who was willing to participate in the study or had not been interviewed. After this, the sequence would continue as stated. In this case, interviews were done only for those patients who met the inclusion criteria, and because two of the sampled patients declined to respond, even after signing the consent form, the study used responses from 238 patients.

3.6 Data Collection Instruments

The questionnaire included details for age, sex, occupation, medication, period with Type 2 diabetes, area of residence, marital status, and family history of Type 2 diabetes, income, culture, and availability and accessibility of food.

3.6.1 Dietary Habit Assessment Form

Data on dietary management was measured using seven variables on dietary management options based on recommendations for Type 2 diabetes as detailed in the NCGMD. The seven variables were broken down to 12 attributes to measure the frequency of intake of complex carbohydrates, high glycemic index foods, fats, fruits and vegetables, sugar, salt and finally adherence to the diet plan. Respondents rated the attributes to best describe their diet intake based on the statements: Never, Rarely, Sometimes, Often or Always, on a five-point likert scale (Appendix 3).

3.6.2 Risk Perceptions Assessment Form

The six variables under risk perceptions were operationalized using eight closed ended questions, that is, a question for each dietary management option, based on a five-point likert scale. Participants were required to circle the answer that best fits their description of their behaviour towards a given dietary management option (Appendix 3)

3.7 Data Collection Procedures

The researcher made a personal visit to the hospital and explained the nature and purpose of the research and the selection criteria to be used. Only patients, who had been directed to the waiting area by the health worker after checking their records to confirm eligibility and who signed the consent form, were interviewed. Patients were also asked if they had participated in a similar study before, to ensure that those who had been in the pilot study and those who had been interviewed earlier in the main study were not interviewed again. Due to the length and nature of the questions, that required probing, three enumerators, all of them undergraduate fourth year students undertaking a course in nutrition and dietetics with information technology (IT), at

Maseno University, assisted the researcher, to administer the questionnaire to the respondent using face-to-face approach. This took place every day of the week from Monday to Friday, during the diabetic clinic. It means all patients were sampled and interviewed during clinic days until the required sample size was reached. Data collection was done over a period of three months, within which it was possible to get a new set of patients. After this period, most of the patients interviewed before would be coming for their next check-up, and it would have led to double counting, where one patient is interviewed twice and counted as two people.

3.8 Measurement of Variables

3.8.1 Dependent Variable

3.8.1.1 Diet Adherence

Diet adherence was the dependent variable and was derived by collecting information on how much what they consumed was according to the given recommendations. In this case, data on the recommended dietary management options was collected using structured questionnaires with closed-ended items on a five-point likert scale. Respondents were asked to indicate the frequency with which their food intake matched the recommended dietary management options for Type 2 diabetes. The seven statements of dietary management options were represented by 12 attributes of recommended diet for Type 2 diabetes. Increased consumption of complex carbohydrates was represented as “carbohydrate intake is made from whole grain flour, that is, whole wheat, maize/millet/sorghum”. Reduced consumption of foods with a high glycemic index was given as “reduced intake of foods with high glycemic index” (a list of foods that have been known to lead to elevated blood sugar, comparable to intake of pure glucose). Reduced saturated and trans fat intake was represented as “use cooking oils”, which are of plant origin and have high contents of high-density lipoprotein, “reduce intake of margarine and or butter, “reduce intake of fats”,

mainly cooking fats and fats from animal products such as lard. There was need to isolate margarine, a transfat and butter an animal fat from cooking fats, and combine them based on their use, being that they are used mostly as spreads rather than for cooking. Increased consumption of fruits and vegetables was given as, “includes vegetables in all meals” and “includes fruit in all meals”. Reduced sugar intake as, “reduce use of sugar in food and beverages” and “reduce intake of sugar flavoured drinks and snacks”. Reduced salt intake as, “reduce intake of table salt” that is in cooking and when added to already cooked foods, and “reduce intake of salted snacks”. Finally, consistent adherence to the dietary plan, which is derived with the patient during counselling, as “adhere to diet plan”. These attributes were rated as “Never, Rarely, Sometimes, Often, And Always” in line with the respondents’ assessment of their own intake, with each respond represented by a corresponding number one to five, respectively. The numerical value score for diet statement for each participant were used to get a mean score of diet adherence for each participant, by adding up all their scores and dividing it by the total number of statements. The mean scores for all participants were added, and divided, by the total number of participants, to get a mean diet adherence; with a possible mean score between one and five, where one was the least score and five the maximum score. Finally, a percent level of adherence was derived by dividing the mean level of adherence by the maximum level, which was five, representing “always” in this case, and then multiplying by 100. To determine the focus of diet adherence by establishing a diet adherence pattern, principle factor analysis and linear regression was done for the 12 statements used to represent diet management options, to derive the main factors in diet adherence and show which statements accounted for most of the variance seen in the derived diet adherence factors.

3.8.2 Independent Variables

3.8.2.1 Socio-economic Factors

Socio-economic data was collected using a mix of open ended and closed questions. Open ended questions were used where expected answers were not similar, such as age, occupation, area of residence, while closed ended were used for questions that would generate a definite answer such as if the recommended diet was affordable, accessible, culturally accepted, or their employment status, sex and marital status.

3.8.2.1 Risk Perceptions

Data on perceptions was collected using closed-ended statements with respondents choosing responses that best align their views, from a five-point likert scale (Trochim, 2010). This structured questionnaire produced data that was analysed quantitatively to identify patterns and explore relations (Cohen, Manion, & Morrison, 2000). Being a closed-ended questionnaire, it only allowed respondents to choose from a presented set of responses (Barribeau *et al.*, 2005) and did not allow them to express themselves fully, but was preferred in this study because it is more specific than open- ended items and was therefore more likely to communicate similar meanings to different respondents. The weakness of likert scales was that respondents tend to respond in predictable terms (Trochim, 2010). This was eliminated in this study by having reversal questions, where the pattern of socially desirable responses was altered. For each risk perception, eight statements representing the diet management options were outlined, in which for each statement they were to indicate on a 5 point likert scale (from strongly disagree to strongly agree) their view about the statement. The eight statements for each perception were then subjected to factor analysis to derive possible perception factors for each risk perception, that would be measured against adherence factors.

3.9 Pilot Study

A pilot study was carried out using ten percent of the sample size and on the same population of clinic attendees managing Type 2 diabetes in JOOTRH. In this case, two enumerators, fourth year students from Maseno University, undertaking a course in nutrition and dietetics with IT, were trained to interview 24 patients in a period of one week three days. Measures were taken in the study to exclude these 24 from the final interview. The inclusion criterion was explained to the nurse in charge, and after attending to the patients, those who met the inclusion criteria were directed to the waiting area. Systematic random sampling was done where every second patient was picked and interviewed, if they agreed to participate. During the interview, it was possible to assess word order, grammatical errors, amount of time taken for interview, interpretation of questions by respondents and the type of responses that would be provoked (Kombo & Tromp, 2006). The data was then entered into an SPSS spreadsheet, cleaned and analyzed to establish reliability of the instruments.

3.9.1 Validity and Reliability of instruments

Internal reliability was tested using Cronbach's reliability coefficient, α , which measures how closely related a set of items are as a group. This calculation is according to the formula $\alpha = rk/[1+(k-1)r]$, where k is the number of items considered and r is the mean of inter-item correlations. In this case, on the risk assessment form, questions were asked on past behaviour and the responses correlated with those on perceived behaviour control, which compares how they have been managing their diet in the past six months and how they will be managing their diet in the next one year, respectively. They being of equal length, and providing an alternative form of the other, establishment of reliability was based on correlating the results of the two sets, generating a cronbach's alpha, $\alpha = 0.9$, which showed that the tool was acceptable.

Internal consistency of the measurement scale, evaluated using Cronbach's alpha (Cronbach, 1951) was able to demonstrate adequate internal consistency for diet habit assessment ($\alpha = 0.7$), attitude ($\alpha = 0.7$), subjective norm ($\alpha = 0.8$), perceived behaviour control ($\alpha = 0.7$), perceived susceptibility ($\alpha = 0.7$), perceived severity ($\alpha = 0.9$), perceived benefits ($\alpha = 0.9$). Reliability coefficients of 0.7 or higher are generally considered to be acceptable for research purpose (Cronbach, 1951), therefore the questionnaire for this study was reliable.

The method used for assessment, in which respondents were asked to rate their adherence to diet behaviour, based on the recommended diet attributes, was modified from the Self care inventory (SCI) tool, developed by La Greca *et al*, 1988 (La Greca, 2004) and tested for validity and reliability in a recent study (Lewin *et al.*, 2009) and from methods used in similar studies (Davison *et al.*, 2014; Lewin *et al.*, 2006). On the other hand, for assessment of risk perceptions, the author followed the steps given in “ changing and predicting behaviour: the reason action approach” (Fishbein & Ajzen, 2010)

3.10 Data Analysis

Data was analyzed in Ms Excel 2003 and SPSS version 20 packages, using functions such as principal factor analysis, linear regression and formulas of summation and division. Descriptive and inferential statistics were used to analyse and interpret the data and group the respondents in terms of the general information i.e. age, sex, marital status, residence, level of education among others, and also assess the level of adherence to dietary management options.

Sample size was tested for adequacy based on Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy. In this test, factor analysis is only allowed for samples that give a KMO value of five or more, implying that the variables in the sample measure a common factor. Principal axis

factor analysis was done to derive possible adherence factors from a given set of recommended diet statements, and to derive risk perception factors associated with dietary management options. To derive an adherence pattern, and understand the focus of diet adherence, linear regression was done to analyse the relationship between the derived adherence factors and the recommended diet statements; and to establish the relationship between diet adherence, risk perceptions, socio-economic and patient factors.

3.11 Ethical consideration

Permission to conduct research was given by Maseno University School of Graduate Studies (Appendix 6). The Jaramogi Oginga Odinga Teaching and Referral Hospital, Ethical Review Committee (JOOTRH-ERC), approved the use of the institution to conduct the research (Appendix 4). Ethical approval came from the Maseno University Ethical Review Committee (MUERC) (Appendix 5). Informed verbal and written consent of the confidentiality of the respondents was upheld with study participants completing and signing the informed consent form (Appendix 2). Ethical requirements such as confidentiality, autonomy, benevolence and fidelity were met in the process of data collection. Confidentiality was maintained by keeping the respondents anonymous in that they did not write their names on the questionnaire. Autonomy was observed by respecting respondent's freedom of choice to participate in the study. Benevolence was attained through the benefits of the study and fidelity by transcribing respondents responses into the data used for the analysis in this study without alteration.

CHAPTER FOUR: RESULTS

4.1 Introduction

This chapter presents study results which have been analyzed and reported under the themes; patient characteristics, adherence to dietary management options for Type 2 diabetes, socio-economic factors affecting diet adherence, and influence of risk perception on diet adherence in dietary management options in Type 2 diabetes.

4.2 Patient Characteristics

This section addressed some factors in the selection criteria, such as age, length of time they had been treated for Type 2 diabetes, where treatment in this case included managing the condition, and the year when they were diagnosed with the condition. The year was necessary to cross check, the period when they had had Type 2 diabetes. As shown in table 4.1, the respondents had a mean age of 57.03 (10.622), and had been receiving treatment for an average of 83.46 (77.852) months, or 6years. This indicates that all the respondents were within the inclusion criteria of male and female patients aged 35 years and above, who have had and have been managing Type 2 diabetes for at least six months.

Table 4.1: Inclusion characteristics of respondents

Inclusion Characteristics	Range	Mean
Age of the respondent in years	49	57.03(10.622)
Length of time on treatment for Type 2 diabetes(months)	414	83.46(77.852)
When diagnosed with Type 2 diabetes(year)	35	2006(6.733)

In addition, majority of the respondents were female, with a larger percentage being married. Most of them had also attained some form of formal education, with 41.8% of the respondents having attained secondary education, 35.4% primary education, 15.6% tertiary education and only 7.2% recording none, meaning they did not attend school. In addition, more than half of the participants had some form of occupation, with 46% running their own businesses (self-

employed) while a smaller percentage (23.5%) were employed. The percentage of those with no meaningful engagement, that is unemployed, was higher than those employed at 29.9% (Table 4.2)

Table 4.2: Patient characteristics

Individual characteristics	Proportion (%)
Sex (n=238)	
Female	64.3
Male	35.7
Marital status (n=238)	
Single	4.2
Married	75.6
Divorced/separated	0.4
Widow/widower	19.7
Highest level of formal education (n=238)	
None	7.2
Primary	35.4
Secondary	41.8
Tertiary	15.6
Occupation(n=238)	
Employed	23.5
Self employed	46.6
Not employed	29.9

Most of the respondents were on diabetic medication, and had been advised on their diet. In assessing diet accessibility, factors other than perceptions that may influence adherence to the modified diet, referred to as socio-economic factors, in the operational framework, were analyzed. These included the percentage of respondents who could afford the modified diet (66.8%), those who agreed that the modified diet was culturally accepted (97.3%) and those who access the required foods in a nearby market (distance), or if it was grown within their area of residence (environment) or if they had to travel a long distance from their place of work to access the modified diet (workplace) at 90.4%, 84.3% and 83.6% respectively (Table 4.3).

Table 4.3: Diabetes management information

Diabetes treatment and diet information	Proportion (%)
On diabetic medication (n=238)	
Yes	98.3
No	1.7
Advised on diet (n=238)	
Yes	89
No	11
Afford diet (n=238)	
Yes	66.8
No	33.2
Diet culturally accepted (n=238)	
Yes	97.3
No	2.7
Diet accessible by Distance (n=238)	
Yes	84.3
No	15.7
Diet accessible from Work place (n=238)	
Yes	83.6
No	15.4
Diet accessible in Environment (n=238)	
Yes	90.4
No	9.6

Finally, on whether they had a family member with diabetes, less than half of the participants, had either a parent, sibling, spouse, child, grandparent, uncle or aunt with diabetes, indicating a family history of diabetes. The question was not specific on the type of diabetes, and in some cases, we could have more than one person with the condition.

4.3 Diet Adherence in Dietary Management of Type 2 diabetes

The scores for the 12 attributes of recommended diet were transferred to an excel sheet, and for negative practices, where it was expected that the score should be “never” the values were reversed, so that “never” ranked highly as “always” in a positive practice. The scores were summed up and divided to derive a mean score for each participant. The least possible mean score was 1 or 20% adherence, in relation to the maximum score of 5 which was 100% adherence. Most of the participants had a mean adherence 4 or 80% adherence, with only 22.3%

having a mean score of 5 or 100% representing “always” adhering to the modified diet (Figure 4.2).

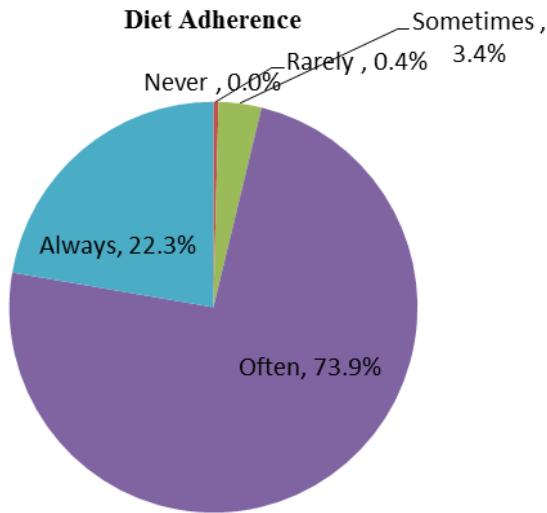


Figure 4.2: Distribution of respondents by mean level of adherence

These mean scores were then added and divided by the total number of participants, to get a mean level of adherence. The mean level of adherence derived was 4 which translates to “often” adhering to the modified diet. Further analysis to get a percentage level of adherence was done, by dividing the mean adherence level of 4 by the maximum adherence level of 5 and multiplying by 100 to get 80% adherence. The indicators were then subjected to factor analysis to derive a diet adherence pattern, which would indicate the order of contribution of each of the 12 diet recommendation statements to the adherence level observed, and be used to determine the focus of dietary management.

The test for sample size adequacy indicated that the sample size for each item was adequate based on Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett’s Test of Sphericity ($KMO=0.584$, $\chi^2 = 346.91$, $p<0.001$). The KMO results implied that the proportion of variance

(0.584) in the component (diet adherence) being measured could be accounted for by the underlying factors (attributes of recommended diet). The results from Bartlett's Test of Sphericity indicate that the intercorrelation matrix between diet adherence and the attributes of recommended diet are significantly related, chi-square ($\chi^2 = 346.91$, $p < 0.001$). It therefore implies that factors extracted would account for a fair amount of variance in dietary adherence. In factor analysis, it is hypothesised that in a given attribute such as diet adherence, there exists a number of common factors (internal attributes which are unobservable and cannot be directly measured) which influence the potentiality of the many surface attributes seen such as what is described in the 12 recommended diet statements. To be able to reflect the effects of the common factors, measures of the surface attributes are used. The score derived from measuring these surface attributes is assumed to be at least in part, the result of the influence of the common factor. The common factors therefore are used to understand and account for observed behaviour. Factor analysis is done to derive these common factors and ascertain which of the surface attributes in these case, the 12 recommended diet statements reflect the effect of the derived factors. It is usually possible that one recommended diet statement might reflect more than one factor, depending on how the derived factors are correlated (Gorsuch, 1983; Tabachnick & Fidell, 1996).

To derive an adherence pattern, which would give direction on why they adhere, factor extraction based on standard Eigen values set at 1 (Gorsuch, 1983; Tabachnick & Fidell, 1996), and varimax rotated, revealed that it was possible to derive five common factors that had a unit variance of more than one, and were possible diet adherence factors among the study population. It means therefore that it was possible to extract five principle components that account for more variance, than that accounted for by each of the 12 recommended diet attributes. All the five

factors of diet adherence, accounted for 37.62% of the variance in dietary adherence. The purpose of varimax rotation is to spread the observed variance (37.62%) among the five extracted components to be able to how clearly the recommended diet statements that loaded on each diet adherence factor

The first diet adherence factor, adherence factor one (AF1), accounted for 11.8% of the total variance in dietary adherence, and was a reflection of two recommended diet statements, use of cooking oil and reduced intake of fats. The second diet adherence factor, adherence factor two (AF2), was able to account for 10.96% of the total variance in dietary adherence. It was in turn a reflection of five recommended diet statements; reduced intake of foods with high glycemic index, reduced intake of margarine and or butter, reduced use of sugar in beverages, reduced intake of sugar flavoured drinks and snacks, and reduced intake of salted snacks. The third diet adherence factor, adherence factor three (AF3), accounted for 5.79% of the total variance in dietary adherence and was a reflection of two recommended diet statements indicators. These were carbohydrate intake from whole grain and reduced intake of table salt. The fourth and fifth diet adherence factors, adherence factor four (AF4) and adherence factor five (AF5), in that order, were able to account for 4.99% and 4.06% respectively of the total variance in dietary adherence. Adherence factors AF4 and AF5 were a reflection of recommended diet statements include fruits in all meals and include vegetables in all meals, respectively (Table 4.4).

Table 4.4: Possible diet adherence factors

Recommended diet statements	Diet adherence factors after rotation				
	AF1	AF2	AF3	AF4	AF5
Da1-Carbohydrate intake is from whole grain			.556		
Da2-Reduce intake of foods with high glycemic index		.590			
Da3-Use of cooking oils	.918				
Da4-Reduce intake of margarine and or butter			.415		
Da5-Reduce intake of fats	.703				
Da6-includes vegetables in all meals					.419
Da7-Includes fruits in all meals				.622	
Da8-Reduce use of sugar in beverages		.478			
Da9-Reduce intake of sugar flavoured drinks		.499			
Da10-Reduce intake of table salt			.549		
Da11-Reduce intake of salted snacks		.509			
Da12-Adhere to diet plan					

Key:

AF1- Adherence Factor One, AF2- Adherence Factor Two, AF3- Adherence Factor Three, AF4- Adherence Factor Four, AF5- Adherence Factor Five

In order to derive an adherence pattern, and understand the focus of diet adherence, further analysis using linear regression was carried out on diet adherence factors as the dependent variable against the recommended diet statements for each adherence factor as independent variables. In multiple linear regression, the model takes the form of the equation:

$$Y_i = b_0 + b_1 X_1 + b_2 X_2 \dots b_n X_n + e_i$$

Where Y_i = the outcome variable (diet adherence factor e.g AF1)

b_0 = the Y- intercept which is adherence factor without the recommended diet statement

b_1 =coefficient of “use of cooking oil” predictor Da3 (X_1)

b_2 =coefficient of “reduce intake of fat” predictor Da5 (X_2)

The b value tells us the degree to which each predictor variable affects the outcome if the effect of all the other predictors is held constant.

The β values tell us the number in standard deviations that the outcome will change as a result of one standard deviation change in the predictor. All β values are measured in standard deviation

units and they provide better insight into the importance each recommended diet adherence attribute as a predictor contribute to the model.

R^2 is a measure of how much of the variability in the outcome (diet adherence factor) is accounted for by the predictors (recommended diet attribute) (Field, 2005). It does not consider the contribution of each model to the outcome.

Adjusted R^2 , which has been used in this analysis, is a measure of the variability in the outcome accounted for by the predictors, but in this case, the contribution of each model to the outcome is considered.

The t-values test whether a b-value is significantly different from zero i.e. its contribution is not zero. It is a measure of whether the predictor is making a significant contribution to the regression model. The larger the value of t, the greater the contribution of the predictor to the model

In this case, “use of cooking oil” and reduced intake of fat, as predictors of diet adherence factor one (AF1) were able to account for 97.6% of its total variance, ($R^2=0.976$, $F= 4493.096$, $p<0.001$). However as seen in table 4.2.2, “use of cooking oil” was a more powerful predictor of AF1, ($\beta=0.82$, $t=60.53$, $p<0.001$), compared to reduce intake of fat ($\beta=0.237$, $t=17.469$, $p<0.001$). It implies that as use of cooking oil increases by 1 standard deviation (0.897), adherence factor one increases by 0.82 standard deviations, when all other predictor effects are held constant (Table 4.5).

Table 4.5: Diet adherence factors and their respective recommended diet statements

Adherence factors	R ²	Recommended diet statements	Std Dev	Unstandardized Coefficients		Standardized Coefficients		
				B	Std. Error	Beta	T	Sig.
AF1	0.976	(Constant)		-6.041	.068		-88.978	.000
		Da3	.897	.983	.016	.820	60.525	.000
		Da5	.848	.300	.017	.237	17.469	.000
AF 2	0.952	(Constant)		-7.548	.136		-55.573	.000
		Da2	1.176	.536	.018	.490	29.694	.000
		Da4	1.019	.304	.020	.241	15.453	.000
		Da8	.924	.381	.022	.274	17.008	.000
		Da9	.910	.371	.023	.263	16.042	.000
		Da11	1.008	.309	.021	.242	14.800	.000
AF 3	0.768	(Constant)		-8.125	.325		-24.972	.000
		Da1	.733	.841	.067	.429	12.579	.000
		Da10	.932	.996	.053	.645	18.937	.000
AF 4	0.749	(Constant)		-4.619	.187		-24.749	.000
		Da7	1.039	1.241	.048	.866	25.693	.000
AF 5	0.404	(Constant)		-9.993	.819		-12.204	.000
		Da6	.512	2.054	.167	.637	12.271	.000

Key:

Da 1-Carbohydrate intake is from whole grain; Da 2-Reduced intake of foods with high glycemic index; Da3-Use of cooking oils; Da4-Reduced intake of margarine and or butter; Da5-Reduced intake of fats; Da6-includes vegetables in all meals; Da7-Includes fruits in all meals; Da8-Reduced use of sugar in beverages; Da9-Reduced intake of sugar flavoured drinks; Da10-Reduced intake of table salt; Da11-Reduced intake of salted snacks; Da12-Adhere to diet plan

The implication is that as patients with Type 2 diabetes focus more on controlling cardiovascular diseases (CVD) onset, they will also focus more on increasing the use of cooking oils than on reducing the use of cooking fats. It therefore means that the focus to control onset of cardiovascular disease, is more by increasing the intake oils (using more oils) rather than reducing the intake of fat. This may result in overall increase in total fat albeit with a modified polyunsaturated to saturated ratio, but is still not desired for diabetes. Linear regression analysis for adherence factor two, AF2, revealed that, reduced intake of foods with high glycemic index, reduced intake of trans fats, reduced use of sugar in beverages, reduced intake of sugar flavoured

drinks and snacks and reduced intake of salted snacks, accounted for 95.2% of its total variance ($R^2=0.952$, $F=873.603$, $p<0.001$). However, reduced intake of foods with high glycemic index was more powerful as a predictor of AF2, ($\beta=0.49$, $t=29.694$, $p<0.001$). It was followed in order of power of prediction, by reduced use of sugar in beverages ($\beta=0.274$, $t=17.008$, $p<0.001$), reduced consumption of sugar flavoured drinks and snacks($\beta=0.263$, $t=16.042$, $p<0.001$), reduced intake of table salt ($\beta=0.242$, $t=14.8$, $p<0.001$) and reduced intake of margarine and or butter($\beta=0.241$, $t=15.453$, $p<0.001$). The focus to control blood sugar and lower the risk of complication development, AF2, is by reducing intake of foods with a high glycemic index. Such foods tend to cause a rapid rise in blood sugar levels, and to a lesser extent, reducing use of sugar in beverages, reducing consumption of sugar flavoured drinks and snacks, reducing intake of salt and reducing use of margarine and or butter.

The same analysis for adherence factor three, AF3, revealed that recommended diet statements, carbohydrate intake is from whole grain and reduce intake of table salt were able to account for 76.8% of the total variance of adherence factor three, ($R^2=0.768$, $F=365.944$, $p<0.001$). However, reduce intake of table salt was a more powerful predictor of adherence factor three ($\beta=0.645$, $t=18.937$, $p<0.001$), compared to carbohydrate intake is from whole grain ($\beta=0.429$, $t=12.579$, $p<0.001$). The focus for adherence factor three was based on the belief that to lower risks of complications development, they will need to focus more on reducing salt intake and to a lesser extent on intake of whole grain carbohydrate.

Recommended diet statement, includes fruits in all meals accounted for 74.9% of the total variance of adherence factor four, AF4 ($R^2= 0.749$, $F=660.106$, $p<0.001$) and was able to significantly predict adherence factor four ($\beta=0.866$, $t=25.693$, $p<0.001$).

Finally for adherence factor five AF5, the recommended diet statement, includes vegetables in all meals was able to account for 40.4% of its total variance ($R^2= 0.404$, $F=150.574$, $p<0.001$) and was able to significantly predict adherence factor five ($\beta=0.637$, $t=12.271$, $p<0.001$) (table 4.2.2). For adherence factor four and five, whose focus is more on healthy eating to prevent infections, the belief is that as they consume more fruits and vegetables in their meals, they will be able to stay healthy.

In summary, diet adherence factor one, which was a reflection of the decision to use cooking oils and reduce the intake of fats represents control of cardiovascular complications by reducing the intake of low-density lipoprotein in favour of high-density lipoprotein. Therefore, the reason for adherence in this case it can be said is to control the onset of cardiovascular diseases, a complication of Type 2 diabetes and it appeared to be a major concern for patients managing Type 2 diabetes based on its larger contribution (11.8%) to adherence variance

Adherence factor two, which had more surface attributes loading onto it, is a reflection of the combined need to control blood glucose and the complications of Type 2 diabetes. By reducing intake of foods with high glycemic index, reducing sugar intake in beverages, flavoured drinks and snacks, the focus is to control blood glucose. While the reduced intake of salted snacks, margarine and or butter focuses on controlling high blood pressure or hypertension. This adherence factor appeared to be of great concern to patients managing Type 2 diabetes based on how much it contributed (10.96%) to the total variance in adherence.

Adherence factor three was a reflection of the need to lower the risk of complications development by the intake of whole grain carbohydrate and reducing the amount of salt in food.

This being a concern of lesser effect based on its contribution of 5.7% to the total variance of adherence.

Adherence factor four and five, were a reflection of the need build up the ability of the body to be able to resist infections, or strengthen the body immune system. These two factors were of least concern, based on their contribution of 4.99% and 4.06% respectively to the variance in adherence.

The results therefore, reveal an adherence pattern whose focus is first to prevent the onset of cardiovascular complications, then to control blood sugar and lower the risk of complication development and finally to strengthen the body to overcome infection.

4.4 Socio-economic Factors in Dietary Management of Type 2 Diabetes

In this section, the influence of social, economic and patient factors on diet adherence was analysed using linear regression. This was done for the five diet adherence factors derived in factor analysis, to identify the factors that influence each diet adherence factor.

4.4.1 Socio-economic and patient factors affecting diet adherence factor one:

For adherence factor one, focused on controlling cardiovascular diseases, diet accessible by distance was the only significant factor ($\beta=0.211$, $t=2.053$, $p=0.041$). Accessing the required foods within their area of residence was the only contributing factor to adherence factor one (Table 4.6).

Table 4.6: Socio-economic and patient factors for diet adherence factor one

Patient and socio-economic factors	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error			
(Constant)	.150	.920		.163	.870
Age	-.004	.008	-.043	-.541	.589
Sex	.270	.180	.124	1.500	.135
Education level	.120	.103	.095	1.161	.247
Marital status	-.152	.098	-.118	-1.546	.124
Occupation status	-.015	.116	-.010	-.126	.900
Period of treatment	-.002	.001	-.139	-1.923	.056
Are you on Diabetic medication	.265	.551	.035	.481	.631
Advice given on diet	-.113	.145	-.057	-.777	.438
Diet affordable	-.045	.064	-.057	-.711	.478
Diet accepted culturally	.037	.255	.011	.146	.884
Diet accessible by distance	.246	.120	.211	2.053	.041
Diet accessible - work place	-.112	.110	-.098	-1.019	.309
Diet available in environment	-.037	.119	-.028	-.307	.759
Diabetes in the family	.022	.152	.010	.146	.884

4.4.2 Socio-economic and patient factors affecting diet adherence factor two:

Diet adherence factor two, which focused on controlling blood sugar and hypertension, had diet accessible from workplace ($\beta=0.193$, $t=2.027$, $p=0.044$) and occupation status, that is what they do to earn a living ($\beta=0.162$, $t=2.051$, $p=0.042$) as significant predictors (Table 4.7).

Table 4.7: Socio-economic and patient factors for adherence factor two

Socio-economic and patient factors	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-1.115	1.099		-1.015	.312
Age	.011	.010	.089	1.122	.263
Sex	.048	.215	.018	.222	.825
Education level	-.025	.123	-.016	-.202	.840
Marital status of respondent	-.150	.118	-.096	-1.274	.204
Occupation status	.285	.139	.162	2.051	.042
Period of treatment	-.001	.001	-.089	-1.245	.215
On Diabetic medication	-.152	.658	-.016	-.231	.818
Advice given on diet	.023	.173	.010	.133	.894
Diet affordable	.112	.076	.117	1.470	.143
Diet accepted culturally	.265	.304	.065	.870	.385
Diet accessible by distance	.123	.143	.088	.860	.391
Diet accessible - work place	.267	.132	.193	2.027	.044
Diet available –environment	-.001	.143	-.001	-.007	.994
Diabetes in the family	.159	.182	.061	.872	.384

Diet being accessible from their work place, and occupation status, that is being employed or self-employed or unemployed, facilitated the efforts to reduce foods with a high glycemic index, reduce of sugar in beverages, reduce intake of sugar flavored drinks, reduce intake of margarine

and or butter, and salted snacks. In this case though, occupation status, was more influential than diet being accessible from the work place.

4.4.3 Socio-economic and patient factors affecting diet adherence factor three:

Adherence factor three, whose focus was to lower the risk of complications development for Type 2 diabetes, three socio-economic and patient factors were significant predictors (Table 4.8). These were age ($\beta=0.178$, $t=2.238$, $p=0.026$), marital status ($\beta=0.208$, $t=2.731$, $p=0.007$) and diet available in the environment ($\beta=0.277$, $t=3.034$, $p=0.003$). An increase in age and food being available in their locality increased adherence to intake of whole grain carbohydrate and a reduction of salt intake.

Table 4.8: Socio-economic and patient factors for diet adherence factor three

Socio-economic and patient factors	Unstandardized Coefficients		Standardized Coefficients Beta	t	Sig.
	B	Std. Error			
(Constant)	-.256	1.260		-.203	.839
Age	.025	.011	.178	2.238	.026
Sex	.166	.247	.055	.673	.502
Education level	-.033	.141	-.019	-.232	.817
Marital status of respondent	.368	.135	.208	2.731	.007
Occupation status	-.026	.159	-.013	-.161	.873
Period of treatment	-.001	.001	-.036	-.496	.621
On Diabetic medication	.115	.755	.011	.152	.879
Advice given on diet	-.054	.199	-.020	-.272	.786
Diet affordable	.036	.088	.033	.416	.678
Diet accepted culturally	-.425	.349	-.091	-1.217	.225
Diet accessible by distance	.160	.164	.100	.978	.329
Diet accessible - work place	.156	.151	.099	1.030	.304
Diet available –environment	.496	.164	.277	3.034	.003
Diabetes in the family	.167	.209	.057	.801	.424

On the other hand, the need to lower the risk of complications development increases as one moves from being single to married to being a widow(er) or divorced.

4.4.4 Socio-economic and patient factors affecting diet adherence factor four:

Adherence factor four, whose focus was on boosting the body's immune had no significant predictors (Table 4.9)

Table 4.9: Socio-economic and patient factors for adherence factor four

Socio-economic and patient factors	Unstandardized Coefficients		T	Sig.
	B	Std. Error		
(Constant)	.737	1.315	.560	.576
Age	.015	.012	.107	.185
Sex	.063	.257	.020	.807
Education level	.052	.148	.029	.723
Marital status of respondent	-.190	.141	-.104	.178
Occupation status	-.204	.166	-.098	.222
Period of treatment	.002	.001	.120	.100
On Diabetic medication	-.202	.788	-.019	.798
Advice given on diet	-.102	.208	-.036	.623
Diet affordable	-.085	.091	-.075	.353
Diet accepted culturally	.171	.365	.036	.640
Diet accessible by distance	.021	.171	.013	.903
Diet accessible - work place	-.087	.158	-.053	.584
Diet available –environment	-.141	.171	-.076	.409
Diabetes in the family	-.322	.218	-.106	.141

4.4.5 Socio-economic and patient factors affecting diet adherence factor five:

Adherence factor five (Table 4.10), also focusing on general health had one significant predictor, which was marital status of the respondent ($\beta=0.209$, $t=2.725$, $p=0.007$). The need to improve on general health by including vegetables in all meals, increases as one moves from being single to married to being a widow(er) or divorced.

Table 4.10: Socio-economic and patient factors for adherence factor five

Socio-economic and patient factors	Unstandardized Coefficients		T	Sig.
	B	Std. Error	Beta	
(Constant)	-1.176	1.449	-.812	.418
Age	-.005	.013	-.032	.691
Sex	.054	.284	.016	.849
Education level	-.080	.163	-.040	.623
Marital status of respondent	.423	.155	.209	.007
Occupation status	.216	.183	.094	.239
Period of treatment	-.001	.002	-.033	.647
On Diabetic medication	.627	.868	.052	.471
Advice given on diet	-.365	.229	-.117	.112
Diet affordable	.111	.101	.089	.270
Diet accepted culturally	-.219	.402	-.041	.586
Diet accessible by distance	-.302	.189	-.165	.111
Diet accessible - work place	.272	.174	.151	.119
Diet available –environment	.009	.188	.004	.964
Diabetes in the family	.054	.240	.016	.823

4.5 The Influence of Risk Perceptions on Diet Adherence in Dietary Management of Type 2 Diabetes

This study looked at six items under risk perceptions, attitude, and subjective norm, perceived behaviour control, perceived susceptibility, perceived severity and perceived benefits. To derive possible perception factors to be measured against the diet adherence factors, principle factor analysis was used. First, all the six items under risk perceptions were tested for sample adequacy and the results showed that the sample size for all the six was adequate based on Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity (Table 4.11)

Table 4.11: Sampling adequacy results for the six risk perceptions

	RP1	RP2	RP3	RP4	RP5	RP6
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.803	.840	.777	.902	.887	.922
Bartlett's Test of Sphericity	474.822	896.701	690.873	1225.228	1735.477	2850.623
Sig.	.000	.000	.000	.000	.000	.000

Key:

RP1-Attitude;RP2-Subjective Nor;RP3- Perceived behaviour control;RP4- Perceived susceptibility;RP5- Perceived severity;RP6- Perceived benefits

The six items under risk perceptions were then subjected to factor extraction based on standard Eigen values set at 1 and varimax rotated to identify possible factors for each perception among the study population.

4.5.1 Risk Perceptions Possible Factors

For attitude, factor extraction based on Eigen value 1 and varimax rotation, revealed that two common factors of attitude were possible among the study population. The two were able to account for 41.623% of the total variance of attitude, with the most important attitude factor, attitude one (Att1) accounting for 32.173% of the total perception of attitude. Att1 was made up of six attitude indicators, “consumption of carbohydrates”, “replace fats with oils”, “reduce use of margarine and or butter”, “reduce sugar intake”, “reduce salt intake” and “adhere to diet plan”.

The second attitude factor, attitude two (Att2), accounted for 9.45% of the total perception of

attitude and was made up of two attitude indicators, reduced consumption of foods with high glycemic index and increased fruit and vegetable consumption (Table 4.12).

Table 4.12: Possible attitude factors among the study group

Attitude indicators	Attitude factors after rotation	
	Attitude 1	Attitude 2
DaP1- Consumption of whole grain carbohydrates	.526	
DaP2- Reduced consumption of foods with high glycemic index		.570
DaP3- Replace fats with oils	.406	
DaP4- Reducing use of margarine and or butter	.596	
DaP5- Increased fruit and vegetable consumption		.490
DaP6- Reducing sugar intake	.890	
DaP7- Reducing salt intake	.646	
DaP8- Adhering to my diet plan	.679	

For subjective norm, factor extraction based on Eigen value 1 and varimax rotation, revealed that one factor of subjective norm was possible among the study population. The one factor, labelled SN1, accounted for 48.429% of the total variance of subjective norm and had all the eight indicators loading on it with almost the same power (Table 4.13).

Table 4.13: Possible subjective norm factors among the study group

Subjective Norm indicators	Subjective Norm Factors after Rotation	
	Subjective Norm 1	
DaP1- Consumption of whole grain carbohydrates	.722	
DaP2- Reduced consumption of foods with high glycemic index	.615	
DaP3- Replace fats with oils	.695	
DaP4- Reducing use of margarine and or butter	.698	
DaP5- Increased fruit and vegetable consumption	.510	
DaP6- Reducing sugar intake	.768	
DaP7- Reducing salt intake	.780	
DaP8- Adhering to my diet plan	.740	

The third risk perception, perceived behaviour control, was analysed using factor extraction based on Eigen value 1 and varimax rotation (Table 4.14). The analysis revealed that two factors of perceived behaviour control were possible among the study population. The two accounted for 51.273% of the total variance of perceived behaviour control, with the most important factor Pbc1, accounting for 26.601% of the total variance of RP3 and the second factor Pbc2, accounting for 24.672% of the total variance of perceived behaviour control, RP3.

Table 4.14: Possible perceived behaviour control factors among the study group

Perceived behaviour control indicators	Perceived behaviour factors after rotation	
	Pbc1	Pbc2
DaP1- Consumption of whole grain carbohydrates	.666	
DaP2- Reduced consumption of foods with high glycemic index	.570	
DaP3- Replace fats with oils	.439	.432
DaP4- Reducing use of margarine and or butter		.464
DaP5- Increased fruit and vegetable consumption	.670	
DaP6- Reducing sugar intake		.960
DaP7- Reducing salt intake		.565
DaP8- Adhering to my diet plan	.752	

Key: Pbc1-Perceived Behaviour Control One; Pbc2- Perceived Behaviour Control 2

Analysis for the fourth risk perception, RP4, perceived susceptibility, was done using factor extraction with fixed number of factors set at two and varimax rotation (Table 4.15). The result was two factors of perceived susceptibility among the study population, which accounted for 64.673% of the total variance of perceived susceptibility. The most important perceived susceptibility factor, labelled Psus1 accounted for 34.402%, while the second factor, labelled Psus2 was able to account for 30.27% of the total variance of perceived susceptibility.

Table 4.15: Possible perceived susceptibility factors among the study group

Perceived susceptibility indicators	Perceived susceptibility factors after rotation	
	Psus1	Psus2
DaP1- Consumption of whole grain carbohydrates	.440	.499
DaP2- Reduced consumption of foods with high glycemic index	.442	.508
DaP3- Replace fats with oils		.850
DaP4- Reducing use of margarine and or butter	.493	.625
DaP5- Increased fruit and vegetable consumption	.664	
DaP6- Reducing sugar intake	.720	.427
DaP7- Reducing salt intake	.834	
DaP8- Adhering to my diet plan	.633	.633

Key: Psus1-Perceived Susceptibility One; Psus2- Perceived Susceptibility two

Analysis for the fifth risk perception, RP5 “perceived severity”, done using factor extraction with fixed number of factors set at 2 and varimax rotated revealed that the two factors of perceived severity accounted for 74.482% of the total variance of perceived severity. The most important perceived severity factor, Psev1 accounted for 37.283%, while the second category, Psev2 was able to account for 37.199% of the total variance of perceived severity (Table 4.16).

Table 4.16: Possible perceived severity factors among the study group

Perceived severity indicators	Perceived severity factors after rotation	
	Psev1	Psev2
DaP1- Consumption of whole grain carbohydrates		.706
DaP2- Reduced consumption of foods with high glycemic index	.448	.621
DaP3- Replace fats with oils		.840
DaP4- Reducing use of trans margarine and or butter		.742
DaP5- Increased fruit and vegetable consumption	.725	.481
DaP6- Reducing sugar intake	.808	.405
DaP7- Reducing salt intake	.825	
DaP8- Adhering to my diet plan	.709	.572

Key:

Psev1-Percieved Severity One; Psev2-Percieved Severity Two

Analysis for the sixth and last risk perception, RP6 “perceived benefits”; done using factor extraction with fixed number of factors set at 2 and varimax rotated revealed that the two factors of perceived benefits accounted for 85.557% of the total variance of perceived benefits. The most important perceived benefits factor, Pben1 accounted for 44.873%, while the second factor, Pben2 was able to account for 40.684% of the total variance of perceived benefits and both had all the indicators loading on them (Table 4.17)

Table 4.17: Possible perceived benefits factors among the study group

Perceived benefits indicators	Perceived benefit factors after rotation	
	Pbn1	Pbn2
DaP1- Consumption of whole grain carbohydrates	.667	.586
DaP2- Reduced consumption of foods with high glycemic index	.462	.772
DaP3- Replace fats with oils	.471	.796
DaP4- Reducing use of margarine and or butter	.532	.722
DaP5- Increased fruit and vegetable consumption	.855	.450
DaP6- Reducing sugar intake	.755	.551
DaP7- Reducing salt intake	.788	.513
DaP8- Adhering to my diet plan	.711	.625

Key:

Pbn1-Percieved Benefits One; Pbn2-Percieved Benefits Two

4.5.2 Influence of Risk Perceptions on Diet Adherence

To assess the influence of risk perceptions, in the presence of socio-economic and patient factors, on diet adherence in dietary management of Type 2 diabetes, linear regression analysis was used, with risk perceptions factors for RP1, RP2, RP3, RP4, RP5 , RP6 and socio-economic and patient factors SEs as independent variables against the adherence factors as the dependent

variable. For adherence factor one, AF1 (Table 4.18), a combination of all the risk perceptions, plus socio-economic factors, RPs+SEs, was able to account for 10.6% of the total variance of AF1, followed by 6RPs which accounted for 8.8%, then 4RPs, which accounted for 6.3%, and 5RPs which accounted for 5.3%. The other combinations 1RP, 2RPs and 3RPs were able to account for -0.2%, 0.7% and 0.3% respectively, but were not significant ($p > 0.05$).

Table 4.18: Risk perceptions, socio-economic and patient factors for adherence factor one

Risk perception, Socio-economic and Patient factors	R	R ²	Adjusted R ²	F	Sig
1RP	.098 ^a	.010	-.002	.841	.433 ^b
2RPs	.172 ^b	.030	.007	1.308	.269 ^c
3RPs	.179 ^c	.032	.003	1.121	.351 ^d
4RPs	.317 ^d	.101	.063	2.684	.012 ^e
5RPs	.319 ^e	.102	.053	2.084	.034 ^f
6RPs	.382 ^f	.146	.088	2.542	.005 ^g
RPs+SEs	.483 ^g	.233	.106	1.828	.015 ^h

Key:

Key:

1RP-Attitude; 2RPs-Attitude and Perceived behaviour control (PBC); 3RPs-Attitude, PBC and Subjective norm (SN); 4RPs-Attitude, PBC, SN and Perceived susceptibility (PSus); 5RPs-Attitude, PBC, SN, Psus and Perceived severity (PSev); 6RPs-Attitude, PBC, SN, PSus, PSev and Perceived benefits (Pben), RPs + SEs-Attitude, PBC, SN, PSus, PSev, Pben and socio-economic and patient factors

To assess the influence of these factors on adherence factor one, linear regression carried out on risk perception, socio-economic and patient factors, RPs + SEs (Table 4.19) revealed two factors that were significant predictors of adherence factor one. These were social economic factor, diet affordable ($\beta = 0.170$, $t = 1.990$, $p = 0.048$) and perceived benefits factor two, Pbn2 ($\beta = 0.242$, $t = 2.642$, $p = 0.009$). The rest of the risk perception factors, were not significant predictors of adherence factor one ($p > 0.05$). It implies that for every 1-unit (0.47) standard deviation increase in diet affordability, the adherence would increase by 0.170 standard deviation units and for the every 1-unit (1.1) standard deviation increase in perceived benefits adherence would increase by 0.242 units of standard deviation.

The influence of perceived benefits appeared greater than that of diet affordable based on the beta scores. Therefore adherence factor one, whose focus was to control cardiovascular disease, by increasing use of oils and reducing use of fats, is influenced more by the perception that it is beneficial to overall health and then by diet being affordable.

Table 4.19: Influence of risk perception, socio-economic and patient factors on adherence factor one

Risk perception, Socio-economic and Patient factors	Std Dev	Unstandardized Coefficients		Standardized Coefficients		T	Sig.
		B	Std. Error	Beta			
(Constant)		-.071	1.468			-.048	.962
Attitude one (Att1)	1.2	.034	.097	.036	.354	.724	
Attitude two (At 2)	1.4	.065	.086	.081	.753	.453	
Perceived Behaviour Control one (Pbc1)	1.2	.062	.108	.067	.570	.569	
Perceived Behaviour Control two (Pbc2)	1.1	.057	.095	.059	.603	.548	
Subjective Norm one (SN1)	1.1	.066	.103	.067	.636	.525	
Perceived Susceptibility one (Psus1)	1.2	.159	.083	.177	1.913	.058	
Perceived Susceptibility two(Psus2)	1.1	.133	.086	.138	1.546	.124	
Perceived Severity one (Psev1)	1.2	.038	.081	.040	.462	.645	
Perceived Severity two (Psev2)	1.1	.051	.084	.052	.607	.545	
Perceived Benefits one (Pbn1)	1.1	.073	.079	.074	.929	.354	
Perceived Benefits twoPbn2	1.1	.233	.088	.242	2.642	.009	
Age	10.2	.008	.009	.075	.868	.387	
Sex	.482	.206	.198	.090	1.038	.301	
Education level	.813	.105	.121	.077	.869	.386	
Marital status	.789	.169	.119	.121	1.418	.158	
Occupation status	.701	.055	.133	.035	.414	.680	
Period of treatment	.075	.659	1.141	.045	.577	.565	
On diabetic medication	77.2	.002	.001	.109	1.362	.175	
Advice given on diet	.288	.100	.316	.026	.316	.752	
Diet affordable	.471	.398	.200	.170	1.990	.048	
Diet accepted culturally	.167	.013	.520	.002	.025	.980	
Diet accessible by distance	.361	.383	.302	.126	1.268	.207	
Diet accessible - work place	.367	.376	.291	.125	1.291	.199	
Diet available in environment	.318	.111	.339	.032	.327	.744	
Diabetes in the family	.498	.160	.170	.072	.941	.348	

For adherence factor two, AF2, a combination of all the risk perceptions plus confounding factors, RPs+SEs, was able to account for 19.9% of the total variance of AF2. This was followed by 5RPs, which accounted for 18.6%, 6RPs, 18.2% then 4RPs, 11.7%. The other combinations 3RPs, 2RPs and 1RP, were able to account for 10.9%, 9.6% and 2.9% respectively, and were also significant predictors at ($p<0.05$) respectively. In this case, the adjusted R^2 change increased

($p<0.05$) as the risk perceptions were added to the equation. However, the addition of perceived benefits reduced the total variance accounted for by the risk perceptions by 0.04 units. An addition of socio-economic factors increases the total variance accounted for by the risk perceptions and socio-economic and patient factors by 1.7 units (Table 4.20)

Table 4.20: Risk perceptions, socio-economic and patient factors for adherence factor two

Risk perception, Socio-economic and Patient factors	R	R ²	Adjusted R ²	F	Sig.
1RP	.201 ^a	.040	.029	3.646	.028 ^b
2RPs	.341 ^b	.116	.096	5.631	.000 ^c
3RPs	.367 ^c	.134	.109	5.279	.000 ^d
4RPs	.390 ^d	.152	.117	4.317	.000 ^e
5RPs	.477 ^e	.228	.186	5.444	.000 ^f
6RPs	.484 ^f	.234	.182	4.550	.000 ^g
RPs+SEs	.560 ^g	.313	.199	2.735	.000 ^h

Key:

1RP-Attitude; 2RPs-Attitude and Perceived behaviour control (PBC); 3RPs-Attitude, PBC and Subjective norm (SN); 4RPs-Attitude, PBC, SN and Perceived susceptibility (PSus); 5RPs-Attitude, PBC, SN, Psus and Perceived severity (PSev); 6RPs-Attitude, PBC, SN, PSus, PSev and Perceived benefits (Pben); RPs + SEs-Attitude, PBC, SN, PSus, PSev, Pben and socio-economic and patient factors

To explore further the relationship between risk perceptions, socio-economic and patient factors and adherence, linear regression was done (Table 4.21). It revealed that there were two significant predictors, perceived behaviour control, Pbc2 ($\beta= 0.229$, $t= 2.459$, $p=0.015$) and Psev2 ($\beta= 0.225$, $t= 2.762$, $p=0.006$). The rest of the perceptions and socio-economic factors were not significant predictors ($p>0.05$). It implies that for every 1 unit (1.1) standard deviation increase in perceived behaviour control, the adherence would increase by 0.229 standard deviation units and for the same change in perceived severity adherence would increase by 0.225 units of standard deviation. The efforts for adherence factor two was to prevent development of complications, by adapting to a diet that controls blood glucose and blood pressure. This is in turn influenced by the perception that one will face challenges and be able to overcome them (perceived behaviour control), and the belief that the consequences they will suffer if they do not adhere will be serious (perceived severity). Based on the beta scores, perceived behaviour control appeared to be slightly more powerful in predating adherence factor two.

Table 4.21: Influence of risk perceptions, socio-economic and patient factors on adherence factor two

Risk perception, Socio-economic and Patient factors	Std Dev	Unstandardized Coefficients		Standardized Coefficients Beta	T	Sig.
		B	Std. Error			
(Constant)		.371	1.608		.231	.818
Attitude one (Att1)	1.2	.031	.106	.028	.296	.768
Attitude two (Att2)	1.3	-.098	.094	.107	1.046	.297
Perceived Behaviour Control one (Pbc1)	1.2	.157	.119	.148	1.325	.187
Perceived Behaviour Control two (Pbc2)	1.1	.257	.104	.229	2.459	.015
Subjective Norm one (SN1)	1.1	.197	.113	.174	1.741	.084
Perceived Susceptibility one (Psus1)	1.2	.045	.091	.043	.491	.624
Perceived Susceptibility two(Psus2)	1.1	.025	.094	.023	.270	.788
Perceived Severity one (Psev1)	1.2	.121	.089	.112	1.359	.176
Perceived Severity two (Psev2)	1.1	.254	.092	.225	2.762	.006
Perceived Benefits one (Pbn1)	1.1	.043	.086	.038	.501	.617
Perceived Benefits twoPbn2	1.1	.061	.097	.054	.627	.531
Age	10.2	.007	.010	.055	.667	.506
Sex	.482	.015	.217	.006	.070	.944
Education level	.813	.092	.132	.059	.699	.485
Marital status	.789	-.207	.131	-.128	-1.59	.114
Occupation status	.701	.275	.146	.151	1.882	.062
Period of treatment	77.2	.000	.001	-.024	-.322	.748
On diabetic medication	.075	-1.151	1.250	-.068	-.920	.359
Advice given on diet	.288	.066	.346	.015	.192	.848
Diet affordable	.471	.310	.219	.115	1.416	.159
Diet accepted culturally	.167	.368	.569	.048	.647	.518
Diet accessible by distance	.361	.248	.331	.070	.750	.455
Diet accessible - work place	.367	.391	.319	.113	1.225	.222
Diet available in environment	.318	.303	.372	.076	.814	.417
Diabetes in the family	.498	.136	.186	.053	.729	.467

For adherence factor three, (Table 4.22) AF3, RPs+SEs accounted for 26.2% of the variance in adherence factor three. Then 6RPs and 5RPs, were each able to account for 23.5% and 23.3% respectively. They were followed by 4RPs, which accounted for 22.5%. The other combinations 2RPs, 3RPs and 1RP were able to account for 18.5%, 18.3% and 14.2% respectively. The total variance accounted for by the risk perceptions increases significantly ($p < 0.05$), as the perceptions are added onto the equation, except when subjective norm is added. The addition of socio-economic factors also leads to a significant increase in the total variance.

Table 4.22: Risk perceptions, socio-economic and patient factors for adherence factor three

Risk perception, Socio-economic and Patient factors	R	R ²	Adjusted		
			R ²	F	Sig.
1RP	.390 ^a	.152	.142	15.516	.000 ^b
2RPs	.452 ^b	.204	.185	10.956	.000 ^c
3RPs	.454 ^c	.206	.183	8.819	.000 ^d
4RPs	.506 ^d	.256	.225	8.252	.000 ^e
5RPs	.522 ^e	.273	.233	6.916	.000 ^f
6RPs	.532 ^f	.283	.235	5.896	.000 ^g
RPs+SEs	.606 ^g	.367	.262	3.483	.000 ^h

Key:

1RP-Attitude; 2RPs-Attitude and Perceived behaviour control (PBC); 3RPs-Attitude, PBC and Subjective norm (SN); 4RPs-Attitude, PBC, SN and Perceived susceptibility (PSus); 5RPs-Attitude, PBC, SN, Psus and Perceived severity (PSev); 6RPs-Attitude, PBC, SN, PSus, PSev and Perceived benefits (Pben), RPs + SEs-Attitude, PBC, SN, PSus, Psev, Pben and socio-economic and patient factors

Linear regression was carried out for a combination of the risk perceptions and socio-economic factors (Table 4.23). It revealed four significant predictors of adherence three, in order of power of influence, based on the beta scores. These were perceived susceptibility factor one, Psus1 ($\beta=0.305$, $t=3.618$, $p<0.001$), diet available in the environment or locally ($\beta=0.241$, $t=2.710$, $p=0.008$), perceived behaviour control two Pbc2 ($\beta=0.210$, $t=2.347$, $p=0.020$) and lastly age of the respondent ($\beta=0.163$, $t=2.060$, $p=0.041$). The rest of the factors were not significant predictors, ($p>0.05$).

It implies that for every one unit (1.4) standard deviation increase in perceived behaviour control, the adherence would increase by 0.210 standard deviation units and for every one unit (1.2) standard deviation increase perceived susceptibility adherence would increase by 0.305 units of standard deviation. For socio-economic factors, a one unit (10.2) standard deviation increase in age, adherence would increase by 0.163 standard deviation units, and a one unit (0.318) standard deviation increase in diet availability adherence would increase by 0.241 standard deviation units. Adherence factor three, whose focus was to lower risk of complication development by intake of whole grain carbohydrate and reducing salt intake, was influenced by two perceptions

and two socio-economic factors. Efforts to lower risk of complication development are thus influenced by the beliefs that they are more likely to suffer complications (perceived susceptibility) and that they will face challenges and be able to overcome them (perceived behaviour control). It is also influenced by age, in that as they grow older they will adhere to reduce the risk of complication. Finally, the availability of whole grain carbohydrates in their locality increases adherence.

Table 4.23: Influence of risk perceptions, socio-economic and patient factors on adherence factor three

Risk perception, Socio-economic and Patient factors	Std Dev	Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	t
(Constant)		-1.105	1.806		-.612 .541
Attitude one (Att1)	1.2	.083	.119	.064	.693 .489
Attitude two (Att2)	1.4	.064	.106	.059	.604 .547
Perceived Behaviour Control one (Pbc1)	1.2	.217	.133	.175	1.627 .106
Perceived Behaviour Control two (Pbc2)	1.4	.275	.117	.210	2.347 .020
Subjective Norm one (SN1)	1.1	.087	.127	.066	.683 .495
Perceived Susceptibility one (Psus1)	1.2	.369	.102	.305	3.618 .000
Perceived Susceptibility two(Psus2)	1.1	.145	.106	.111	1.370 .173
Perceived Severity one (Psev1)	1.2	.140	.100	.111	1.394 .165
Perceived Severity two (Psev2)	1.1	.007	.103	.005	.065 .948
Perceived Benefits one (Pbn1)	1.1	.098	.097	.073	1.016 .311
Perceived Benefits twoPbn2	1.1	.192	.109	.148	1.773 .078
Age	10.2	.024	.012	.163	2.060 .041
Sex	.482	.158	.244	.051	.648 .518
Education level	.813	.014	.148	.008	.094 .925
Marital status	.789	-.235	.147	-.124	-1.6 .111
Occupation status	.701	.141	.164	.066	.863 .390
Period of treatment	77.2	.000	.001	-.024	-.329 .743
On diabetic medication	.075	-.406	1.404	-.021	-.289 .773
Advice given on diet	.288	.267	.389	.052	.686 .494
Diet affordable	.471	.424	.246	.134	1.724 .087
Diet accepted culturally	.167	.310	.639	.035	.486 .628
Diet accessible by distance	.361	.225	.371	.054	.605 .546
Diet accessible - work place	.367	.337	.358	.083	.940 .349
Diet available in environment	.318	1.131	.417	.241	2.710 .008
Diabetes in the family	.498	.254	.209	.085	1.214 .227

For adherence factor four, AF4, 4RPs was able to account for 5.9% of the total variance of adherence factor four. Then 3RPs and 2RPs were each able to account for 5.2% and 5.2% respectively, followed by 6 RPs at 5.3% and 5RPs at 4.9%. Even though, RPs+SEs was able to

account for 6.8% of the total variance of AF4, RPs+SEs was not significant ($p=0.068$). Finally, 1 RP was able to account for 4.0% of the total variance of adherence factor four. The total variance in adherence four, accounted for by the perceptions increases as we add more variables into the model (Table 4.24). The addition of subjective norm and perceived severity decreases the total variance accounted for by the perceptions by 0.01 units each, while adding perceived benefits to the model increases the variance by 0.04 units. When socio-economic factors are added to the model, the total variance accounted for by risk perceptions and socio-economic factors increases by 0.15 units, but this increase is not significant ($p=0.068$). This meant that there was no need to explore this relationship using linear regression, since the focus was to assess the influence of perceptions in the presence of socio-economic and patient factors.

Table 4.24: Risk perceptions and socio-economic variables for adherence factor four

Risk perception, Socio-economic and Patient factors	R	R ²	Adjusted R ²	F	Sig.
1RP	.225 ^a	.051	.040	4.623	.011 ^b
2RPs	.271 ^b	.074	.052	3.396	.011 ^c
3RPs	.279 ^c	.078	.051	2.880	.016 ^d
4RPs	.311 ^d	.096	.059	2.561	.016 ^e
5RPs	.313 ^e	.098	.049	2.005	.042 ^f
6RPs	.335 ^f	.112	.053	1.885	.045 ^g
RPs+SEs	.449 ^g	.202	.068	1.515	.068 ^h

Key:

1RP-Attitude; 2RPs-Attitude and Perceived behaviour control (PBC); 3RPs-Attitude, PBC and Subjective norm (SN); 4RPs-Attitude, PBC, SN and Perceived susceptibility (PSus); 5RPs-Attitude, PBC, SN, PSus and Perceived severity (PSev); 6RPs-Attitude, PBC, SN, PSus, PSev and Perceived benefits (Pben), RPs + SEs-Attitude, PBC, SN, PSus, PSev, Pben and socio-economic and patient factors

For adherence factor five, AF5, (Table 4.25), none of the combination in the model was significant as a predictor of adherence factor five ($p>0.05$). Therefore, there was no need to carry out a linear regression analysis

Table 4.25: Risk perceptions and socio-economic variables for adherence factor five

Risk perception, economic and Patient factors	Socio-		Adjusted		
	R	R ²	R ²	F	Sig.
1RP	.060 ^a	.004	-.008	.315	.730 ^b
2RPs	.089 ^b	.008	-.015	.341	.850 ^c
3RPs	.183 ^c	.034	.005	1.183	.319 ^d
4RPs	.219 ^d	.048	.008	1.209	.301 ^e
5RPs	.257 ^e	.066	.015	1.300	.241 ^f
6RPs	.274 ^f	.075	.013	1.207	.286 ^g
RPs+SEs	.405 ^g	.164	.025	1.179	.267 ^h

Key:

1RP-Attitude; 2RPs-Attitude and Perceived behaviour control (PBC); 3RPs-Attitude, PBC and Subjective norm (SN);
4RPs-Attitude, PBC, SN and Perceived susceptibility (PSus); 5RPs-Attitude, PBC, SN, Psus and Perceived severity (PSev);
6RPs-Attitude, PBC, SN, PSus, PSev and Perceived benefits (Pben), RPs + SEs-Attitude, PBC, SN, PSus, Psev, Pben and socio-economic and patient factors

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This chapter presents a discussion of the study findings, which have been analysed and interpreted in chapter four. It focuses on the patient characteristics, level of adherence, socio-economic factors in adherence and risk perceptions of influence in dietary management of Type 2 diabetes.

5.2 Patient Characteristics

Majority of the respondents were female, aged on average 59 years, and were mostly married. Most of them were either employed or self-employed, and had attained some form of formal education, meaning that they had a form of income and could understand dietary advice. In addition, almost all of the respondents at 98.3% were on medication for blood sugar control. This indicates that diet alone was not sufficient to control blood glucose. A good number of the respondents had a relative with diabetes, an indication of family history, which makes one susceptible to the condition. This study results also shows a higher percentage of females with Type 2 diabetes attending the diabetes clinic in JOOTRH, a scenario that has been seen in other studies conducted in primary health care settings (Turcatto *et al.*, 2013; Gucciardi, Wang, De Melo, Amaral, & Stewart, 2008). This can be an indication of a higher population of females with Type 2 diabetes, as seen in another study, (Motala & Ramaiya, 2010) or it could also be due to women being better at seeking health care services or that they are more likely to survive (WHO, 2003). This study results, in which a higher percentage of the respondents were women, and most of the respondents had a family history of diabetes are in line with a study done in Ontario. In the Ontario study, which was done to identify characteristics of men and women with diabetes, indicated that more women than men were likely to have a family history of

diabetes (Gucciardi *et al.*, 2008). The results of the Ontario study also indicated that more women than men had received previous education on diabetes, were more receptive with the outcomes of self-management activities and perceived higher support from professional healthcare teams. Subsequently, the study recommended that men should be encouraged to attend self-management education sessions (Gucciardi *et al.*, 2008). Again this agree with this study findings where a higher percentage of those who attended the diabetic clinic were women, and were therefore in a better position to receive support and education on self management. This study in line with other studies, therefore agree that more women than men attend the diabetic clinic, and are therefore better placed in receiving education and professional support on self-care.

The percentage of those who had attended school was high and in line with government statistics on the literate in Nyanza which stood at 91.9%. Another comparison was the statistics on marriage, where we had a high number of married, followed by the widowed (Central Bureau of Statistics, 2006). This indicates that most of them had or had had a partner, and may have received their support in managing the condition. To further support this, one study found that while men view nutrition management in diabetes as a broader family issue, women viewed it as a personal issue (Peel, Perry, Douglas, & Lawton, 2005). In this case therefore, being that women are solely responsible for meal planning, they would adjust meals to suit their diabetic partner, and in case it was them with diabetes, they would not impose their meals on others, but will prepare a separate meal for themselves (Wong, Gucciardi, Li, & Grace, 2005). In both cases, meals will therefore be prepared for the benefit of a person with diabetes, thus having a partner, may translate to having support in diabetes management, especially for men. Majority of the

respondents, were on diabetic medication. This agrees with the observation that most people present to the health centers when their condition is already advanced (McFerran, 2008), thus requiring medication to control it.

5.3 Adherence to Dietary Management of Type 2 Diabetes

On adherence to diet, the study revealed a mean adherence level of 4 out of 5, which translates to 80%. The implication is that patients managing Type 2 diabetes will adhere “often”, but not always to their modified diet. The fact that majority of the patients, 98.3%, were taking medication, implies that diet alone was insufficient to control blood sugar, supports this finding. In agreement to this study results, other studies have found that due to inconsistency in adherence to diet and exercise, patients with Type 2 diabetes have to take medication to control blood sugar (ADA, 2013; Emilio *et al.*, 2013; Grant, Pirragha, Meigs, & Singer, 2004). In both cases therefore, non-adherence to diet has led to the use of medication to control blood sugar, making patients with Type 2 diabetes vulnerable to extra costs they incur in medical care, more so in Kenya, a country that has inadequate funds for diabetes prevention and care (McFerran, 2008). Furthermore, another study found that patients with Type 2 diabetes preferred taking medication to control blood sugar as opposed to diet, with the belief that medication would lower the consequences of diabetes, was easier to take than preparing a meal, less distressful to adhere to and led to development of fewer complications (Broadbent *et al.*, 2011). However, World Health Organisation advices that for effective blood glucose control, then a complete adherence to a combination of medication, diet and exercise is required (Sabate, 2003), except in cases where age and other conditions restrict the type of diet, one can take (Turcatto *et al.*, 2013). On the other hand though, other studies have found that the side effects of prolonged medication use eventually lead to non-adherence (Pollack, Purayidathe, Bolge, & Williams, 2010; Hauber,

Mohamed, Johnson, & Falvey, 2009; Donnelly, Morris, & Pearson, 2009), indicating the need for more focus on dietary adherence to reduce the reliance on medication for blood glucose and disease progression control.

Further analysis on adherence pattern revealed five possible adherence factors, which accounted for 37.62% of the total variance of dietary adherence. Adherence factor one, which was reflected in increased use of oils and reduced intake of saturated and trans fat was the highest contributor (11.8%) to diet adherence. Saturated and trans fats found in animal sources and solidified plant oils respectively, contribute to high levels of low-density lipoprotein cholesterol, which causes cardiovascular diseases. This adherence factor appeared to focus on controlling onset of cardiovascular diseases (Bantle *et al.*, 2008; CDC, 2011; Chorzempa, 2006). Adherence factor two, reflected in reduced intake of foods with a high glycemic index, reduced sugar intake, reduced intake of margarine and or butter and reduced intake of salted snacks accounted for 10.96% of adherence. These recommendations, which are geared towards direct control of blood glucose and blood pressure (Fagherazzi *et al.*, 2013; Bantle *et al.*, 2008; Davison *et al.*, 2014; Gannon & Nuttall, 2006; Greenwood *et al.*, 2013), appeared to be a result of the need to control blood glucose and reduce the complications of Type 2 diabetes. Adherence factor three, reflected in reduced salt intake and an increased intake of whole grain carbohydrate was aimed at lowering the risk to complications development (Bantle *et al.*, 2008; Gonzalez *et al.*, 2011; Davison *et al.*, 2014; Fung *et al.*, 2008; Greenwood *et al.*, 2013; Hodge *et al.*, 2004; CDC, 2011; Boden *et al.*, 2005 ; Cho *et al*, 2013). The focus for adherence factor three appeared to focus on maintaining blood pressure and lowering the risk of complications development. Adherence factors four and five, which accounted for less than 10% each of adherence, were a measure of increased fruit and

vegetable consumption in that order. This results, in which consumption of whole grain carbohydrates, fruits and vegetables were less contributors to the total adherence, agree with another study, which revealed a low adherence to plant-based diets (Lee, Mckay, & Arden, 2015). In this case, a plant-based diet was defined as the intake of whole grain, plant-based foods and the exclusion of meat, dairy products, eggs, refined and processed foods, from the diet (Tuso, Ismail, & Bartolotto, 2013). This displays an adherence pattern, in which there is a need to control development of cardio vascular diseases, followed by control of blood glucose and the development of complications, than lowering the risk of complications development and finally general health. This gives an adherence pattern whose focus is in line with the focus as given in the Kenya NCGMD, for the secondary management of Type 2 diabetes, except for the order.

In the Kenya NCGMD, secondary management of Type 2 diabetes involves the early detection and management of complications, through good blood glucose control. Before a diet plan is drawn, tests are done to ascertain blood sugar, blood pressure and blood lipid levels. First, there is need to maintain blood glucose control to as near normal as possible and prevent the development of complications. In the case of the study results, this was the second focus. In the Kenya NCGMD, the second focus is to maintain a lipid and lipoprotein level that reduces the risk of cardiovascular disease, which was the first focus according to the study. Studies show that the control of LDL cholesterol helps to reduce the development of cardiovascular disease (CDC, 2011; Chorzempa, 2006). The third focus for NCGMD is to maintain blood pressure levels to as near normal as possible and lower the risk of complications development, which was the same for this study.

Other studies have also shown that the DASH diet and consumption of whole grain carbohydrates are associated with a lower risk of complications development for Type 2 diabetes (ADA, 2008; Gouveri *et al.*, 2011; Hu *et al.*, 2012; Greenwood *et al.*, 2013). This focus could also be due the fact that a higher percentage of adults with diabetes also have a high blood pressure (CDC, 2011). Based on this study results, where 89% of the respondents acknowledged receiving advice on diet, the pattern derived indicates that they were aware of the options in dietary management, as provided by the NCGMD, even if their focus was slightly different. The focus then would be to improve on the mean adherence level from 4 or 80% to 5 or 100%, to ensure that the secondary prevention efforts focusing on dietary management bear fruit.

5.4 Socio-economic factors in Dietary Management of Type 2 diabetes

The study looked at the role of socio-economic factors on adherence to diet in the management of Type 2 diabetes. The focus was on social, economic and other patient factors, which may affect diet adherence. Of specific importance was age, marital status, sex, diabetes in the family, education levels, period with diabetes and culture. Economic factors were measured by the cost of the modified diet and employment status, while environmental factors were assessed based on availability of the modified diet in terms of distance, area of residence and workplace. Of all these factors, six appeared to have a significant effect on adherence. These were age, marital status, diet found in the locality or surrounding environment, diet accessible by distance, diet accessible from the workplace, occupation status. These study results, which show some socio-economic issues influencing adherence, therefore, do not fully agree with other studies that concluded that socio-economic factors were weak in predicting adherence (Freita *et al.*, 2011; Zhu, Tu, Marrero, Rosenman, & Overhage, 2011; Yang *et al.*, 2009). Although in this study sex did not have an influence on adherence, other studies have indicated that women are twice more

likely to be depressed (Kessler, 2003) leading to a dissatisfaction with care and subsequently, poor adherence to diabetes self-care (Ciechanowski, Katon, Russo, & Hirsh, 2003). In another study in which socio-economic factors were assessed against adherence, the results showed that age, gender, education levels and income did not influence adherence (Turcatto *et al.*, 2013), unlike in this study where age appeared to influence diet adherence. The length of time one has been managing diabetes, did not appear to influence adherence, but has shown conflicting results in other studies. While the World Health Organisation suggests that the long period in managing chronic diseases such as diabetes will eventually lead to non adherence (Sabate, 2003), another study found that patients who have been managing diabetes for a long period are more likely to adhere to diet and medication (Silva, Ribeiro, & Cardoso, 2006).

Adherence factor one, whose focus was to control CVD, by increasing use of oils and reducing fat intake, increases as diet accessible by distance increased. In other words, the nearer the point where they could access cooking oils or foods made with cooking oils, the more they were able to adhere to adherence factor one. For adherence factor two, whose focus was to control blood glucose and the development of complications, an increase in diet being available at the work place and occupation status were able to increase its adherence. In other words, the fact that they could access the modified diet from their workplace, whether they were employed or self employed increased adherence to reducing intake of foods with a high glycemic index, reducing use of sugar in beverages, reducing intake of sugar flavoured drinks and snacks, reducing intake of margarine and or butter and salted snacks. The implication therefore is that if these foods are not available at the workplace, whether employed or self employed, then they would not be able to adhere. An increase in age, marital status and having the required foods grown in the locality

led to an increase in diet adherence factor three. This diet adherence factor was focused on lowering the risk of complications development, by reducing salt intake and increasing whole grain carbohydrates intake. The fact that age and marital status led to an increase in adherence factor three, could be explained by the fact that as people grow older, they are also more likely to marry, thus their effect could be the same. To support this finding, one study revealed that marital status and or having a family member with knowledge about diabetes care influenced its management (Gutschall *et al.*, 2011; Mayberry & Osborn, 2012) and that if a family member had knowledge then they were supportive to diabetes management leading to increased adherence to treatment regimes. Marital status also led to an increase in adherence factor five, whose focus was on maintaining good health by increasing vegetable consumption.

Therefore, this results provide a basis upon which health care providers may need to focus on to ensure that adherence levels are met. When drawing a diet plan to control the onset of CVD, it would be important to know how far they have to move from their homes in order to get cooking oil. In the same way, to control blood glucose and prevent the development of complications it would be important to provide alternatives for ensuring that they are able to access the modified diet from their work place for the employed and self employed, such as packing their own lunch. Considering that for those who have to work in an urban setting the temptation of fast food joints and supermarkets offering ready to eat could lead to non-adherence. Since the required foods being grown in the locality led to an increase in adherence, it is important to find out where they access their food from to understand if they are more likely to adhere or not and provide adequate solutions. Marital status which seemed to influence adherence factor three and five cannot be ignored. It therefore implies that special attention be given to single people or those

who stay alone, to ensure that they are supported more to adhere to these two adherence factors. The focus for previous studies has mostly been on the reasons for non-adherence (Dibari *et al.*, 2012; Khan *et al.*, 2012; Adewale *et al.*, 2013), providing room for this study to focus on those socio-economic and patient factors that will influence adherence, and have to be a point of focus during the counselling sessions and when a diet plan is being drawn for each patient.

5.5 Influence of Risk Perceptions in Dietary Management of Type 2 diabetes

The study considered six risk perceptions; that is attitude, subjective norm, perceived behaviour control all from the theory of planned behaviour (TPB), and perceived susceptibility, perceived severity and perceived benefits from the health belief model (HBM). Out of the six, four perceptions came out as being able to influence behaviour. These were perceived benefits, perceived susceptibility and perceived severity from the HBM and perceived behaviour control from TPB. The four were able to influence three adherence factors separately, adherence factor one, adherence factor two and adherence factor three. None of the perceptions appeared to have influence of significance on adherence factor four and five. In other words, perceptions held by patients in this case, did not seem to influence adherence to fruits and vegetables. In his study on adherence to plant-based diets, Lee *et al.*, 2015, concludes that the low adherence to a plant-based diet may have been a result of low knowledge on the same, and a reflection of the perception of diabetic educators and physicians on its practicability (Lee *et al.*, 2015). It means that the participants in his study did not adhere because during their diet counselling sessions, the benefits of a plant-based diet was not emphasised. Though not conclusive, this could be the same reason why in this study there were low adherence levels for fruits and vegetables consumption, which were not a result of patient perceptions.

5.5.1 Influence of risk perceptions on adherence factor one

Adherence factor one, which focused on controlling the development of cardiovascular diseases (CVD), by increasing oils and reducing fats, was influenced by perceived benefits and affordable diet. Even though perceived susceptibility did not seem to influence this adherence factor, another study found that more patients with cholesterol levels within the recommended amounts were more likely to adhere to a diet plan, than their counter parts, with higher levels of cholesterol (Fara *et al.*, 2012). The implication is that patients with cholesterol levels higher than the recommended amounts did not adhere even if they knew that they were more likely to suffer the complications of unmanaged diabetes. Perceived benefits, has been defined as the belief that the outcome of performing a behaviour are good. As discussed earlier, in secondary management of Type 2 diabetes, the second purpose is to prevent the development of complications and for this, diet is modified after test are carried out to check blood pressure, lipid levels and blood sugar. The control of CVD focuses more on reducing the intake of foods with low-density lipoprotein in favour of foods with high-density lipoprotein, and the general advice is to replace the animal fat sources, which have low-density lipoprotein with sources from plant oils, which have high-density lipoprotein. There is also need to avoid trans fats, which are solidified plant oils and contribute to the formation of low-density lipoprotein cholesterol in the body. Perceived benefits appeared to have a greater influence on adherence factor one when compared to diet affordable, based on the value of their beta scores in the regression model. This implies that the belief that controlling the development of CVD is beneficial to one, will enhance adherence to diet, the cost of food notwithstanding. This study results agree with another study which showed that a portion of patients who adhered to diet in the management of Type 2 diabetes, believed that adherence to diet was beneficial to them (Broadbent *et al.*, 2011). In the same study, a larger

number of patients reported adhering to medication because they believed it was beneficial to them (Broadbent *et al*, 2011). The cost of cooking oils in the local market has always been higher than the cost of cooking fat of the same quantity, and plant oils such as corn oil, sunflower oil and olive oil have always had high prices compared to cooking fats. The implication here is that if people managing Type 2 diabetes understand well the benefits of controlling blood lipid levels, then the cost of the cooking oils will not be a big hindrance to adherence. Therefore cost of food, one of the reasons cited for non-adherence can be overcome if the benefits of adherence are emphasised during counselling and therapy sessions. It is also important to note that diet accessible by distance, which was of influence under socio-economic factors, ceased being of influence in the presence of perceived benefits. This implies that if patients understand the benefits of adherence to control CVD, then the distance they have to travel to get these foods will no longer be an issue.

5.5.2 Influence of risk perceptions on adherence factor two

Adherence factor two, which focused on controlling blood glucose and complications development, had perceived behaviour control and perceived severity as its significant predictors. This adherence factor was a reflection of reducing; intake of foods with a high glycemic index, sugar in beverages and sugar flavoured drink and snacks, intake of margarine and or butter and salted snacks. This implies that efforts to maintain these diet recommendations in adherence factor two are influenced by the belief that one will face obstacles in their efforts and that they are able to overcome these obstacles (perceived behaviour control). In the same vein, the same efforts are influenced by the belief that they are more likely to suffer the dire consequences of Type 2 diabetes if they do not adhere (perceived severity). This results conflict with another study that showed that patients who reported complete adherence to dietary

recommendations had perceptions of fewer symptoms (Broadbent *et al.*, 2011). In other words, their perception that the symptoms of Type 2 diabetes were not a threat as such increased adherence to diet, while in this study, the more severe the perceived condition is, the more they adhere. However, in terms of an increase in adherence as a result of an increase in perceived behaviour control, it agrees with other findings of the same study that showed that patients who reported complete adherence also reported higher levels of personal control (Broadbent *et al.*, 2011). This adherence factor is the first purpose for secondary management of Type 2 diabetes, to control blood glucose and prevent the development of complications. It means that uncontrolled blood glucose may lead to dire consequences, such as disability and even death. It is no wonder that this adherence factor was influenced by perceived severity. On the other hand, the modification of diet for this adherence factor focuses on some of the most common eating habits; sugar in beverages, sugar flavoured drinks, salted snacks and foods with a high glycemic index, it again is a no wonder that it was influenced by the belief that they would face obstacles in adherence. These findings indicate that people managing Type 2 diabetes will adhere more to diet if they understand the severity of the condition. It also implies that the belief they will face obstacles and be able to overcome them will increase adherence. The implication is that the obstacles of adherence and the severity of non-adherence have to be communicated during counselling and diet planning, and together with the patient devise ways of overcoming these obstacles. The findings of this study agree with what other studies found, that showed that parents and adolescents under estimated the severity of their weight leading to poorer eating habits (Skinner, Weinberger, Mulvaney, Schlundt, & Rothman, 2008). In this case, the fact that they did not give the severity of their condition the attention it deserved, led to poor eating habits, that aggravated their situation. It also agrees with another study where percieving better

control of diabetes was associated with better adherence to diet (McAndrew, Horowitz, Lancaster, & Leventhal, 2010). The implication is that its important to inform patients managing Type 2 diabetes, what they are up against, their challenges and the severity of non-adherence, and guide them in drawing a diet plan that will enable them overcome their obstacles. Diet accessibility from the workplace and employment status which were influential in the assessment of socio-economic factors, ceased to be of influence in the presence of perceptions, again indicating that perceptions have a greater influence on this adherence factor, when compared to socio-economic factors.

5.5.3 Influence of risk perceptions on adherence factor three

Adherence factor three, whose focus was to lower the risk of complications development was influenced by perceived susceptibility, perceived behaviour control, diet available in the environment or locality and age. This adherence factor was a reflection of adherence to diet recommendations carbohydrate intake is from whole grain and reduce intake of table salt, in cooked foods. As age and food availability in the locality increased, there was an increase in adherence for these options. This results on adherence and age are in line with results from another study that showed that as patients continue managing the condition, they are more likely to adhere, as they get more knowledge and understand their condition more (Silva *et al.*, 2006; Fara *et al.*, 2012). However, another study cautions on increase in diet adherence with age, in that as people grow older, they are more likely to forget, be dependent on others and have old age conditions that may affect dietary intake and consequently, adherence (Bonardi, Souza, & Moraes, 2007). The implication is that the same study carried out on elderly patients may have a reverse result.

On adherence factor three, it was observed that as perceived susceptibility and perceived behaviour control increased, adherence would increase. However, perceived susceptibility appeared to have greater influence on adherence to lower risk of complications development. It was followed by diet in the environment or locality, then perceived behaviour control and finally age. As discussed earlier, statistics indicate that most people with Type 2 diabetes have got high blood pressure or hypertension, implying that having Type 2 diabetes makes one more susceptible to high blood pressure. It is therefore possible that an increase in the belief that they are susceptible to complications will enhance adherence to a diet that will lower this risk. This results conflict with a study that showed that those patients who reported complete adherence to dietary recommendations had perceptions of fewer consequences (Broadbent *et al.*, 2011). In other words, their perception that they would have less consequences of unmanaged diabetes led to an increased adherence to diet. On the other hand, this study results agree with findings in the same study, that showed that those patients who reported complete adherence also had perceptions of higher personal control (Broadbent *et al.*, 2011). In both studies, the perception that one was able to face obstacles in adherence and overcome them, led to increased adherence to diet.

Studies also indicate that a combination of whole grain carbohydrate and DASH (Diet to Stop Hypertension) diet were able to lower the risk of complications development in the management of Type 2 diabetes (ADA, 2008; Gouveri *et al.*, 2011; Hu *et al.*, 2012; Greenwood *et al.*, 2013). Another facilitator for this adherence pattern was the availability of whole grain carbohydrates in their locality. It means the more they are able to access whole grain carbohydrates, the more they will adhere. Therefore the concern about Kisumu's elevated status and the easily available ready

to eat foods, rich in processed and refined sugars, and available in supermarkets and food outlets is real (Jackson, 2012). The adherence to this diet adherence factor relies on the fact that they will be able to access the right foods within their area of residence. Perceived behaviour control, was also influential in this adherence factor, and may serve to counteract the obstacle of having refined and processed foods within their locality which may affect adherence. In this case, if the issue is discussed as an obstacle that they will meet, then because in perceived behaviour control, they believe that they can overcome this obstacle, it will lead to increased adherence.

Finally, age as an influencing factor means that as they grow older, adherence to avoid complication increases, meaning that adherence for the younger generation in this aspect may be wanting. The implication is that for younger patients, more effort will be put in place during counselling to ensure that they understand why they have to adhere, as this adherence factor increases with age. This recommendation was also made in a study in which adherence seemed to increase with age, raising concern that more efforts have to be put in to enhance adherence levels for youths and adolescents managing Type 2 diabetes (Fara *et al.*, 2012). Marital status, which seemed to influence this adherence factor, was no longer of influence in the presence of perceptions, again implying that perceptions override its influence.

5.5.4 Influence of risk perceptions on adherence factor four and five

For adherence factor four, predicted by including fruits in all meals, results showed that the combined influence of perceptions socio-economic and patient factors was not significant. This was also the case for adherence factor five, predicted by including fruits in all meals, which initially had marital status as an influential factor. In the presence of perceptions, this factor was no longer of influence. As discussed earlier, adherence to fruits and vegetable intake did not

appear to be influenced by perceptions, but instead may be a result of low knowledge on the same, and a reflection of the perception of diabetic educators and physicians on its practicability (Lee *et al.*, 2015). In other words, it may be that during counselling sessions on diet, not much emphasis is put on these adherence factors, as was seen in the study by Lee *et al.*, 2015, in which the health professionals, acknowledged that diet recommendations for a plant-based diet did not seem practical, and so they did not communicate this knowledge to patients (Lee *et al.*, 2015).

CHAPTER SIX: SUMMARY OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

This chapter presents summary of the study findings, which have been analysed, interpreted in chapter four and discussed in chapter five, conclusions, recommendations and suggestions for further studies.

6.2 Summary of the findings

6.2.1 Patient Characteristics

The patients in this study had a mean age of 59 years, been diagnosed with Type 2 diabetes and had been attending the diabetic clinic for at least 6 months. Majority were female, married and had some form of employment. In addition, most of them received advice on diet and were on medication to control blood glucose. Less than half of the participants had a relative with Type 2 diabetes. Finally, majority of the respondents acknowledged that the recommended diet was affordable, culturally accepted and accessible from their workplace, home, and grown in their areas.

6.2.2 Adherence to Dietary Management Options for Type 2 Diabetes

The results chapter four revealed a mean adherence level of 4 or 80% adherence. This is because majority of the participants had a mean adherence level of four, with less than one quarter having a mean adherence level of 5 or 100% adherence. Further analysis revealed an adherence pattern, whose main focus was first, to control the onset of cardiovascular disease, then the control of blood glucose and the development of complications. Finally to lower the risk of complication

development and maintain general good health. This is in line with the main purposes of diet modification in secondary management of Type 2 diabetes as outlined in the Keny NCGMD.

6.2.3 Socio-economic Factors in Dietary Management of Type 2 Diabetes

The study revealed that several socio-economic factors had an influence on the different adherence focuses. Adherence to control cardiovascular diseases increased as the required foods became accessible by distance, the nearer the source, the higher the adherence. On the other hand, adherence to control blood glucose and development of complications increased with an increase in diet accessibility from their workplace and their employment status, meaning that employers should make efforts to ensure that their employees with Type 2 diabetes are able to access the required foods while at work. To lower the risk of complications development, adherence increases with age, marital status and required food grown in the locality. This means giving closer attention during counselling to younger, unmarried and patients from urban settings who may not be able to grow the food. Finally, adherence to maintain general good health increased with marital status, again requiring more focus in dealing with this fact among the youth

6.2.4 The influence of Risk Perceptions on Diet Adherence in Dietary Management of Type 2 Diabetes

Finally, analysis carried out to determine the influence of risk perceptions on adherence to diet in the presence of socio-economic variables revealed that not all perceptions were significant. Adherence to control cardiovascular diseases increased with an increased belief in the benefits of adherence and was of more influence than their ability to afford the required foods. Adherence to control blood sugar and the development of complications was influenced by the belief that they will face challenges and be able to overcome them, and by the perception that they would suffer

serious consequences if they did not adhere. Finally, adherence to lower risk of complications development was influenced by their perception that they are more likely to suffer the adverse complications of Type 2 diabetes, based on factors such as age, body weight, and family history among others.

Important to note is the fact that some socio-economic factors such as diet accessible by distance, diet accessible from the workplace, employment status and marital status, which were socio-economic factors of influence, ceased having the same effect in the presence of risk perceptions. This strengthens the importance of assessing perceptions, socio-economic and patient factors in an integrated model. It should be noted that all the perceptions from the Health Belief model were of influence, compared to just one from the Theory of Planned Behaviour model. This indicates the importance of the integrated approach, as it gives a picture of which perceptions have weight in dietary management of Type 2 diabetes and therefore need special focus.

6.3 Conclusion

Majority of the respondents were aged above 50years (mean age 59years), were married, were employed and could afford and access the required foods within their area of residence, all these factors having a positive influence on adherence. This may have contributed to more than 90% of the respondents having adherence levels of 80% and more. The influence of perceptions, which appeared to override some of these socio-economic factors, may explain why even with the high number of participants having the positive socio-economic influence, only 22.3% had adherence levels of 100%. This gives a possible indication that the perceptions of influence revealed in the analysis have to be dealt with to realize 100% adherence. This study therefore concludes that, adherence to diet is still wanting , and that dealing with socio-economic and patient factors alone

during counseling sessions, may still not realize a 100% adherence to diet in the management of Type 2 diabetes. It also recognizes that risk perceptions, perceived benefits, perceived susceptibility, perceived severity and perceived behaviour control play a role in diet adherence in dietary management of Type 2 diabetes.

6.4 Contribution to the Body of Knowledge

This study assessed the level of adherence to diet in the management of Type 2 diabetes, information that has been inadequate in Kenya as a country (Sabate, 2003), in the hope that it will be used to intensify efforts in managing the condition

The study was also able to identify the socio-economic factors that affect diet adherence in dietary management of Type 2 diabetes, information that had not yet been established. This information if included in the counselling sessions, will be useful during tailoring of diets to suit each individual.

This study was able to identify risk perceptions that influence diet adherence in dietary management of Type 2 diabetes, again an area of study that had not yet been exploited in Kenya. It also identifies that risk perceptions more strongly influence diet adherence than socio-economic factors. This information will be useful in improving adherence if counselling sessions are modified to include handling these perceptions.

6.5 Recommendations

After analyzing the influence of risk perceptions on diet adherence in dietary management of Type 2 diabetes in JOOTRH, the following recommendations are necessary:

1. To make all efforts to further increase diet adherence levels to at least 95% in dietary management of Type 2 diabetes, for all patients managing the condition. In addition, in

controlling of CVDs, emphasis for this group should be laid on first reducing overall fat intake. This will ensure a reduction in complications, loss of life and a reduced cost in the management of Type 2 diabetes

2. To enrich counselling sessions to address socio-economic factors age, cost of food, accessibility to the recommended food that affect diet adherence.
3. To enrich counselling sessions to handle risk perceptions identified in this study, in order that they enhance diet adherence. These are perceived benefits, perceived behaviour control, perceived susceptibility and perceived severity.
4. To carry out further research on the outcome of dietary management of Type 2 diabetes, that is blood glucose control, in cases where counselling session has incorporated this study result findings.

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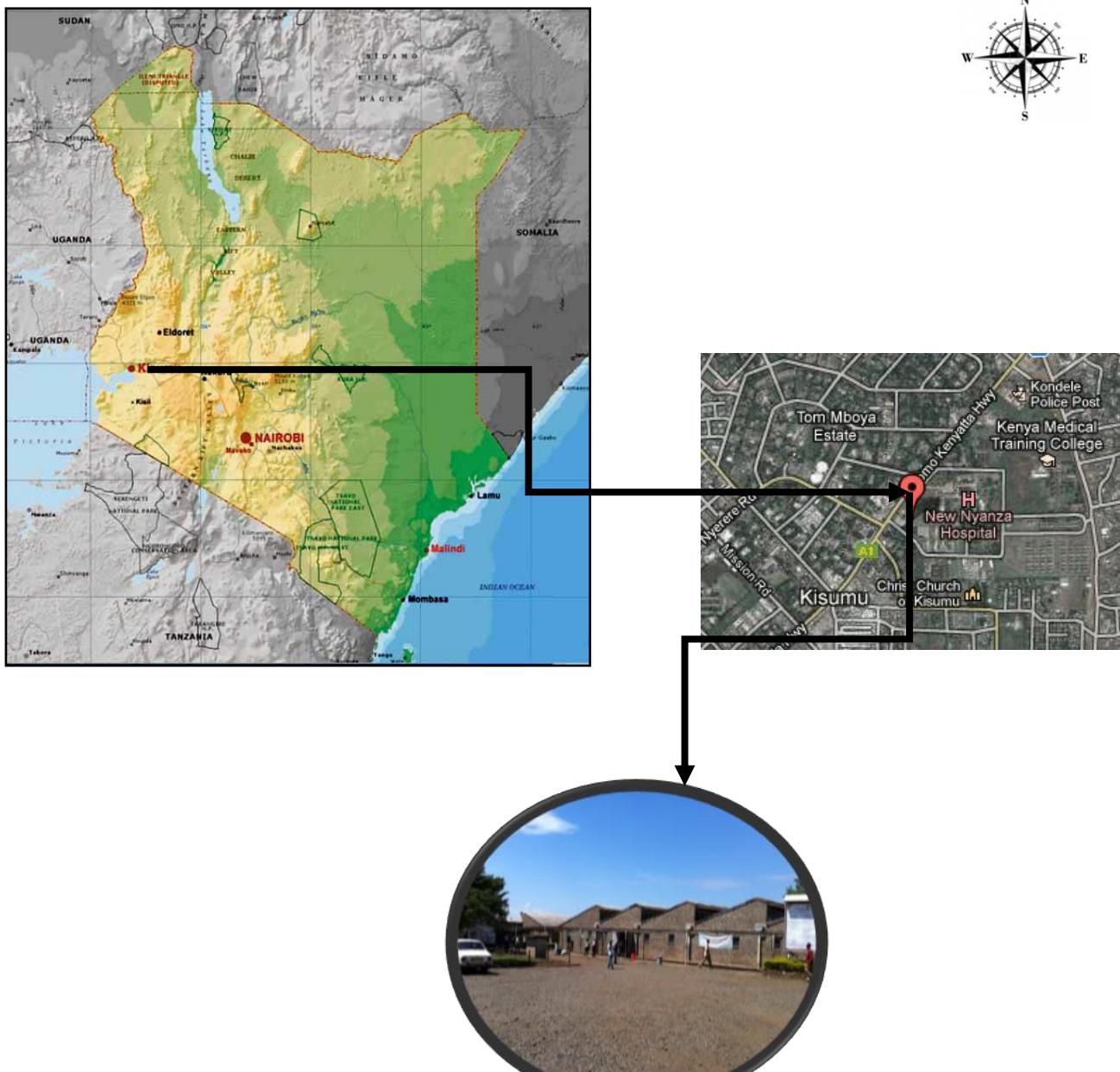
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APPENDICES

Appendix 1: Kenya and Study Setting Map

A map of Kenya and a part of Kisumu town, showing the location of Jaramogi Oginga Odinga Teaching and Referral Hospital



A front view of Jaramogi Oginga Odinga Teaching and Referral Hospital

Appendix 2: Consent to Participate in Research
MASENO UNIVERSITY

Patients' Consent Form

Consent Form Section A: Study Information

Study Title: Influence of Risk perceptions on Adherence in Dietary Management of Type 2 Diabetes in Jaramogi Oginga Odinga Teaching and Referral Hospital, Kenya

Statement of the Researcher

We request you to participate in a research study. The information in this form explains what participation in the study entails. Please, listen carefully as I read this form. You are free to ask questions about what we will ask you to do, the risks involved, the benefits, your rights as a volunteer or anything in this form that may not be clear to you. In a process known as informed consent, you decide whether you would like to participate in the study. If you agree to take part in the study after we have described it to you and having answered any questions, you have to your satisfaction, we will give you a signed copy of this form for your records.

Purpose of the Study

The purpose of this study is to determine the influence of our beliefs and practice on our compliance to diet in the management of Type 2 diabetes. This information is useful in determining whether our beliefs will influence our intake of diet as modified for the management of Type 2 diabetes, hence will give direction on whether during counselling sessions public health workers need to focus on these beliefs.

Study Procedure

The study will be carried out in Jaramogi Oginga Odinga Teaching and Referral Hospital, as you attend the Diabetic clinic. We shall engage enumerators to interview you to get information on your diet habit and on your beliefs towards the modified diabetic diet. If you agree to participate in the study, we will interview you at the site. We shall collect data on your diet habit, using a diet habit assessment form and on your beliefs using a Perceptions Assessment form. The interview will take about 30 to 45 minutes in the hospital waiting area.

Risks, Stress and Discomforts

This study does not put you at any risk. However, answering the questionnaire will take about 30 to 45 minutes of your time

Benefits of Participating in the Study

Your participation will help us assess the influence of beliefs have on adherence to diet in the management of Type 2 diabetes

Volunteerism and Other Information

Your participation in this study is voluntary and you may decide to withdraw your participation before or during the interview without any consequences. It is still possible to decline to participate even after signing this consent form. Information generated from this study will be used for the purpose described in this consent form. We would like to reassure you that the data and any publication from this study will not contain information that will reveal your identity as a participant. Only the investigator and the enumerator will have access to information that link your name on the consent form you have signed or put your mark on and your study number. We will keep information you give confidential. Should you have any question about the study, please feel free to get in touch with;

Ms CarolyneMusee.

Name of Researcher

Signature

Consent Form Section B: Statement of the Patient

The purpose of the study has been clearly explained to me. I consent to participate in this study. I have been accorded the opportunity to ask questions. I understand that my participation in this research will expose me to no risk. I understand that my identity will be kept confidential. Data will be coded such that my identity will not be compromised at any time nor will any key with participant names be available to anyone other than the investigator of this research and the academic supervisors. I understand that if I need additional information or have further questions, I will reach the investigator of this research study, Carolyne Musee, Master of Science (MSc) Nutrition candidate, Department of Nutrition and Health, School of Public Health and Community Development, Maseno University, Kenya, at the following address:

P.O.Box 3160, Kisumu

Tel: +254720336146

Email: museecaro@yahoo.com

OR

Maseno University

School of Public Health and Community Development

Private Bag, Maseno.

Name of Participant

Signature

Date

Or (for those unable to sign)

	Thumbprint (right hand)
--	----------------------------

Date _____ (To
be filled by the interviewer)

Name of witness (if necessary)

Signature

Date

Kiswahili version

Fomu ya idhini sehemu ya A: Habari kuhusu utafiti

Mada ya utafiti: Ushawishi wa mitazamo kwa kuhudhuria malezi katika matibabu ya ugonjwa wa kisukari katika Jaramogi Oginga Odinga Teaching and Referral Hospital, Kenya

Taarifa ya mtafiti

Tunakuomba ushiriki kwa hu utafiti. Habari iliyo kwa fomu hii inaeleza kinachohitajika ili ushiriki kwa hii utafiti. Tafadhali sikiza kwa makini nitakapo ipitia hii fomu. Uko huru ku uliza maswali kuhusu ushirika wako, hatari na faida zozote za kushiriki, haki zako kama mshirika ama kitu cho chote kwa hii fomu kyenye hakieleweki. Katika mchakata unaojulikana kama kujulishwa kwa idhini, uta amua kama unataka kushirik ikwa huu utafiti.Ukikubali kushiriki katika utafiti huu baada yakupata maeleo kui husu, na umetosheka na majibu zamaswali umeuliza, tutakupatia nakala ya hii fomu iliyo na sahihi uweke kwa rekodi zako.

Kusudi la utafiti

Kusudi ya utafiti huu ni kujua ushawishi wa fikira zetu kwenye uti wetu kwa malezi katika utibabu wa ugonjwa wa kisukari. Hii habari ina maana ya kujua iwapo fikira zetu zina shawishi uti wetu kwa malezi tunapokabiliana na ugonjwa wa kisukari, ili itupatie mwelekeo wafanyi kazi wa afya wanapo peana ushauri na saha kwa wagonjwa.

Utaratibu wa utafiti

Hii utafiti utafanyiwa Jaramogi Oginga Odinga Teaching and Referral Hospital, unapo hudhuria kliniki ya ugonjwa wa ki sukari. Utahojiwa ili kupeana habari kuhusu malezi yako na fikira zako ukizielekeza kwa malezi uliopewa. Utahjiwa ukiwa hospitalini. Mahojiano yata endelea kwa muda wa dakika 30 hadi 45 katike eneo la kusubiri.

Hatari, dhiki na usumbufu

Huu utafiti hauna madhara yoyote. La sivyo mahojiano yataendelea kwa muda wa dakika 30 hadi 45.

Faida ya kushiriki utafiti; Ushiriki wako utatuelekeza kujuwa ikiwa fikira zetu zina shawishi uti wetu wamalezi katika kukabiliana na ugonjwa wa kisukari

Kujitolea na habari nyingine; Ushirikiano wako katika utafiti huu ni wakujitolea na unaeza toa uamuzi kutoshiriki kabla ama baada ya mahojiano bila matokeo yoyote. Unaeza toa uamuzi kutoshiriki hata baada ya kutia sahihi hii fomu. Habari itakayo patikana kwa utafiti huu itatumika kama vile imeelezwa kwa fomu ya idhini. Tungependa kukuhakishia kwamba habari ama taarifa yeyote itakayochapishwa kulingana na hii utafiti haita kutangaza kama mshiriki. Ni mtafiti na muhoji tuu ndio watakuwa na habari inyohusisha jina lako au sahihi na nambari yako ya usajili. Habari yeyote utakayotoa itakiwani. Ukiwa na swali lolote kuhusu huu utafiti, mshulishe mtafitii kwa hii anwani:

Bi Carolyne Musee.

Jina la mtafiti Sahihi Tarehe

Fomu ya idhini sehemu ya B: Taarifa ya muhojiwa

Nimejitolea kushiriki katika utafiti huu wenye mada ‘ Influence of Risk Perceptions on Dietary Management of Type 2 Diabetes in Jaramogi Oginga Odinga Teaching and Referral Hospital’ Nimekuwa na muda wa kuuliza maswali. Ikiwa nitakuwa na maswali yoyote baadaye, nitamfikia mchunguzi wa utafiti huu, Carolyne Musee, Master of Science (MSc) Mwanafunzi wa Nutrition, Department of Nutrition, School of Public Health and Community Development, Maseno University, Kenya kupitia anwani ifuatayo:

S.LP 3160, 40100 Kisumu

Nambari ya simu: +254 720 336 146

Anwani ya barua pepe: museecaro@yahoo.com

ama

Maseno University

School of Public Health and Community Development

Sanduku La Posta, Maseno.

Nime elewa kuwa kauli hii yashahada ya uzamili hii itachunguza ‘Influence of Risk Perceptions on Adherence in Dietary Management of Type 2 diabetes in Clinic Attendees in Jaramogi Oginga Odinga Teaching and Referral Hospital’

Ninaelewa kuwa kushirik ikwangu kutachukua muda wa masaa mawili kujaza fomu ya mahojiano. Sitafidiwa kwa kushiriki. Nina elewa kuwa kushiriki kwangu ni wa kujitolea na nina weza kushitisha kushiriki kwangu wakati wowote hata kama nitakuwa nimeijaza fomu yamakubaliano. Naelewa kuwa kushiriki kwangu katika utafiti huu hakutanitia katika shida zinazozidi zile nina zozipitia katika maisha yangu ya kila siku.

Naelewa siri yoyote inayo nihusu itawekwa vyema. Naelewa kuwa yakuwa matokeo ya utafiti na andiko lolote la utafiti huu halitakuwa na ujumbe utakaota siri yangu kama mshiriki na kuwa matokeo hayo hayatapatikana kwa watu wengine ijapokuwa mtafiti mwenyewe na wasimamizi wake. Naelewa kuwa matokeo ya utafiti ya tachapishwa au kuripotiwa vizuri ili kusaidia jamii na mpangilio vile mambo yanafanyika, lakini siri yangu haitatolewa inje.

Jina la mshirika

Sahihi

Tarehe

Ama (kwa wenye hawana sahihi)

Alama ya kidole cha gumba (mkono wa kulia)

Tarehe _____
(Itajazwa namhoji)

Jina la mushuhuda (kama ni lazima)

Sahihi

Appendix 3: Sample Questionnaire

Socio-economic factors

Age: (in years)

Sex: (Tick where appropriate) Male/Female

Residence (where do you live?)

Level of education: (Tick where appropriate) Primary, Secondary, Tertiary, None

Marital status:(Tick where appropriate) Single, Married, Divorced, Widowed

Main occupation (what do you do for a living?).....

When were you diagnosed with Type 2 diabetes? (mm/yyyy).....

How long have you been on treatment? (Please indicate if months or years).....

Are you on any diabetic medication? (Tick where appropriate)Yes / No

If yes, which ones:

For the following questions, tick where appropriate:

Have you ever been advised on your diet?

Yes

No

If yes:

The modified diet is:	Yes	No
Affordable		
Culturally accepted		
Accessible in terms of:		
a) Distance		
b) Workplace		
c) Environment		

Does anyone else in your family have diabetes? (Tick where appropriate)Yes / No

If yes, who?.....

Part I Dietary habit assessment form

Beside each of the statements presented below, please score your diet habit for the different categories

Key:

1= Never, 2= Rarely, 3= Sometimes, 4=Often, 5= Always

Statement	Score				
	1	2	3	4	5
Diet habit					
a) My carbohydrate intake is made from whole grain flour i.e. whole wheat, whole maize/millet/sorghum,					
b) Foods like Irish potatoes, sweet potatoes, white rice, ripe bananas, watermelon are part of my daily diet					

c) I use cooking oils such as <i>elianto</i> , golden fry, and <i>popco</i> .				
d) I take blue band and or butter				
e) I use cooking fats such as <i>chipsy</i> , <i>kimbo</i> , <i>chipo</i> , animal fat in meat and chicken skin				
f) I include vegetables in all my meals				
g) I take a fruit with all my meals.				
h) I take sugar in food and beverages such as tea, porridge, fruit salad, sugarcane				
i) I take soft drinks, ice cream, sweets, juice, biscuits				
j) I take table salt in my food				
k) I take salted snacks such as crisps, groundnuts				
l) I adhere to my diet plan				

Part II: Risk Perceptions Assessment

Please circle the number that best describes your opinion

Attitude:

My consumption of whole grain carbohydrates every day for the next one year is:

Pleasant : 1 : 2 : 3 : 4 : 5 : Unpleasant

Reducing consumption of foods such as Irish potatoes, sweet potatoes, white rice, ripe bananas, and watermelon every day for the next one year is:

Unpleasant : 1 : 2 : 3 : 4 : 5 : Pleasant

Replacing my fat intake with salad oils such as *elianto*, golden fry, and *popco* every day for the next one year is:

Pleasant : 1 : 2 : 3 : 4 : 5 : Unpleasant

Reducing the use of margarine (blue band) butter, every day for the next one year is:

Pleasant : 1 : 2 : 3 : 4 : 5 : Unpleasant

My increased consumption of fruits and vegetables every day for the next one year is:

Unpleasant : 1 : 2 : 3 : 4 : 5 : Pleasant

Reducing my sugar intake every day for the next one year is:

Pleasant : 1 : 2 : 3 : 4 : 5 : Unpleasant

Reducing my salt intake every day for the next one year is:

Unpleasant : 1 : 2 : 3 : 4 : 5 : Pleasant

Adhering to my diet plan every day for the next one year is:

Pleasant : 1 : 2 : 3 : 4 : 5 : Unpleasant

Subjective norm

Most people who are important to me approve of my consuming of whole grain carbohydrates every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

Most people who are important to me approve of reducing consumption of foods such Irish potatoes, sweet potatoes, white rice, ripe bananas, watermelon every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Most people who are important to me approve of my replacing fats with salad oils such as as *elianto*, golden fry, and *popco* every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

Most people who are important to me approve of my reducing the use of margarine (blue band) butter, every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

Most people who are important to me approve of my increased consumption of fruits and vegetables every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Most people who are important to me approve of me reducing my sugar intake every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

Most people who are important to me approve of me reducing my salt intake every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Most people who are important to me approve of my adherence to my diet plan every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

Perceived behaviour control

I am confident that I will be able to take whole grain carbohydrates, every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

I am confident that I will be able to reduce consumption of foods such as Irish potatoes, sweet potatoes, white rice, ripe bananas, watermelon every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

I am confident that I will be able to replace fats with salad oils such as *elianto*, golden fry, and *popco* every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

I am confident that I will be able to reduce the use of margarine (blue band), butter, every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

I am confident that I will be able to increase consumption of fruits and vegetables every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

I am confident that I will be able to reduce my sugar intake every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

I am confident that I will be able to reduce my salt intake every day for the next one year:

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

I am confident that I will be able to adhere to my diet plan every day for the next one year:

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Past Behaviour

In the past 3 months, I was able to take whole grain carbohydrates, everyday;

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the past 3 months, I was able to reduce consumption of foods such as Irish potatoes, sweet potatoes, white rice, ripe bananas, and watermelon;

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the past 3 months, I was able to replace fats with salad oils such as as *elianto*, golden fry, and *popco* everyday;

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the past 3 months, I was able reduce the use of margarine (blue band), butter everyday;

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the past 3 months, I was able to consume to fruits and vegetables every day;

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the past 3 months, I was able to reduce my sugar intake every day;

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the past 3 months, I was able to reduce my salt intake every day;

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the past 3 months, I was able to adhere to my diet plan every day;

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Perceived susceptibility

In the event that I do not take whole grain carbohydrates every day for the next one year

I will not be able to control my blood sugar

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the event that I do not reduce consumption of foods such as Irish potatoes, sweet potatoes, white rice, ripe bananas, watermelon; everyday for the next one year I will not be able to control my blood sugar

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the event that I do not replace fats with salad oils such as *elianto*, golden fry, and *popco* every day for the next one year, I will not be able to control my blood sugar

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the event that I do not reduce the use of margarine (blue band), butter every day for the next one year I will not be able to control my blood sugar

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the event that I do not consume fruits and vegetables every day for the next one year

I will not be able to control my blood sugar

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the event that I do not reduce my sugar intake every day for the next one year, I will not be able to control my blood sugar

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

In the event that I do not reduce my salt intake every day for the next one year, I will not be able to control my blood sugar

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

In the event that I do not adhere to my diet plan every day for the next one year, I will not be able to control my blood sugar

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

Perceived severity

If I do not take whole grain carbohydrates every day for the next one year, I will lose my vision, my limbs or my life

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

If I do not reduce consumption of foods such as Irish potatoes, sweet potatoes, white rice, ripe bananas, watermelon; every day for the next one year I will lose my vision, my limbs or my life

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

If I do not replace fats with salad oils such as *elianto*, golden fry, *popco* every day for the next one year I will lose my vision, my limbs or my life

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I do not reduce the use of margarine (blue band), butter every day for the next one year I will lose my vision, my limbs or my life

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I do not consume fruits and vegetables every day for the next one year, I will lose my vision, my limbs or my life

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

If I do not reduce my sugar intake every day for the next one year, I will lose my vision, my limbs or my life

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I do not reduce my salt intake every day for the next one year, I will lose my vision, my limbs or my life

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I do not adhere to my diet plan every day for the next one year, I will lose my vision, my limbs or my life

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Perceived benefits

If I take whole grain carbohydrates every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I reduce consumption of foods such as Irish potatoes, sweet potatoes, white rice, ripe bananas, and watermelon every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

If I replace fats with salad oils such as *elianto*, golden fry, *popco*, every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I reduce the use of margarine (blue band), butter every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

If I consume fruits and vegetables every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I reduce my sugar intake every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

If I reduce my salt intake every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Agree: 1 : 2 : 3 : 4 : 5 : Strongly Disagree

If I adhere to my diet plan every day for the next one year, I will increase my chances of recovering from Type 2 diabetes and reduce my health care costs

Strongly Disagree: 1 : 2 : 3 : 4 : 5 : Strongly Agree

Appendix4: Research Authorization JOOTRH



MINISTRY OF HEALTH

Telegrams: "MEDICAL", Kisumu
Telephone: 057-2020801/2020803/2020321
Fax: 057-2024337
E-mail: medsuptnpgh@yahoo.com
When replying please quote

JARAMOGI OGINGA ODINGA TEACHING &
REFERRAL HOSPITAL
P.O. BOX 849
KISUMU

ERC 1B/VOL.I/60
Ref:

13th September, 2013
Date

Carolyne Nekesa Musee
Maseno University,
MASENO,

Dear Carolyne,

RE: FORMAL APPROVAL TO CONDUCT RESEARCH TITLED: "INFLUENCE OF RISK PERCEPTIONS ON DIETARY MANAGEMENT OF TYPE 2 DIABETES IN JOOTRH, KENYA."

The JOOTRH ERC (ACCREDITATION NO. 01713) has reviewed your protocol and found it ethically satisfactory. You are, therefore, permitted to commence your study immediately. Note that this approval is granted for a period of one year (13th September, 2013 to 15th September, 2014). If it is necessary to proceed with this research beyond the approved period, you will be required to apply for further extension.

Also note that you will be required to notify the committee of any protocol amendment(s), serious or unexpected outcomes related to the conduct of the study or termination for any reason.

Finally, note that you will also be required to share the findings of the study in both hard and soft copies upon completion.

The JOOTRH ERC takes this opportunity to thank you for choosing this institution and wishes you the best in your endeavours.

Yours sincerely,

FRED O. AKWATTA,
SECRETARY – ERC,
JOOTRH – KISUMU.

See copy 3

Appendix 5: Research Authorization MUERC



MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 622 Ext: 3050
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya
Email: muerc-secretariate@maseno.ac.ke

FROM: SECRETARY - MUERC

DATE: 22nd May, 2014

TO: Mrs Carolyne Musee Nekesa,
PG/MSc/00056/2011
Department of Nutrition and Health,
School of Public Health and Community Development,
Maseno University, Private Bag, Maseno, Kenya.

REF: MSU/DRPC/MUERC/000067/14

RE: Influence of Risk Perceptions on Adherence in Dietary Management of Type 2 Diabetes in Jaramogi Oginga Odinga Teaching and Referral Hospital, Kenya. PROPOSAL REFERENCE NO: MSU/DRPC/MUERC/888867/14

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 22nd day of May, 2014 for a period of one (1) year.

Please note that authorization to conduct this study will automatically expire on 21st May, 2015. If you plan to continue with the study beyond this date, please submit an application for continuation approval to MUERC Secretariat by 20th April, 2015.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach MUERC Secretariat by 20th April, 2015.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advise MUERC when the study is completed or discontinued.

Thank you.

Yours faithfully,

Dr. Bonuke Anyona,
Secretary,
Maseno University Ethics Review Committee.



Cc: Chairman,
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED



Appendix 6: Research Authorization SGS



MASENO UNIVERSITY SCHOOL OF GRADUATE STUDIES

Office of the Dean

Our Ref: PG/MSC/056/2011

Private Bag, MASENO, KENYA
Tel:(057)351 22/351008/351011
FAX: 254-057-351153/351221
Email: sgs@maseno.ac.ke

Date: 24th February, 2014

TO WHOM IT MAY CONCERN

RE: PROPOSAL APPROVAL FOR CAROLYNE NEKESA MUSEE—
PG/MSC/056/2011

The above named is registered in the Master of Science in Community Nutrition Programme of the School of Public Health and Community Development, Maseno University. This is to confirm that her research proposal titled "Influence of Risk Perceptions on Adherence in Dietary Management of Type 2 Diabetes in Jaramogi Oginga Odinga Teaching and Referral Hospital, Kenya" has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

Dr. Pauline Andang'o

ASSOCIATE DEAN, SCHOOL OF GRADUATE STUDIES



Maseno University

ISO 9001:2008 Certified

