NUTRITIONAL KNOWLEDGE, ATTITUDES AND PRACTICES IN MANAGEMENT OF TYPE 2 DIABETES AMONG ADULTS IN NAKURU PROVINCIAL GENERAL HOSPITAL

LUCY GATHONI WAITHAKA

THESIS SUBMITTED FOR THE DEGREE OF MASTERS OF SCIENCE (FOODS, NUTRITION AND DIETETICS) IN THE SCHOOL OF HEALTH SCIENCES, KENYATTA UNIVERSITY.

JULY, 2008

Waithaka, Lucy Gathoni
Nutritional knowledge, attitudes and
DECLARATION

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

Signature

................................. Date.

LUCY GATHONI WAITHAKA
H60/5415/03

I/we confirm that the work reported in this thesis was carried out by the candidate under my/our supervision as university supervisor(s).

1. Signature

................................. Date.

PROF. JUDITH WAUDO
DIRECTOR
GRADUATE SCHOOL
KENYATTA UNIVERSITY

2. Signature

................................. Date.

DR JUDITH KIMIYWE
DIRECTOR
ALUMNI DIRECTORATE
KENYATTA UNIVERSITY
DEDICATION

This thesis is dedicated to my parents for their support in my studies and for the education they have given me and to my husband and siblings for their encouragement.
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<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>NIDDM</td>
<td>Non Insulin Dependent Diabetes Mellitus</td>
</tr>
<tr>
<td>IDDM</td>
<td>Insulin Dependent Diabetes Mellitus</td>
</tr>
<tr>
<td>ADA</td>
<td>America Diabetes Association</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>A.D.A.M</td>
<td>America Diabetes Association Management</td>
</tr>
<tr>
<td>NPGH</td>
<td>Nakuru Provincial General Hospital</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>SPSS</td>
<td>The Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>KDIIS</td>
<td>Kenya Demographic Health Survey</td>
</tr>
<tr>
<td>FSAU</td>
<td>Food Security Analysis Unit</td>
</tr>
<tr>
<td>UN</td>
<td>United Nation</td>
</tr>
<tr>
<td>DMI</td>
<td>Diabetes Management Institute</td>
</tr>
<tr>
<td>FAO</td>
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<tr>
<td>KAM</td>
<td>Kenya Medical Association</td>
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ABSTRACT

Diabetes mellitus is a clinical disorder characterized by elevated blood glucose level. It presents a high burden for individuals as they have to live with it. Diabetes being a chronic disease requires lifelong dietary management, regular physical exercise and medication. The success of diabetes management depends largely upon people's compliance with the prescribed management plan. Therefore, the people's behavior is crucial to the successful management of the disease. The purpose of this study was to investigate peoples' knowledge of type 2 diabetes on nutrition management, their attitudes and nutrition practices. This was a descriptive survey that employed questionnaire for data collection. Data collected included demographic information, medical history, attitudes of the people with type 2 diabetes towards diabetes, nutrition knowledge and practices; physical activity, food frequency and dietary patterns. Target group comprised of males (37.5%) and (62.5%) females with type 2 diabetes aged between 25 and 75 years attending clinics in Nakuru provincial general hospital. Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Anthropometric data were analyzed using Epi Info. Chi square tests and Pearson Product Correlation were used to determine the relationships between the variables in the study at p<0.05 level of significant. Likert’s scale with five points was used to measure attitudes held by diabetic people while knowledge total scores were computed for each subject by summing up total score. Scores were grouped as poor, fair or good. Quantitative data were presented using tables and graphs while qualitative data are presented in text form describing relationship between variables. Majority of the respondent with type 2 diabetes patient engaged in poor nutrition practices such as meal patterns; time interval between meals and total meals taken in a day. Practices on physical activity were good as majority (83.3%) engaged in physical activity although they did not know the right time to exercise and balancing meals and physical activity. Findings indicate that, nutrition knowledge was fair (63.3%) among people with type 2 diabetes. Majority of people with type 2 diabetes (71.7%) held positive attitude as regards diabetes besides nutrition management. There was a significant relationship between nutrition knowledge and attitude held towards diabetes (p = 0.047). Additionally there was no significant relationship between knowledge on nutrition management of type 2 diabetes and various practices like no of meals (p = 0.069). There was a significant relationship between knowledge and some of the socio demographic characteristics like years suffered (p = 0.034), and between attitude and years suffered (p = 0.035). There was a significant relationship between blood sugar levels and nutritional status (p = 0.014) and also nutritional knowledge and physical activity (p = 0.036). Additionally there was no significant relationship between blood sugar level and nutrition education and also with the number of meals (p= 0.263). The main conclusion that emerges from this study is that the assumption that greater amount of correct knowledge about nutrition knowledge should be associated with good practices and more favorable attitudes was supported in relation to attitude but not with meal pattern. Therefore, greater attention should be given in ensuring that people with diabetes are enlightened on various issues of diabetes besides nutrition as this has an impact on attitude and healthy practices the indulge in.
CHAPTER 1

INTRODUCTION

1.1 Background of the study

Diabetes is the name given to the clinical condition of patients with a number of symptoms arising from raised glucose levels. The syndrome can occur from many specific ‘secondary causes’. It is evident that diabetes is a syndrome with multiple forms, resulting from lack of insulin or insulin resistance and subsequent beta cell dysfunction (William, 1994). There are two major forms of diabetes; type 1 also referred to as juvenile onset diabetes or Insulin Dependent Diabetes Mellitus (IDDM) and type 2 diabetes or maturity onset diabetes or Non Insulin Diabete Mellitus (NIDDM). Others are gestational diabetes and impaired glucose tolerance (Wardlaw and Kessel, 2002; Joe, et. al 1999; Mngola, 2001; Ruesen, et. al 1995; Herold and Joyce, 1997).

Diabetes is a costly disease for those affected, their families and health care system. The disease process can lead to pain, anxiety, inconvenience and impaired quality of life. It is the leading cause of blindness in adults in developed countries and the most common cause of amputation (World Health Organization, 2003). Those with diabetes are two to four times more likely to develop cardiovascular diseases and stroke (WHO, 2002). Mortality and morbidity related to diabetes complications therefore pose great threat and burden to nation’s economy.

Type 2 diabetes has become a major problem in both developed and developing countries. The prevalence of type 2 diabetes varies considerably between different human
populations. Recent reports demonstrate that diabetes is highly prevalent in developing
countries with the prevalence sometimes exceeding that of developed nations (Badruddin
et. al. 2002). The prevalence of type 2 diabetes is thus going up faster than the
population growth as a whole. Worldwide 177 million people were affected by diabetes
mostly type 2 by the year 2003 (International Nutrition Foundation, 2003). Currently,
diabetes affects almost 200 million people worldwide (Kenya Diabetes Association,
2006). If there are no concerted interventions, developing countries like Kenya will have
more than 76% of the total number, diagnosed mainly through complications (Kenya
Diabetes Association, 2005). With no action to defuse this increase, it was estimated that
total direct health care expenditure on diabetes worldwide would have been between 213
billion and 396 billion dollars in 2025. That is, the proportion of the world’s healthcare
budget spent on diabetes care in 2025 would have been between 7-13% (Kenya Diabetes
Association, 2006).

In the African region, chronic non-communicable diseases, such as diabetes account for
more than 23% of deaths. The number of people with diabetes in Africa will be more
than double over the next 25 years (World Health Organization, 2004). In 2002, there
were 7.5 million cases of diabetes in the continent and this figure is expected to rise to
around 18.2 million. It is also estimated that more than 80% of people with diabetes in
Africa remain undiagnosed. Despite this shocking trend, awareness about importance of
diabetes in Africa is poor (Kenya Diabetes Association, 2004).
In Kenya, according to International Diabetes Federation, (2006) the prevalence rate of diabetes is estimated at 3-10%. Out of this number, 15% are people below 30 years who need prompt education to avoid complications that affect the vital organs of the body. The Ministry of Health estimates that the prevalence of diabetes to be around 10% (3.5 million people (International Diabetes Federation, 2006)). Apart from causing much human suffering, diabetes places a considerable economic burden to individuals and families and the health care system. The number of people with type 2 diabetes appears to be rising sharply as the sedentary behaviors and high fat, high sugar foods that are typical of expanding urbanization which replaces the constant physical activity and vegetables based diet that characterize the rural lifestyle.

The primary goal for people with type 2 diabetes is to achieve and maintain near normal blood glucose levels (International Diabetes Federation, 2006). Type 2 diabetes can be managed with diet, medication and exercise. The emphasis for nutrition therapy in type 2 should also be placed on achieving glucose, lipid and blood pressure goals. Making healthy food choices, especially modifying calorie intake can be beneficial and increase in physical activity may lead to improved weight control (American Diabetes Association, 2000). Spacing meals is another strategy that can be adopted. Regular exercise and learning new behaviors and attitudes can help facilitate long-term lifestyle changes. (American Diabetes Association, 1994). Monitoring blood glucose levels, glycated hemoglobin, lipids and blood pressure is essential. However, if metabolic control has not improved after employment of better nutrition and regular exercise, an
oral glucose lowering medication or insulin may be needed (American Diabetes Association, 1994).

There is conclusive evidence that good control of blood glucose levels can substantially reduce the risk of developing complications and slow their progression (World Health Organization, 2003). The management of high blood pressure and raised blood lipids is equally important. Better control of these could contribute to a substantial improvement in quality of life. The success of diabetes management depends largely upon compliance with the prescribed management plan by people with diabetes. Therefore, people’s behavior is crucial to the successful management of the condition (WHO, 2002). Similarly people’s knowledge about the disease and nutritional management is important. Therefore, all diabetic people if given proper guidance and education regarding diabetes care should be able to make significant improvement in their living (Badrrudin et. al., 2002). Evidence suggests that without effective control and prevention diabetes would continue increasing globally (WHO, 1994; Mngola, 2001).

1.2 Statement of the problem

Type 2 diabetes, often occurring at ages of increased responsibilities, deprives families of precious income and communities of productivity reserves. Given the limited resources for health in the face of numerous priorities, the management of diabetes based on hospital curative model alone cannot work. Diet should always be the first treatment offered to NIDDM people before drugs are considered. Therefore, crucial to the overall management program are the patient’s attitude, motivation, knowledge and environment
(Mngola, 2001). Unlike acute illness and even most chronic diseases, in diabetes the patient assumes primary responsibility for routine daily management. It is because of this that a person with diabetes needs healthy counseling on dietary management of his/her condition besides other medical advice so as to prevent the burden of morbidity and mortality attributed to diabetes. Despite the knowledge that exists concerning nutrition management of diabetes a large portion of people with diabetes suffers from diabetes related complications. The reasons as to why this happen remain high and warrant need for research. Therefore, in the effort to control and manage diabetes it would be insufficient to look at the treatment and nutrition management without first evaluating the knowledge and attitude regarding the condition since it has an impact on the utilization of any control approaches.

All people with diabetes if given proper guidance and education regarding diabetes care should be able to make significant improvements in their lifestyle, which is helpful in maintaining good glycemic control. Peoples’ lack of understanding and attitude hinders proper guidance about disease. Education is likely to be effective if we know the characteristics of the people with diabetes in terms of knowledge, their attitude and practices about diabetes. The chances of improper guidance about the disease due to lack of understanding of peoples’ characteristics that is; the personality and attitude of people with diabetes are high. Therefore, understanding of individual patient in terms of knowledge, attitude towards diabetes management and behavior tendencies is a necessary step for those intending to change the current habits of non compliance in dietary management of diabetes. Thus, this study aimed to assess knowledge, practices and
1.3 Purpose of the study
The purpose of this study was to assess nutritional knowledge, attitudes and practices in management of type 2 diabetes among adults in Nakuru Provincial General Hospital.

1.3.1 Specific objectives of the study
To achieve the purpose of the study the objectives were to:

1. Determine nutrition status of people with type 2 diabetes.
2. Assess the nutritional knowledge of diabetic people on nutritional management of type 2 diabetes.
3. Determine the attitudes of diabetic people towards diabetes and its nutritional management.
4. Determine the nutritional practices undertaken by diabetic people in management of type 2 diabetes.
5. Establish the relationship between nutritional knowledge, practices, attitudes, socio-demographic characteristics and nutrition status of type 2 diabetic patients.

1.4 Hypotheses
1. There is no statistically significant relationship between nutritional knowledge and nutrition, attitude, socio-demographic characteristics and health practices in management of type 2 diabetes at $p < 0.05$ level of significance.
2. There is no statistically significant relationship between attitude towards diabetes and socio-demographic characteristics at p<0.05 level of significance

3. There is no statistically significant relationship between blood sugar levels and nutritional status, knowledge, practices and socio-demographic characteristics at p < 0.05 level of significance.

1.5 **Significance of the study**

There is currently no cure for diabetes as a result control is important for those already with the condition. Nutrition education on management of diabetes play an essential role in enlightening people about management of diabetes since it constitute the most powerful tool for reaching people with diabetes. The result of this study should therefore be beneficial to dietitian or nutritionists and doctors in educating and counseling diabetes people and also to the people themselves. Findings and recommendations of this study will be useful for further investigation on the same for different age groups.

1.6 **Limitations of the study**

The study targeted adults aged 25 – 75 years therefore results cannot be generalized to the other age groups.

1.7 **Assumptions of the study**

The key assumption of this study was that diabetic people are well informed on nutritional management of type 2 diabetes therefore they manage their conditions well.
1.8 Conceptual framework

The conceptual framework Figure 1.1 illustrates how factors under study relate and how they influence each other. It portrays how knowledge about nutritional management has an influence on attitudes towards diabetes and practices. Thus, the kind of attitude held whether positive or negative will have an influence on dietary practices.
Management of diabetes/ practices
- Dietary practices;
- No of snacks taken daily
- Number of meals per day
- Physical activity
- Frequency of physical activity
- Duration of exercise
- Medication

Attitude towards diabetes and nutritional management

Knowledge on: -
- Nutritional management of type 2 diabetes
- Complications of diabetes
- Causes of diabetes
- Control of diabetes

Figure 1.1: Interrelationships on how various factors influence each other in management of type 2 diabetes

Source: Gathoni, 2008
1.9 Scope
The study was confined to adults (males and females) aged 25–75 years in Nakuru Provincial General Hospital.

1.10 Operational definitions of terms

**Type 2 diabetes** – It is referred as a disease of carbohydrates metabolism characterized by high blood glucose (hyperglycemia). In type 2 diabetes insulin level is normal, depressed or elevated. When insulin is high, it indicates decreased tissue sensitivity or responsiveness to insulin referred to as insulin resistance. Low insulin levels often develop as Non Insulin Dependant Diabetes Mellitus (NIDDM) progresses.

**Knowledge** - Refers to what a diabetic patient knows about nutritional management of type 2 diabetes

**Attitude** – Referred to general feelings, beliefs, and behavior tendencies towards diabetes and its nutritional management.

**Practices** - Refers to engagement/ involvement in management of type 2 diabetes

**Physical activity** – Refers to person engagement/ involvement in any form of bodily exercise.
CHAPTER 11

LITERATURE REVIEW

2.1 Overview

The literature review is presented under the following sections; type 2 diabetes or Non Insulin Dependent Diabetes Mellitus (NIDDM), causes of type 2 diabetes, prevalence of type 2 diabetes, management of type 2 diabetes (Diet therapy), knowledge on nutrition management of type 2 diabetes, attitude towards type 2 diabetes and nutrition management, practices on nutritional management of type 2 diabetes.

2.2 Type 2 diabetes; non insulin diabetes mellitus (N.I.D.D.M)

It’s also referred to as maturity onset diabetes. Type 2 diabetes had been referred to as a disease of carbohydrates metabolism. It is especially related to the metabolism of two fuels, carbohydrate and lipids in the body’s overall energy system (William, 1994). It is also referred to as a disorder in which the pancrease continues to produce the hormone insulin but the body is unable to effectively use it to transport glucose out of the blood and into the body’s cells. The insulin’s level may be normal, depressed or elevated. High insulin levels indicate resistance while low insulin levels often develops as NIDDM progresses (American Diabetes Association, 2000; Dam, Rimm and Wille, 2002).

NIDDM develops more slowly and is usually milder and non stable. It is the most frequent form of diabetes in all populations with five percent of elderly adults affected in some populations, thus it occurs mainly in adults (Ascroft and Ashcroft, 1992; Williams, 1994; Dewapura and Fernado, 2002). Diabetic patients are 2 to 4 times more
likely to report having heart disease and peripheral vascular disease (Castaneda and Bermudez, 1999; Bloomington, 2003).

NIDDM is characterized by increased thirst (polydipsia), increased urination (polyuria), increased hunger (polyphagia), obesity, blurred vision, skin irritation and skin infection, weakness and loss of strength, glycosuria (sugar in urine), abnormal glucose tolerance, poor wound healing, tingling in hands and feet and hyperglycemia (elevated blood sugar) (Wardlaw and Kessel, 2002; Williams, 1994; Dam, Rimme and Wille, 2002; and Boston, 2004).

Hyperglycemia occurs due to insulin resistance and impaired Beta cell function. This results in slow and ineffective suppression of glucose production in the liver and decreased glucose uptake by the peripheral tissue (Kings, Rewer, and WHO, 1993 and Wardlaw and Kessel, 2002). Chronic prolonged hyperglycemia may further impair insulin secretion and functions leading to glucose toxicity (Kings, Rewer, and WHO, 1993). It also leads to fifty percent of all amputation of the lower extremities in adults, common cause of end stage renal disease and the leading cause of blindness in adults (Castaneda and Bermudez, 1999; and Wardlaw and Kessel 2002). High incidences of diabetes related complications are reported among diabetic people in Kenya. The common complications are diabetic foot disease and eye problem (Kenya Medical Association, 2008). This indicates a gap in proper management of the condition.
2.3 **Causes of Non Insulin Dependent Diabetes Mellitus**

These include; obesity, inactivity, genetic factor, western diet in relation to African diet, number of pregnancies and health related factors.

**i) Obesity**

Many cases of type 2 diabetes (80%) are associated with obesity especially fat allocated in the abdominal region (centrally distributed) which lead to insulin resistance, the underlying abnormality in most cases of type 2 diabetes (WHO, 2003, KDA, 2006). Obesity associated with oversized fat cells simply increases the risk for insulin resistance by the body. In some cases lean people also develop type 2 diabetes (Tuomilthto, et al 2001; WHO, 2003; Boston, 2003; Mngola, 2001; Wardlaw et. al., 2002). As obesity has become an epidemic over the past decade, the rate of type 2 diabetes has also increased as it is closely related to obesity (WHO/Food and Agriculture Organization, 2003). The prevalence of overweight and obesity are rising rapidly in developing countries as a result of sweeping urbanization and wide scale adoption of western lifestyle. Many populations in Africa are at risk of developing diabetes (IDF, 2006). In Kenya the number of people with obesity related diabetes appears to be rising sharply as the sedentary behaviors and high fat, high sugar foods are typical of expanding urban poverty replace the constant physical activity and vegetable based diet that characterize the rural lifestyle (IDF, 2006).

**ii) Inactivity**

A large population of the world’s population currently takes an adequate amount of physical activity. The heavy reliance on the motorcar and other form of labor saving
machinery has had much to do with this leading to sedentary lifestyle (WHO/FAO, 2003). Inactivity due to sedentary lifestyle contributes to obesity in the population with risk factor for developing type 2 diabetes (Wardlaw and Kessel, 2002). The high prevalence of diabetes in Africa is also attributed to inactivity (sedentary lifestyle) leading to obesity a predisposing factor (Kenya Diabetes Association, 2006)

iii) Genetic factors

NIDDM is also genetically linked where the initial problem is with the insulin receptors in the cell surface of certain body tissues making glucose remain in the blood stream leading to raised blood glucose (Joe et. al., 1999; Wardlaw et. al., 2002). The pancreas attempts to increase insulin output to compensate, but there is a limit to its ability to do this. Non obese people have a higher prevalence of a family history of diabetes than obese people (Wardlaw and Kessel, 2002; Joe et. al., 1999; Boston, 2003). According to Boston (2003) 25% to 33% of all type 2 patients have family member with diabetes. Having a first degree relative with diabetes poses forty (40%) percent risk in developing diabetes.

iv) Western diet in relation to African diet

Diet high in processed meats, especially red meats, diet high in refined grains, French fries, high fat dairy products and sweets increases chance of developing type 2 diabetes among others (American Diabetes Association, 2003). A study in United state on western diet and prudent diet high in fruit, vegetable, whole grain, fish and poultry showed that western dietary pattern was associated with diabetes. Fifty nine percent of
the study sample developed type 2 diabetes while prudent diet was associated with sixteen percent lowers risk of diabetes (America Diabetes Association, 2003). Therefore, western diet raises the risk of diabetes especially if one is obese or engages in low physical activity (Aschroft and Aschroft, 1992). Many people in Africa are increasingly adapting to the westernized lifestyle eating of high fat and low in fibre diet. These diets consist of little or no vegetables, animal protein and animal fats (KDA, 2006, IDF, 2006).

v) Number of pregnancies

Type 2 diabetes is also common in women who have had several pregnancies. This is because pregnancy is characterized by increased insulin resistance from placental lactogen secretion. Thus, it is possible that pregnancy exacerbates the effect of insulin resistance, thus inducing the condition (Aschroft and Aschroft, 1992).

vi) Health related factors

This occur from many specific 'secondary causes' including pancreatectomy, iron overload of the Beta cell resulting from haemochromatosis, excess cortical production in Cushing’s syndrome, excess growth hormone secretion in acromegaly and insulin resistant syndrome (Aschroft and Aschroft, 1992).

2.4 Complications of diabetes

The immediate aim of the treatment in diabetes is to keep the diabetic person fit, feeling well, and free from troublesome symptoms. The ultimate is to reduce the risk of various complications that occur after diabetes has been present for many years (Connor et. al.,
These include; retinopathy, nephropathy, neuropathy, peripheral arteriosclerosis and increased chance of coronary heart diseases and stroke.

i) Retinopathy
Degeneration of retina at the back of the eye is common in diabetic patient who have had diabetes for over 2 years and hemorrhage may occur leading to blindness. Eyes should be observed once a year and treatment given if necessary (Connor et. al., 2003).

ii) Nephropathy
Kidneys are damaged by long standing diabetes and this may lead to kidney failure with earliest sign as microalbuminuria (Connor et. al., 2004; Parillo and Riccardi, 2004).

iii) Neuropathy
Peripheral nerves involvement leads to loss of reflexes, pain in the leg, muscle wastage and gait weakness (Parillo and Riccardi, 2004).

iv) Peripheral arteriosclerosis
This occurs particularly in the elderly patients and is characterized by hardening of the arteries of the leg which then leads to an impoverishment of the blood supply to the feet (Mngola, 2001). Any minor damage to the toes takes a long time to heal and is prone to infection. This may lead to gangrene with consequent amputation of the whole leg (Mngola, 2001; Connor et. al., 2003).
v) Increased chances of coronary heart disease and stroke

Diabetes increases atheroma in coronary and cerebral arteries and this may lead to ischemic heart disease, which is the main cause of deaths in diabetes (Connor et al., 2003). People with diabetes are 2-4 times likely to develop cardio-vascular disease and stroke (WHO, 2002). In Kenya in a study carried out in Mombasa General Hospital most people with diabetes 42% of them had ischemic heart disease while 25% had hypertension. This indicates high prevalence of cardio-vascular disease among people with diabetes (Kenya Medical Association, 2008).

2.5 Attitude towards type 2 diabetes and its nutritional management

Shavit (1990) referred attitude as enduring mental representation of people, places or things that evoke feelings and influences behaviors. Attitudes make one to react in a consistent way, positive or negative to a less predictable degree to a particular situation (Shavit, 1990). The assumption underlying the information, education and communication, intervention that have long been used to alert the general public about nutritional management of type 2 diabetes has been that it will cause people’s attitudes to change (Badruddin et al., 2002). Most diabetic people are troubled more by emotional factors associated with diabetes (Hoover, 1997). It ranges from the stress caused by the responsibility of a demanding daily regime to the accumulated fear anticipating disabling complication and the possibility of premature death (Hoover, 1997; William, 1994).

The problem of diabetes management has been seen as a problem of self management. Participation may be meaningful to individuals who have always perceived that they
exert a great deal of control over their lives. To those individuals whose life experience has led them to believe that they are able to exert little control over life events, participation may seem irrelevant (Hoover, 1997). The latter individuals feel powerless. This exerts a negative effect on seeking and retaining control, relative information including health knowledge, since individuals become insensitive to, and uninformed about an environment over which they believe they have little control (Hoover, 1997; William, 1994). Feelings of lack of personal control in response to threat may bring about overwhelming anxiety, helplessness or even depression. A harmonious and productive helper patient relationship is likely to result if people are presented with positive reasons for doing something, rather than being threatened with negative consequences if they don’t (Hoover, 1997; William, 1994).

People with diabetes lack understanding or negative attitude hinder proper guidance (Castadena et. al., 1999; William, 1994). Improper guidance about type 2 diabetes is due to lack of understanding of patients characteristics that is the personality and attitude of the patients (Badruddin et. al., 2002; Castaneda et. al., 1999).

Results of a study carried out in Karachi on the attitudes showed cumulative effect of various risks factors which could lead to poor control and complication of type 2 diabetes. Most overweight people did not consider themselves to be overweight, a problem with their attitudes (Badruddin et al., 2002). The investigation of psychological processes and methods of management is vital because it is this which must be understood and used if disease control is to be improved for the majority of people with
diabetes. Thus, exploring peoples' attitudes is a necessary first step for those intending to change peoples' attitude towards nutritional management of diabetes (Castadena et. al., 1999; Hoover et. al., 1994). The psychological effect must therefore be considered as diabetic person must demonstrate a great adaptation capacity to change his/her lifestyle (Castadena et. al., 1999). A good approach can help an individual understand that it is possible to avoid complication if some changes are brought (Badrudhin et. al., 2002).

2.6 Management of type 2 diabetes (NIDDM)

The key goal for people with NIDDM is to achieve and maintain near normal blood glucose level. The corner stones of diabetes management are maintaining a healthy weight, following a healthy diet and regular physical activity or taking medication (Barbara and Carol, 2000; Egebe, Zheng and Ye, 2002; Boston, 2003; Tuomilehhto et al., 2001; Valsamakis et. al., 2002). Diabetes management is a problem of many things including behaviors, attitudes, stress control and family support as well as metabolism. Medical crisis are as much as a function of behaviour and environmental events as they are of biochemical events (Barbara and Carol, 2002).

2.6.1 Nutritional management of type 2 Diabetes (NIDDM)

i) Dietary habits

Sound nutritional therapy remains the fundamental base of management for all persons with diabetes (American Diabetes Association, 1995). This nutritional base and self monitoring of blood glucose have become indispensable tools of daily self management (Williams, 1994; Joe et. al., 1999). Some people believe that there is a 'diabetic diet' but
people with diabetes can enjoy the same foods as persons without diabetes. Healthy food choices can help people with diabetes improve overall health (Joe et. al., 1999). Diabetic needs should be addressed taking into consideration personal, cultural preferences and lifestyle as well as the willingness to make changes.

Because NIDDM usually occurs in overweight individuals, the major goals are losing excess weight with a sound diet and maintaining healthy body weight. Weight loss increases sensitivity and normalizes hepatic glucose production (Valsamakis et. al, 2002). The energy value of the diet should be expressed in terms of kilocalories sufficient to meet individual needs for normal growth and development, physical activities and maintenance of desirable lean weight (Wardlaw and Kessel 2002; Valsamakis et. al, 2002).

ii) Carbohydrates

Complex forms of carbohydrates have a low glycemic index although some foods with low fibre content may also have a low glycemic index. Several beneficial effects of high fibre low glycemic diets have been shown, including lower postprandial glucose and insulin responses, improved lipid control and possibly improve insulin sensitivity (Parillo and Riccardi, 2004). Since blood glucose response is influenced not only by the glycemic index value of the food, but also by the amount of ingested carbohydrates what really matters is the quantity of carbohydrates consumed. Carbohydrates should provide 55-60% of total kilocalorie of the diet. Modification of carbohydrate food should take
iii) Protein

People with diabetes have similar protein requirements to those of the general population, adults RDA of 0.8g/kg of body weight approximately 10%-20% of the total kilocalorie (Parillo and Riccardi, 2004). With the onset of nephropathy, lower intakes of protein should be considered (American Diabetes Association, 1994). ADA (1994) technical review noted that in a study where protein intake was restricted to 0.7 gram per kilogram body weight per day, there was significant reduction in the rate of decline in glomerular filtration rate. Therefore restriction of protein to 0.8g/kg body weight per day ‘may’ slow progression of nephropathy. Excessive intake should therefore be avoided (Parillo and Riccardi, 2004).

iv) Lipids

Total fat intake should be lowered to 35% or less of the day’s total kilocalorie with greater attention given to the control of saturated fat and cholesterol. This is because fats predispose one to heart diseases (Parillo and Riccardi, 2004). Diabetes is a strong independent risk factor for cardiovascular diseases (Williams, 1994). If obesity and weight loss are the primary issues a reduction in dietary fat intake is an efficient way to reduce caloric intake and weight. In development of overweight the energy intake really matters which is often high when fat rich foods are consumed in large amounts especially animal fats than with vegetable fats (Parillo and Riccardi 2004).
v) Alcohol
Alcohol should be limited to one or two per week. Alcohol may increase the risk for hypoglycemia especially in people treated with insulin. If consumed it should only be ingested with a meal (Connor et al., 2003). Calories from alcohol need to be calculated as part of the total calorie intake. It is best substituted for fat exchanges or fat calories (American Diabetes Association, 1994). Reduction of or abstention from alcohol intake may be advisable for people with diabetes (Connor et al., 2003).

vi) Fruits and vegetables
Dietary fructose produces a smaller rise in plasma glucose than most starchy carbohydrates (American Diabetes Association, 1994). In that regard, fructose may offer an advantage as a sweetening agent in the diet for people with diabetes. There is no reason to recommend that people with diabetes should avoid consumption of fruits and vegetables in which fructose occur naturally (American Diabetes Association, 1994).

vii) Dietary fibre
Dietary fibre may be beneficial in treating or preventing several gastrointestinal disorders; including colon cancer and amount of soluble fibre have a beneficial effect on serum lipids (Parillo and Riccardi, 2004). Although selected soluble fibres are capable of delaying glucose absorption from the small intestine, the effect of dietary fibre on glycemic control is probably insignificant (ADA, 1994). Therefore fibre intake recommendations for people with diabetes are the same as for the general population.
Daily consumption of a diet containing 20 – 35 grams dietary fibre from a wide variety of food sources is recommended (American Diabetes Association, 1994).

Fairly and even amounts of food should be eaten throughout the day, adjusted to blood glucose self monitoring. This helps minimize the high and low swings in blood glucose concentration (Barbara et. al., 2002). Personal adaptation and approaches are important in planning nutritional therapy to enable carry the responsibility for long term self care. Meals must be spaced during the day, in addition to the three meals; there should also be snacks in the middle of the morning, in the early afternoon, and at bed time. Meals must be taken at regular times since delayed meals may lead to hypoglycaemic attacks. Food exchange system has been recommended which is based on the concept of food equivalent and their exchange to maintain both diet control and food choices variety (Williams, 1994; Barbara and Carol 2002).

viii) Physical activities

Other than diet, physical activities are important for managing diabetes. This is because it lowers blood glucose, both by burning glucose for energy and by increasing the cells ability to take glucose from the blood (Wardlaw et. al., 2002; Barbara et. al., 2002). Exercise can also help lower blood pressure, it also diminishes appetite and boost diabetic mood, making it easier to stick to ones diabetes care plan (Mngola, 2001). Together, diet and exercise can help one lose weight and keep it off, which make insulin more effective (Wardlaw and Kessel, 2002; Barbara and Carol, 2002; Mngola, 2001; Connor et. al, 2003).
A modest weight loss of 3.6 – 4.5 kilograms can help control blood glucose levels. Since each person's body, lifestyle, and diabetes are different thus each person's ability and willingness to individualized physical activity plan. One should exercise at least thirty (30) minutes of moderate activity a day whereby activities such as jogging, walking, cycling, swimming and dancing are recommended (Barbara and Carol, 2002).

2.7 Knowledge on nutritional management of NIDDM

The respective roles of people with diabetes and other professional therapists are changing in modern health care. In past years a traditional medical model has guided diabetes education in its methods, languages and assumed roles (Wardlaw and Kessel, 2002). The professionals viewed themselves as having many authoritative roles of practitioner. However, consumer persons with diabetes are assuming a more active voice in planning and conducting their own care (William, 1994).

People who know more about diabetes and how it affects their bodies manage their diabetes more effectively. Thus diabetic people should know as much as possible about the disease and importance of combining diet, physical activity and medication to achieve normal glucose level (Castaneda and Bermudez, 1999; Sievenpiper, 2002). Thus, without knowledge of the individual's background and habitual eating habits it would be impossible to know what dietary changes need to be made (Connor et al., 2003). Greater knowledge and understanding of nutrition needs of the person are needed if they are to manage and control their disease (Connor et al., 2003).
In a study in Egypt findings showed that 90% of the study population had poor knowledge about the complications associated with diabetes and 96.3% had poor knowledge on how to control the disease (Kamel et al., 1999). Similar findings were seen in a study in Karachi, Pakistan where 54% had poor knowledge, 34% had fair knowledge while only 13% had good knowledge (Barbara and Carol, 2002). Only 34% knew that in strict diet control alone, medicine could be avoided. Knowledge of the people-visiting clinic for the first time was found to be inadequate.

It is possible that some diabetic people in Kenya may equally be misinformed. The proper knowledge regarding diet requirement of each individual person with diabetes should be given individual dietary advice with clear view of its purpose. Thus, education of diabetic person would be more effective if the level of knowledge of people with diabetes is known (Barbara and Carol, 2002).

The education given must take into account the individual’s personal preference, beliefs and lifestyle, and must respect the individual wishes and willingness to change. It must be adapted to the specific need of the individual which may change with time and circumstances (Connor et al., 2003). It takes considerable skills to apply the nutritional objectives of diabetes management in a way which is realistic and practical while the desired aims in terms of dietary composition should underpin dietary guidance. They should not be regarded as rigid targets to be imposed on every diabetic individual. The focus should always be on modifying an individual’s existing eating habits in an acceptable and achievable way (Connor et al., 2003).
2.8 Practices in nutritional management of type 2 diabetes

Knowing that something is a risk to one's health and perceiving it as a threat are not the same. Knowledge cannot motivate consideration of behavior change unless it constitutes a threat to the person. Once a threat is recognized, then one may take some action, but the action may not be anticipated (Black and Jones, 1998; Weinstein, 1994). No wonder then, that even with the means available to educate people with diabetes type 2 on good nutritional management of their condition, there are shortcomings on nutritional management of type 2 diabetes (Joe et al., 1999).

Type 2 diabetes is accounting for considerable morbidity and mortality from diabetes related complications due to poor management (Low and Leow, 2002). The role of high fibre diet in improving glycemic control is well established and despite of this knowledge, a study in Karachi showed that the consumption of fruits and vegetable was low as only 47% patients had fruit and vegetable intake daily. According to Badruddin et al. (2002) in the same study overall exercise was found to be poor; as only a few had good exercise and only nine percent exercised for more than half an hour daily despite the well known benefits of exercise.

Self-monitoring of blood glucose is a simple and practical procedure acceptable for the diabetic person who can afford and facilitate the attainment of good glycemic control. Unfortunately, the practice of using glucometer in a study carried out in Karachi was low as only fifty percent (50%) of the diabetic people had their own glucometer. Only...
fourteen (14%) percent were regularly monitoring their blood sugar (Badruddin et. al., 2002).

Weight loss is very important for obese people. In a study carried out in United Kingdom among diabetic people showed that intentional body weight loss of 11% of initial body weight through physical exercise was associated with 25 percent reduction in total mortality, 28 percent reduction in cardio vascular and diabetes mortality (Connor et. al., 2003). In another study by Joslin Diabetes Centre researchers, obese persons who lost seven percent of their weight and did moderate intensity physical exercise for 6 months improved blood vessel function by approximately 80 percent (Boston, 2003).

People at large, not just those with diabetes continue to smoke, eat high fat diet, refined sugars and lead sedentary lifestyles, because the immediate result is gratifying. The long range possibility that it might be bad for health, exert little short term control, problem lapses, treatment drop out and low level of self care behavior are found in all areas of health diabetes management being one (Mngola, 200').

2.9 Challenges in dietary compliance

Compliance refers to the extent to which a person behavior coincides with the medical advice given. The success of diabetes management depends largely upon patient compliance with the management plan given (Kamel et. al., 1999). Study by Kamel et. al, 1999 shows that roles of compliance are usually low. Some of the reasons for non-compliance are; failure to educate people with diabetes properly on the main cause of non
compliance thus failure of the educators. Many educators provide information and skills training without incorporating learning theories to influence diabetic people attitudes towards diabetes and nutritional management leading to failure (William, 1994; Kamel et. al., 1999).

Other factors or challenges are fear of complications, depression, and financial constraints. This impacts the ability of a person with diabetes to achieve blood glucose control, which impacts on the rate of development of diabetes complications (Bloomington, 2003). Cultural heritage also influences people adherence that is, health beliefs, decision making skills, food availability and personal choices. Lack of understanding and resentment by the person with diabetes of drastic change in the living habits poses a challenge in management of diabetes (Williams, 1994; Bloomington, 2003).

2.10 Summary

It is observed from the literature reviewed that the overall goal of diabetes management is to help individuals with diabetes gain necessary knowledge, life skills and support needed to achieve optimal health. Lack of the ability, confidence or motivation in implementing necessary skills is making it impossible for the diabetic patient to control the condition. Therefore, for effective management of type 2 diabetes characteristics of the patient in terms of knowledge, attitude, personality and practices about diabetes should be known. People with diabetes need to be knowledgeable, have skills and motivation to assess their risks and to understand what they will gain from changing their behavior. Exploring
peoples’ knowledge, attitudes and practices on management of type 2 diabetes is thus a necessary step for those intending to change the current habits of non-compliance in dietary management of diabetes.
CHAPTER III
METHODOLOGY

3.1 Introduction
This chapter presents the research methodology that was employed in this study. The chapter is planned to include the following sub sections research designs, research variables, area of the study and justification of study area. Others are target population, sample size and sampling technique, data collection instruments and procedures, pre testing, and ethical consideration.

3.2 Research design
A descriptive survey design was employed in this study. The researcher made a detailed assessment of subjects, which consisted of asking diabetic people information concerning their knowledge, practices and attitudes in relation to diabetes and its nutrition management. The study also sought to establish association between variables such as knowledge and attitude pertaining to type 2 diabetes as they relate to nutritional practices.

3.3 Research variables
These were items for which data was sought. These included dependent and independent variables.

3.3.1 Independent variables
They included socio-demographic information; age, gender, monthly income, duration in years of suffering after diagnosis, education level and nutrition knowledge.
3.3.2 Dependent variables

They included attitude (that was the various beliefs, fears and concerns related to diabetes) and practices; this was determined by dietary pattern, food choices by people with diabetes, their level of physical activities or exercise, time of physical activity, frequency, meal timing and physical activity, nutrition status and blood glucose level check up.

3.4 Area of the study

This study was carried out in Nakuru Provincial General Hospital (NPGH), which was selected purposively being one of the 98 hospitals in Kenya situated in Rift Valley province by 2002 according to Health Management Information System Ministry of Health. Nakuru Provincial General Hospital being a large referral hospital-serving people from many parts of the country enabled the researcher to access the target group and obtaining the necessary data for the research.

3.4.1 Physical description of Nakuru district

Nakuru district is one of the 18 districts of the Rift Valley province. It lies within the Great Rift Valley and borders 8 other districts namely; Kericho and Bomet to the west, Baringo and Laikipia to the north, Nyandarua to the east, Narok to the south west, and Kajiado and Kiambu to the south (Republic of Kenya, 2001). The district has an area of 7,242 square kilometers and it’s located between longitudes 35 and 36 degree, east of Greenwich meridian between latitude 0 degree 13 north and 1 degree 10 south of the equator. Administratively, the district is divided into sixteen (16) divisions, which are
Further sub-divided into sixty nine (69) locations and one hundred and seventy (170) sub-
locations (Republic of Kenya, 2001)

3.4.2 Social economic profile

Nakuru district is an agricultural district with most of the population depending on
agriculture and livestock for income and employment. Most industries depend on
agriculture for raw materials. Thus about eighty (80%) percent of the total population
depend on agriculture and livestock for their livelihoods (Republic of Kenya, 1996). The
district has been a leading producer of food and cash crops to feed its inhabitants and
surplus sold to deficit areas. There are small scale farmers distributed throughout the
district. However, there are still some large farms within the district. Most of the
agricultural commodities are marketed through multi- produce and marketing co-
operatives. The district is well endowed with forests, which covers 145,000 hectares.
However, lately forest cover has been declining due to encroachment by human
settlement and over exploitation of forest products (Republic of Kenya, 1996).

3.4.3 Social and economic infrastructures

Between 1989 and 1993 the population of Nakuru district rose by 4.71% from about
862,000 to 902,600. In order to give adequate health services, there was need to increase
health facilities and services, over the period. Thus, there was an increase in the number
According to the Ministry of Health’s policy, for every population of 200,000 to 500,000 there should be a hospital. In Nakuru district there are thirteen (13) hospitals but only six (6) are open to the general public. The six hospitals are just adequate but are scattered. There are twenty four (24) health centers in the district, which are just adequate but not equipped fully and are not easily accessible by the population (Republic of Kenya, 2001).

3.4.4 Justification for the study area

The hospital was assumed to serve people from regions in and around Nakuru district and all over the country being a referral hospital. This would minimize bias in terms of ethnic community and social economic background of the study subjects. It also had a diabetic clinic that was usually run on weekly basis.

3.5 Target population

The study targeted people with type 2 diabetes 25-75 years of age who attend clinic in Nakuru Provincial General Hospital. Both sexes were interviewed.

3.5.1 Inclusion criteria

People with diabetes were only enlisted in the study if one had lived with type 2 diabetes for at least one year and whose age was between 25–75 years and attending clinic in Nakuru Provincial General Hospital. The patient was also expected to give consent and to have attended clinic two consecutive times.
3.6 Sample size and sampling technique

To qualify for the interview the diabetic person was expected to attend clinic which was run on Mondays between April and June 2005. The sample size was calculated using Gay method. According to Gay, (1999) a sample size of 10% of the accessible population is enough for a descriptive survey. According to hospital record the diabetic clinic serves around 800 diabetic people in two months. A sample size of 80 subjects was therefore required but for generalization a sample of 120 was considered convenient.

Therefore a sample size of 120 subjects was required. Simple random sampling was used to obtain a representative sample of 120 subjects in diabetic clinic in Nakuru Provincial General Hospital. Lottery method of simple random sampling was used to sample respondents to participate per day. Under this method, all respondents who had given consent to participate in the study their names were written on a separate slip of paper of identical size, colour and shape. These slips were then folded and mixed up in a container. A blindfold selection was made of 10 respondents to participate in the study per day. This was repeated every week by the researcher to obtain respondents for that day.

3.7 Data collection instruments

The main instrument for data collection was a structured questionnaire which was self administered for those who knew how to write but for the illiterate it was face to face interview which was used to administer the questionnaire. It had both open-ended and close ended questions. The questionnaire consisted of five parts; demographic
information, health status (medical history), diabetes and nutritional knowledge, nutritional practices and attitudes questions respectively. The questionnaire had both primary and secondary data that is blood glucose level of the subject for the day were obtained from clinic card of the subject on request from the respondent.

**Demographic information**

This first section was used to elicit information on demographic characteristics such as sex, age, education level, occupation and income. This section contained ten (10) items to which the respondent was expected to provide all the information. Part I also contained anthropometric measurement height and weight, which were taken and then used to develop an understanding of an individual nutritional status.

**Medical history questions**

This section provided information on medical history of the subject; age at which diabetes was diagnosed, years suffered, present complications, whether on any medication among others. This section contained fourteen (14) items to which the respondent provided required information while for some questions the information was obtained from their individual hospital files like blood sugar level.

**Diabetes and Nutritional knowledge questions**

The section was designed in a way that the first three (3) items were open ended while the rest fifteen items were close ended. Thus, the type of response format in this section was agree/disagree scale type with 2 points. The section contained some items with true
(agree) statement while others had false statements (disagree). The questionnaire contained items on nutritional knowledge, causes of diabetes, related complications and control of diabetes.

**Nutritional practice questions**

The section was divided into three parts; general nutritional practices, exercise and food frequency section.

**SECTION I: General nutritional related practices**

The section contained fifteen items such as number of snacks and meals taken daily, alcohol taken and whether the subject smoked cigarette among others.

**SECTION II: Exercise**

The questionnaire also captured whether the subject was involved in any physical activity, type of physical activity, and duration of exercise and time of exercise. This part contained eight items.

**SECTION III: Food frequency**

This section was divided into five food groups to capture foods commonly taken and their frequency in the past seven days prior to data collection to capture consumption pattern.

**The Diabetes attitude questionnaire**

The attitude questionnaire contained a list of statements which were intended to reflect
the three attitudes components; cognitive, affective and behavioral. The attitude scale was used to obtain information on attitudes of subjects about dietary management of diabetes, exercise, medication, diet and attitudes towards diabetes in general. This questionnaire used a Likert scale. The response format was Agree/Disagree scale with five (5) numbers of categories. The subjects were asked to respond to each statement by putting a tick after each statement corresponding to the following codes; SD = strongly disagree, D = Disagree, N = neither agree nor disagree, A = Agree and SA = strongly agree. For scoring purpose each point was assigned a value thus, SD = 1, D = 2, N = 3, A = 4 and SA = 5 with these values reversed for negatively worded statements. In designing the whole questionnaire several existing instruments with some parts relevant to this study were referred.

3.8 Pre-testing of the research instrument

The instrument was pre-tested after discussing the questionnaire with the academic supervisors. This was done with the aim of validating the instrument and to ascertain its reliability.

3.8.1 Reliability

Test retest method was used to test consistency in producing the same results if the questionnaire was administered several times to the same respondent. The subjects of pre-test comprised of six people who had type 2 diabetes and who were randomly sampled outside the study area. The researcher allowed the pre-test subjects to make comments and give suggestions concerning the questionnaires. Pre-testing was done
twice with the same subjects with an aim of ascertaining its reliability. This was meant to
identify major problems, instrument deficiencies and at making suggestions for
improvement. This enabled the researcher to identify items that were ambiguous and
reconstructed them. Pearson product moment formula was used to compute the
correlation co-efficient to establish the extent to which the questionnaire was consistent
in eliciting the same response every time the instrument was administered.

3.8.2 Validity
Three competent people on diabetes were requested to assess the questionnaire
individually and provide feedback to the researcher after which the instrument was
revised. The questionnaires were also administered to six subjects twice. A comparison
was made between answers obtained. Therefore, this ascertained the content validity of
the research instrument.

3.9 Ethical consideration
Consent was sought from the respondent before administration of the questionnaire.
Participants were given clear accurate statements about the meaning and limits of
confidentiality during data collection. To secure privacy of the participant names and
other means of identify the participant during research were not recorded. The researcher
ensured that all information obtained was kept in strict confidence and used only for the
purpose of the study.
3.10 Data collection procedures

The researcher obtained a research permit from the Ministry of Education, Nakuru General Hospital medical superintendent and from the doctor in charge of diabetic clinic. On granting permission, the researcher proceeded to collect data. The researcher requested the subjects to participate in the study as participation was voluntary and willing participants were required to give an informed verbal consent after which the researcher briefed them on how to respond to items in the questionnaire. The researcher then administered the questionnaire to those subjects who knew how to read and write and requested them to respond to all items without discussing it with any other member. To avoid any discussion the researchers requested the subjects to look for an independent place to sit as he/she responded to the questionnaire. After the subjects were through with the questionnaire they were collected back on the same day. For those who didn’t know how to read and write questions were read to them by well trained enumerators (who were trained on the purpose and objectives of the study and on how to administer the instrument so as to collect the required information) and responses given were recorded on the questionnaire accordingly. The questionnaires were administered with the help of trained research assistant.

The weight of the respondent was obtained using a bathroom scale, which was set at zero on a flat surface. Weight was taken to the nearest 100 grams (0.1 kilogram) when the respondent was lightly dressed. The procedure was repeated and average weight obtained recorded on the questionnaire. To get the height of the individual, he/she was made to stand bare footed on a flat surface of stadiometre. Feet were set parallel to each other.
while the shoulder, buttock, head and heel of the feet touched the upright scale. The head was held comfortably upright. Head piece was lowered to make contact with the top of the head gently crushing the hair. The readings were taken to the nearest 0.1 centimeter twice. Average reading was obtained and recorded accordingly.
CHAPTER IV
RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents data analysis, results and discussion of the data collected from one hundred and twenty (120) subjects with Type 2 diabetes in NPGH. The results are discussed under the following themes: Socio demographic information, medical history of people with type 2 diabetes, nutrition status of people with type 2 diabetes, knowledge on type 2 diabetes and nutritional management of type 2 diabetes, attitudes related to diabetes and nutrition management of people with type 2 diabetes, nutrition practices of people with type 2 diabetes, relationship between nutrition knowledge and practices of people with type 2 diabetes and with socio demographic characteristics, relationship between knowledge and attitudes related to type 2 diabetes of people with type 2 diabetes and relationship between nutritional status and other variables.

4.1 Data analysis and presentation

Questionnaires completed by the respondents were edited, cleaned, coded and analyzed using computer software Statistical Package for Social Sciences (SPSS). Quantitative data was summarized using descriptive statistic such as percentages and frequencies as they could be reduced to numerical values. Chi-square tests and Pearson product correlation were used to establish relationship between categorical and continuous variables respectively. Data on nutritional status were analyzed by first calculating body mass index (BMI) using Epi Info computer programme. BMI = Weight (kilograms)/Height (meters) squared. The BMI were classified as follows; Underweight
(<18.5); Normal range (18.5 – 24.9); Pre obese or overweight (25.0 – 29.9), Obese class 1 (30.0 – 34.9); Obese class 11 (35.0 – 39.9); Obese class 111 (>40.0) (WHO/FAO, 2003).

Attitude, to obtain overall attitude total scores (point values of the responses) were computed for each subject by adding his or her rating on the 1 – 5 point disagree/agree scale. The result sum was considered, with higher total scores indicating more positive attitude or higher level of acceptance of the attitude issues about diabetes and nutritional management (after reverse scoring the negatively worded items). Low scores indicated negative attitude. This was arrived at as follows; minimum scores $1 \times 30 = 30$; maximum scores $30 \times 5 = 150$; and expected mean score $(150+30)/2 = 90$. Therefore, the respondents who attained a total score 91-150 were termed as having positive attitude while those whose scores 30-90 were regarded as having a negative attitude.

Similarly for knowledge, total scores were computed for each subject by summing the number of factual correct statements (true statement). Each true statement carried a score=1 and zero for wrong statement or no answer. The resulting sum was considered with the highest score $= 15 \times 1 = 15$; Lowest score $= 15 \times 00 = 00$. The level of knowledge was graded as poor with a score of 0-5, fair 6-10 and good with a score of 11-15. Some of knowledge items were analyzed qualitatively that is knowledge on causes of diabetes, control and complications. Responses were categorized under different titles. Nutritional practices responses were discussed under different themes such as meal pattern, food frequency and physical activity. Those respondents who were not involved
in any physical activity were said to be inactive; those who were involved in only one type of exercise were said to be moderately active while those who engaged themselves in two or many physical activities were put under most active classification. Additionally those who exercised daily, having a small meal before exercise and for those who exercised more than 15 minutes were considered to have good practices. Those respondents who had 5-6 meals per day and meal pattern of 2-3 hours were considered as having good practices. Quantitative data were presented using table and graph as data were in interval scale. Qualitative data were presented in text form to describe and show relationship between both independent and dependent variables.

4.2 Demographic and socio-economic characteristics of the diabetic patients in Nakuru Provincial General Hospital

The demographic characteristics and the details of the people with type 2 diabetes who were interviewed were established. These were; age, sex, education level, occupation and the sources of income. Demographic characteristics were important in that they are associated with level of knowledge, attitude held towards diabetes and practices the patients undertake in management of type 2 diabetes.

4.2.1 Age

Data were collected from people who had type 2 diabetes aged between 25 – 75 years. The results presented in Figure 4.1 indicate that ages were distributed as follows; those aged below 35 years (10); those aged between 36 – 45 years (15) and 46 – 55 years (31). In addition, some were aged between 56 – 60 years (21); others 61 years and above (43).
This can be explained by the fact that type 2 diabetes is common among the middle aged (40 years and above) and the elderly although rare cases are seen in earlier stage of life. It is at middle stage that people tend to be more overweight and obese thus putting them at risk of developing Type 2 diabetes. Previously diabetes was seen as a disease of the middle aged and elderly but recently has escalated in all age groups and is now being identified in younger age groups as observed in this study (WHO/FAO, 2003). In a study done in Kenya showed that Kenyans are developing type 2 diabetes at a much younger age than people in the developed countries (Kenya Medical Association, 2008). According to the same study the peak age of onset of type 2 diabetes in Kenya is between 45 years and 55 years, compared with 64 years in the developed countries (Kenya Medical Association, 2008).

![Figure 4.1: Distribution of interviewed NIDDM patients by age in Nakuru Provincial General Hospital](image-url)
4.2.2 Gender

The study revealed that the subjects comprised of males and females who had type 2 diabetes. Females were the majority with a frequency of 62.5% with males having a frequency of 37.5%. Females tend to be more obese than males, which could put them at risk of developing type 2 diabetes. Other study carried out by Badruddin et. al, (2002) and Kenyatta National Hospital, 2008 support this phenomenon. This could also be attributed to the fact that men engage in more strenuous activities unlike females. This could contribute to reduced chances of obesity which was a major cause of diabetes.

4.2.3 Education level

Academically, as shown in Table 4.1 the majority were those with primary school education with a frequency of 41.7%, followed by those who had secondary school education (23.3%), others (20.8%) and college/university education (14.2%). This could be attributed to the fact that government hospitals mostly serve people of low socio-economic status as services are affordable unlike in private hospitals which serve highly educated people who could be having diabetes as they can afford the service which are usually expensive. People with primary school education have low paying jobs or none at all thus they are economically challenged. According to KDHS (2003), majority of the Kenyan population (58%) usually attain primary school education and not beyond and the same case applies in Rift Valley province (57.2%). There were more females (26.6%) without formal education and more men with college (17.8%) and secondary education (24.4%).
Table 4.1: Distribution of education level of NIDDM patients in Nakuru Provincial General Hospital by sex

<table>
<thead>
<tr>
<th>EDUCATION LEVEL</th>
<th>Males</th>
<th>% Proportion of males</th>
<th>% Proportion of females</th>
<th>Frequency/Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>College/University</td>
<td>8</td>
<td>17.8</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>(47%)*</td>
<td></td>
<td>(53%)</td>
<td>(14.2%)**</td>
</tr>
<tr>
<td>Secondary school</td>
<td>11</td>
<td>24.4</td>
<td>17</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>(39.3%)</td>
<td></td>
<td>(60.7%)</td>
<td>(23.3%)</td>
</tr>
<tr>
<td>Primary school</td>
<td>21</td>
<td>46.7</td>
<td>29</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>(42%)</td>
<td></td>
<td>(58%)</td>
<td>(41.7%)</td>
</tr>
<tr>
<td>Others (Non-formal education)</td>
<td>5</td>
<td>11.1</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>(20%)</td>
<td></td>
<td>(80%)</td>
<td>(20.8%)</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
<td>75</td>
<td>120</td>
</tr>
</tbody>
</table>

NB/: * Number in brackets denote percentages in that education level category
** Number in brackets denote percentages of the total sample

4.2.4 Income

The results presented in Table 4.2 indicate that majority (45%) of the diabetic patients had an individual income of Kshs. 5,000 and below followed by those who had an income of Kshs. 5,001 and 10,000 (27.5%); Kshs. 10,001 – 15,000 (13.3%); Kshs. 15,001-20,000 (10%) while those who had an income level of Kshs. 20,001 and above had a frequency of only 4.2% being the minority. In addition, the highest income was Kshs 48,000 with a mean income of Kshs 8990. Majority of the diabetic patients had an income of Kshs 5000 with a frequency of 17.5%. This could be attributed to the level of
education as majority of the respondents with type 2 diabetes had only attained primary school education. Majority (45.3%) of females and males (44.5%) had income level of Kshs 5000 shillings and below which could be attributed to the fact that majority had not attained secondary school education and above to offer them good jobs. Similar findings indicate that diabetes was evident in those with lower income and less educated which could be attributed to change in lifestyle. It was presumed that the condition would progressively shift to more poor sectors of the society. There was some evidence that this was already happening, especially among women in low income groups for example in Brazil and South Africa, as well as in countries in economic transition (WHO/FAO, 2003). In Kenya this could be explained by the fact that most (around 57%) of the Kenyan do not go beyond primary education and therefore they are not able to secure better paying jobs (KDHS, 2003).

Table 4.2: Distribution of surveyed NIDDM by monthly income in Nakuru Provincial General Hospital by sex

<table>
<thead>
<tr>
<th>Monthly income (Kshs)</th>
<th>Males</th>
<th>% Proportion of males</th>
<th>Females</th>
<th>% Proportion of females</th>
<th>Frequency/Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000 and below</td>
<td>20 (37%)</td>
<td>44.5</td>
<td>34 (63%)</td>
<td>45.3</td>
<td>54 (45.0%)</td>
</tr>
<tr>
<td>5001-10000</td>
<td>14 (42.4%)</td>
<td>31.1</td>
<td>19 (57.6%)</td>
<td>25.3</td>
<td>33 (27.5%)</td>
</tr>
<tr>
<td>10001-15000</td>
<td>5 (31.3%)</td>
<td>11.1</td>
<td>11 (68.7%)</td>
<td>14.7</td>
<td>16 (13.3%)</td>
</tr>
<tr>
<td>15001-20000</td>
<td>5 (41.7%)</td>
<td>11.1</td>
<td>7 (58.3%)</td>
<td>9.3</td>
<td>12 (10.0%)</td>
</tr>
<tr>
<td>20000 and above</td>
<td>1 (20%)</td>
<td>2.2</td>
<td>4 (40%)</td>
<td>5.3</td>
<td>5 (4.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
<td>75</td>
<td>100%</td>
<td>120 (100%)</td>
</tr>
</tbody>
</table>
4.2.5 Occupation

The results in Table 4.3 show that the surveyed people with diabetes had different occupations. As shown, the majority of the respondents were farmers (34.2%), followed by business men and women (25.0%), civil servants (24.2%), house workers (9.2%), student (1.7%) and NGO or private workers (5.9%). The findings were consistent to the findings on KDHS (2003) where most (41.8%) of Kenyan are farmers (agriculture sector). Government hospitals are commonly attended by people of low socio-economic status, which could have been the case. Many years back type 2 diabetes was known to be the disease of the rich, which is no longer the case. This could be due to westernization having led to lifestyle change, which cuts across all socio-economic levels (Mngola, 2001).

Table 4.3: Distribution of the surveyed NIDDM respondents by occupation in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Males</th>
<th>% Proportion of males</th>
<th>Females</th>
<th>% Proportion of females</th>
<th>Frequency/ Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil servant</td>
<td>10 (34.5%)</td>
<td>22.2</td>
<td>19 (65.5%)</td>
<td>25.3</td>
<td>29 (24.2%)</td>
</tr>
<tr>
<td>Farmer</td>
<td>15 (36.6%)</td>
<td>33.3</td>
<td>26 (63.4%)</td>
<td>34.7</td>
<td>41 (34.2%)</td>
</tr>
<tr>
<td>House worker</td>
<td>1 (9.1%)</td>
<td>2.2</td>
<td>10 (90.9%)</td>
<td>13.3</td>
<td>11 (9.2)</td>
</tr>
<tr>
<td>NGO/ Private</td>
<td>4 (57.1%)</td>
<td>8.9</td>
<td>3 (42.9%)</td>
<td>4.0</td>
<td>7 (5.9%)</td>
</tr>
<tr>
<td>Business</td>
<td>13 (43.3%)</td>
<td>28.9</td>
<td>17 (56.7%)</td>
<td>22.7</td>
<td>30 (25.0%)</td>
</tr>
<tr>
<td>Student</td>
<td>2 (100%)</td>
<td>4.4</td>
<td>0 (0.0%)</td>
<td>0.0</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
<td>75</td>
<td>100%</td>
<td>120</td>
</tr>
</tbody>
</table>
4.3 Medical history of the NIDDM respondents in Nakuru Provincial General Hospital

Medical history of NIDDM respondents was sought and discussed under the following; age at which the disease was diagnosed, duration of time suffered, place of initial diagnosis, NIDDM complications, monitoring of blood glucose and blood glucose levels of diabetic patients.

4.3.1 Age at which the disease was diagnosed

The lowest age at which the disease was diagnosed was seventeen (17) years with only 1 subject (0.8%), while the highest age was found to be 74 years with a frequency of 2.5% and a mean of forty nine years. The study found that most of the respondents (81.7%) were diagnosed to have diabetes at an age of 40 years and above while those who were below 40 years at first diagnosis were only 18.3%. The age that had the highest frequency was 41 years (9.2%). According to grouped ages the majority of the subjects were in the category of 46 – 55 years (27.5%) while the minorities were in the category of 35 years and below (15%). This was attributed to the fact that type 2 diabetes is most common in adults with rare case being reported among the young people although the trend was changing (Mngola, 2001). According to Kenya Diabetes Association (2005), out of 3.5 million Kenyan with diabetes, only 15% are below 30 years.
4.3.2 Duration of time suffered from diabetes

According to the findings the longest time that a respondent had stayed with diabetes was 31 years while the least duration was one year. About 58% of the respondents (Table 4.4) had suffered from diabetes for 1-5 years, 6-10 years (25.8%), 11-15 years (8.3%), 16-20 years (6.7%) and 21 years and above (1.7%). Majority had suffered from diabetes for 1-5 years, which shows high rate of diabetes morbidity. Type 2 diabetes was mild and develops slowly therefore; the disorder could develop much earlier before the time it was diagnosed. These results were similar to a study done by DMI (2005) and in Kenyatta
National Hospital (Kenya Medical Association, 2007) where most of the diabetic had suffered from diabetes for 6 years.

### 4.3.3 Place of initial diagnosis

The study found that about 41% of the respondents learnt that they had diabetes through screening; through symptoms (30%) while through hospitalization was 29.2% (Table 4.4). Those who learnt through symptoms could be due to the fact that 55% of the respondents had relatives with diabetes so they already knew signs and symptoms of diabetes. Majority of the respondents did not know their status until they were screened which could be due to the fact that people were not educated on diabetes. The findings are consistent to another study done in Mt Kenya region where 30% of people with diabetes were not aware they had the condition (Kenya Medical Association, 2008).

### 4.3.4 NIDDM complications

Most of NIDDM respondents (97.5%) were on medication with 75.8% having complications related to diabetes (Table 4.4). Complications mentioned included; hypertension, kidney problem, failing memory, poor eyesight, leg ulcers and sexual dysfunction. This could be due to the fact that type 2 diabetes is commonly diagnosed when the person was already presenting with complications. (Kenya Diabetes Association, 2005). Presence of complications can also be attributed to poor nutrition and medical management. Kenyans with diabetes are at a higher risk of life threatening or crippling complications than people in more developed countries, largely because they report to the health care centres when their condition is advanced (KMA, 2008).
According to a study done in Mombasa General Hospital the most common complications among people with diabetes were foot disease, eye problem, infections (75%), Ischaemic heart disease (42%), hypertension (25%) and kidney problem (25%) (Kenya Medical Association, 2008). The findings were consistent to findings of this study. In another study conducted in Kenyatta National Hospital most of the people with diabetes were on medications (92.5%) with only 7.5% treated with diet alone (Kenya Medical Association, 2008). The findings are consistent to the findings of this study whereby only 2.5% of the respondents were treated with diet alone.

4.3.5 Monitoring of blood glucose

It was noted that all the respondents monitor their glucose levels either at home (17.5%) using glucometer or visit clinic for screening (82.5%). This could be attributed to the fact that most of the respondents with type 2 diabetes were of low socio economic status therefore they were not in a position to buy their own glucometer which cost 5,000Kshs. A study done by Badruddin et. al (2002) revealed that fifty percent (50%) of the diabetic people had their own glucometer. Additionally, only fourteen percent (14%) were regularly monitoring their blood sugar.

4.3.6 Blood glucose levels of diabetic patients

The study revealed that the respondents had low, normal or high blood sugar levels (Table 4.4). Those who had fasting blood sugars of 3.8 and below millimoles/litre were classified as having low blood sugars, 3.9 -5.8 as normal and more than 5.8 had high blood sugars. Majority of the surveyed diabetic (80.8%) patients had high blood sugars,
16.7% had normal blood glucose while 2.5% had low blood sugars. The findings are consistent to a study carried out in Kenyatta National Hospital where most of people with diabetes had poor controlled fasting blood glucose levels of 9.15 (KMA, 2008). The low and high blood sugars could be attributed to poor management of the disorder. The primary goal for patients with type 2 diabetes is to achieve and maintain near normal blood sugar levels (Boston, 2003). The degree of control of blood glucose concentration affects the development of diabetes related complications accounting for a considerable morbidity and mortality related to poor control of the disease (Kenya Diabetes Association, 2006; Nthangeni et al. 2002). People with type 2 diabetes are more resistant to hypoglycemia (low blood sugar) thus more characterized by hyperglycemia (Kenya Diabetes Association, 2005), as it was the case in this study.
Table 4.4: Distribution of medical history of NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Year(s) suffered</th>
<th>Frequency</th>
<th>Percentages (%)</th>
<th>Comparison with another study by DMI 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>69</td>
<td>57.5</td>
<td>48.7%</td>
</tr>
<tr>
<td>6-10</td>
<td>31</td>
<td>25.8</td>
<td>18.4%</td>
</tr>
<tr>
<td>11-15</td>
<td>10</td>
<td>8.3</td>
<td>12.9%</td>
</tr>
<tr>
<td>16-20</td>
<td>8</td>
<td>6.7</td>
<td>7.7%</td>
</tr>
<tr>
<td>21 and above</td>
<td>2</td>
<td>1.7</td>
<td>4.7%</td>
</tr>
<tr>
<td>Not sure of duration</td>
<td>-</td>
<td>-</td>
<td>7.5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Frequency</th>
<th>Percentages (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>36</td>
<td>30.0</td>
<td></td>
</tr>
<tr>
<td>Hospitalization</td>
<td>35</td>
<td>29.2</td>
<td></td>
</tr>
<tr>
<td>Screening</td>
<td>49</td>
<td>40.8</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Presence of complications</th>
<th>Frequency</th>
<th>Percentages (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>91</td>
<td>75.8</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>29</td>
<td>24.2</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>On medication</th>
<th>Frequency</th>
<th>Percentages (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>117</td>
<td>97.5</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>2.5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood glucose levels</th>
<th>Frequency</th>
<th>Percentages (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>3</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>20</td>
<td>16.7</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>97</td>
<td>80.8</td>
<td></td>
</tr>
</tbody>
</table>

4.4 Nutrition status of diabetic respondents in Nakuru Provincial General Hospital

Nutritional status was assessed using the Body Mass Index (BMI) formula. The body mass index (BMI) is an indicator of nutritional status, used to assess an adult’s body weight relative to height. It is a useful indirect measure of body composition, because it correlates highly with body fat in most people (Connor et. al, 2003). This method was
obesity is an important risk factor for diabetes related complications. Between 60-75% of all type 2 diabetes were obese at the onset of diabetes (Macmillan, 1993). Therefore weight loss and stabilization is a major priority for those who are overweight and obese. According to a study done in United State by Diabetes Prevention Program it was found that for every 5 kilograms of weight loss there was a 16% reduction in the risk of developing diabetes, with weight loss the dominant predictor of reduced diabetes incidences and complications (Kenya Diabetes Association, 2005).

Table 4.5: Distribution of the surveyed NIDDM respondents by Body Mass Index by sex

<table>
<thead>
<tr>
<th>Nutritional status (BMI)</th>
<th>Males</th>
<th>% Proportion of males</th>
<th>Females</th>
<th>% Proportion of females</th>
<th>Frequency/Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (&lt;18.5)</td>
<td>2 (100%)</td>
<td>4.4</td>
<td>0 (0.0%)</td>
<td>0.0</td>
<td>2(1.70%)</td>
</tr>
<tr>
<td>Normal (18.5-24.9)</td>
<td>22 (53.7%)</td>
<td>48.9</td>
<td>19 (46.3%)</td>
<td>25.3</td>
<td>41(34.2%)</td>
</tr>
<tr>
<td>Overweight/pre-obese (25-29.9)</td>
<td>18 (34.6%)</td>
<td>40</td>
<td>34 (65.4%)</td>
<td>45.3</td>
<td>52(43.3%)</td>
</tr>
<tr>
<td>Obese Class I (30-34.9)</td>
<td>3 (14.3%)</td>
<td>6.7</td>
<td>18 (85.7%)</td>
<td>24</td>
<td>21(17.5%)</td>
</tr>
<tr>
<td>Obese class II (35-39.9)</td>
<td>0 (0.0%)</td>
<td>0.0</td>
<td>4 (100%)</td>
<td>5.3</td>
<td>4(3.3%)</td>
</tr>
<tr>
<td>Obese class III (&gt;40)</td>
<td>0 (0.0%)</td>
<td>(0.0%)</td>
<td>0 (0.0%)</td>
<td>0.0</td>
<td>0(0.0%)</td>
</tr>
<tr>
<td>Totals</td>
<td>45(37.5%)</td>
<td>100%</td>
<td>75(62.5%)</td>
<td>100%</td>
<td>120(100%)</td>
</tr>
</tbody>
</table>

4.5 Knowledge on diabetes and nutrition management of type 2 diabetes

The collected data were used to identify respondents who were highly knowledgeable about diabetes and dietary management and those who had fair and low knowledge. This results are presented and discussed under the following themes; level of nutrition
knowledge and level of knowledge on key issues on diabetes; complications of diabetes, how to control diabetes and causes of diabetes.

4.5.1 Level of nutrition knowledge of diabetic respondents in Nakuru Provincial General Hospital

Clinical nutrition therapy was integral to total diabetes care and management. Although adherence to nutrition was one of the most challenging component aspects of diabetes care, nutrition therapy was an essential component of successful diabetes management. Therefore, nutrition knowledge plays an important role in management of type 2 diabetes. The study therefore collected data to determine the level of nutrition knowledge held by people with type 2 diabetes. The assessment included overall nutrition knowledge and knowledge on specific nutrients of food items with regard to diabetes management.

i) Overall nutrition knowledge of diabetic respondents in Nakuru Provincial General Hospital

As shown in Table 4.6, majority of the interviewed diabetic patients (63.3%) had fair overall nutrition knowledge (that is not having a lot of knowledge on nutrition management of type 2 diabetes); 8.3% had good knowledge while 28.3% had poor knowledge. There was not much disparity between males and females as majority in both categories had fair knowledge 68.9% and 60% respectively. Nutritional knowledge acquired by NIDDM respondent was linked to knowledge offered in the clinic which is offered occasionally in the clinic. These results are similar to a study by Badruddin et.al (2002) which found that only 13% of people with type 2 diabetes had good knowledge on
diet and diabetes. These results also are similar to another study done by Pivaral, Menchaca and Lopez (1991) with only 10% of people with type 2 diabetes with high level of knowledge. This could be due to the fact that people with diabetes were not being furnished with the appropriate and most current information about nutrition management of NIDDM. Knowledge acquired by patients has an important bearing upon the control the patient exerts on the management. People who know more about diabetes and how it affects their bodies manage their diabetes more effectively (Sievenpiper et. al, 2002). A major challenge to diabetes care delivery in Africa is the provision of patient education to help those with diabetes look after themselves (Macmillan, 1993). Diabetes education remains fragmented in the Africa region. Services of diabetes educators are not used in the same capacity as in the developed countries. Diabetes education is carried out by anyone, health professionals or not (IDF, 2006). In Kenya level of knowledge on diabetes is low which is consistent to the findings of the study. There is need for knowledge on the nature and levels of awareness about diabetes (KDA, 2004).
Table 4.6: Distribution of overall nutrition knowledge of surveyed NIDDM patients in Nakuru Provincial General Hospital by sex

<table>
<thead>
<tr>
<th>Nutrition knowledge</th>
<th>Males</th>
<th>% proportion of males</th>
<th>Females</th>
<th>% proportion of females</th>
<th>Frequency/ percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>12 (35.3%)</td>
<td>26.7</td>
<td>22 (64.7%)</td>
<td>29.3</td>
<td>34 (28.3%)</td>
</tr>
<tr>
<td>Fair</td>
<td>31 (40.8%)</td>
<td>68.9</td>
<td>45 (59.2%)</td>
<td>60</td>
<td>76 (63.3%)</td>
</tr>
<tr>
<td>Good</td>
<td>2 (20%)</td>
<td>4.4</td>
<td>8 (80%)</td>
<td>10.7</td>
<td>10 (8.3%)</td>
</tr>
<tr>
<td>Total</td>
<td>45</td>
<td>100%</td>
<td>75</td>
<td>100%</td>
<td>120 (100%)</td>
</tr>
</tbody>
</table>

**ii) Knowledge on various nutrition issues of diabetes of diabetic respondents in Nakuru Provincial General Hospital**

Regarding the specific knowledge issues on nutrition, people with diabetes were knowledgeable to some of them as shown in table 4.7. The nutrition knowledge included various food issues such as knowledge on carbohydrates and diabetes, proteins, fats, fruits and vegetables, alcohol, meal pattern and exercise.

**(a) Carbohydrates and diabetes**

Majority, (85%) of the respondents chose more of complex carbohydrates and avoids simple carbohydrates (Table 4.7). In addition, all respondents stated that sugar should be avoided. The notion held on complex carbohydrates could be attributed to the fact about...
the high content of fibres in complex carbohydrates. Fibre rich foods often have a low Glycemic Index although some foods with low fibre content may also have the same (Parillo and Riccardi, 2004). Since blood glucose responses was influenced not only by the fibre content of the food but also by the amount of ingested carbohydrates what really matters was quantity of the carbohydrates consumed (Parillo and Riccardi, 2004).

(b) Lipids and diabetes

The results presented in Table 4.7 revealed that 89.2% of people with type 2 diabetes had good knowledge on fats and diabetes. They agreed with the fact that hydrogenated and saturated fats such as animal fats and hydrogenated fats should be taken in minimal amounts. This could be due to the well known fact on effect of fat in relation to health. Since most people interviewed were overweight they could have been well informed on the relationship between overweight and fats. The primary issue in weight loss was reduction in dietary fat which was an efficient way to reduce caloric intake and weight gain (American Diabetes Association, 1994).

(c) Protein and diabetes

The results showed that only 5% of the NIDDM respondents knew that excessive intake of protein above the recommended for a healthy person could accelerate rate of renal failure while 40% had no idea. The notion held on excessive intake of protein could be attributed to the fact that majority of the patients avoid carbohydrates therefore they could be substituting carbohydrates with proteins. People with diabetes have similar protein requirement with the non-diabetic (Parillo and Riccardi, 2004). Excessive intake
of protein should be avoided as they increase the risk of nephropathy although more researches need to be done in this area (Parillo and Riccardi, 2004).

(d) Fruits and vegetables and diabetes

The sixty percent (60%) of the respondents with type 2 diabetes indicated that there was no need to restrict the intake of fruits and vegetables. This could be attributed to the fact that majority of the respondents were farmers therefore they could be growing some of the vegetables and fruits. This was considered as having good knowledge on benefit of consumption of fruits and vegetables. Fruits and vegetables should be promoted among people with diabetes because of the protective benefit, as one of the symptoms of diabetes was frequent skin infection.

(e) Alcohol and diabetes

All the respondents agreed to the fact that alcohol taking was a threat in diabetes management, which was termed as having good knowledge. This could be attributed to the same precaution regarding the use of alcohol that applies to the general public. Under normal circumstances, however, blood glucose levels would not be affected by moderate use of alcohol (2-3 units) when diabetes was well controlled. Alcohol contains 7 kilocalories and could cause or aggravate hypertriglyceridaemia, so its use should be restricted by those who are trying to lose weight or those who have significant hypertriglyceridaemia (Connor et. al., 2003). Serious hypoglycemia can occur with larger quantities of alcohol, particularly in insulin treated patients especially if food was omitted or if alcohol was substituted for some or all the carbohydrates content of the meal.
Therefore reduction of or abstention from alcohol intake would be advisable for people with diabetes (Connor et. al, 2003).

(f) Meal patterns and diabetes

Table 4.7 also indicates that only 35.8% of NIDDM respondents knew the need to have a regular meal pattern while 64.2% did not. This could be due to the fact that diabetes is characterized by frequent hunger especially if not well controlled. Therefore people with type 2 diabetes could be challenged to follow a regular pattern especially if no snacks are taken in between meals. Well distributed meals (regular meal) throughout the day would help minimize the high and low swings in blood glucose concentration (William, 1994; Barbara and Carol, 2002).

(g) Diet therapy and diabetes

Table 4.7 shows that majority of the NIDDM patients (71.5%) agreed with the statement that it was possible to manage diabetes with diet alone while 28.5% refuted. Additionally, 15% felt that there was no need of diet if one was on medication, which was considered as poor knowledge. Eighty five percent knew the importance of dietary therapy in the management of diabetes. The knowledge on importance of dietary therapy in management of diabetes could be due to the fact that diabetes is a metabolic disorder that affects metabolism of fats, protein and carbohydrates (Badruddin et. al, 2002). Therefore NIDDM patients are usually advised on the need to check on their diet at diagnostic stage, which makes them perceive dietary therapy as important in management of the disorder. Additionally, 91.7% knew that complications could be avoided with strict diet.
Table 4.7: Distribution of knowledge issues of the surveyed NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Knowledge items</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>No strict regulation on fruits and vegetables</td>
<td>72</td>
<td>60</td>
</tr>
<tr>
<td>Diabetic people should avoid sodas</td>
<td>115</td>
<td>95.8</td>
</tr>
<tr>
<td>Diabetic people should take whole carbohydrate instead of refined</td>
<td>102</td>
<td>85</td>
</tr>
<tr>
<td>It is possible to manage NIDDM with diet</td>
<td>88</td>
<td>71.5</td>
</tr>
<tr>
<td>Sugar is not allowed for people with diabetes</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>Carbohydrates should be avoided</td>
<td>19</td>
<td>15.8</td>
</tr>
<tr>
<td>Complications could be avoided with strict diet</td>
<td>110</td>
<td>91.7</td>
</tr>
<tr>
<td>If on medication dietary restriction is not that necessary</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Meals should follow a regular pattern</td>
<td>43</td>
<td>35.8</td>
</tr>
<tr>
<td>There is restriction on the amount of milk to be taken in a day</td>
<td>40</td>
<td>33.3</td>
</tr>
<tr>
<td>Need to avoid anything with a sweet taste</td>
<td>71</td>
<td>59.2</td>
</tr>
<tr>
<td>Alcohol taking is a threat to people with diabetes</td>
<td>120</td>
<td>100</td>
</tr>
<tr>
<td>People with diabetes should balance meals and exercise</td>
<td>39</td>
<td>32.5</td>
</tr>
<tr>
<td>Should restrict intake of fatty foods and animal fats</td>
<td>107</td>
<td>89.2</td>
</tr>
<tr>
<td>High protein intake can result to other complications such as renal failure</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>
4.5.2 Level of knowledge on key issues on diabetes of diabetic respondents in Nakuru Provincial General Hospital

Knowledge on complications of diabetes, ways of controlling diabetes and causes of type 2 diabetes were determined. From the total sample of 120 NIDDM respondents, most of them were less knowledgeable on general information about diabetes.

(i) Knowledge on control of diabetes

This study showed that 74.2% of the respondents (Table 4.8) knew at least two ways of controlling diabetes, which included diet and drugs, and were therefore categorized less knowledgeable. Only 25.8% of the respondents mentioned three ways mostly diet, medications and exercise as the key component in management type 2 diabetes and were categorized to have good knowledge. Similar findings were observed by Kamel et.al, 1999 with 96.3% of the patients having poor awareness on how to control diabetes.

Patients with type 2 diabetes could be treated with diet, oral hypoglycaemic agents and physical activities. About 85% of patients with type 2 diabetes present with obesity. Nearly all of them could be treated by diet alone provided they co-operate. It was essential to reduce their weight to near their ideal by dieting. The patients needed to take foods less than the body requires so that the body draws fat deposits as a source of energy.

In most cases once a normal weight had been achieved, the blood sugar level returns to normal. In patients who had normal weight and do not respond to dietary restrictions oral anti diabetics are used to control the high blood sugar (Bloomington, 2002). Physical
activity was another component of diabetic care. It increased insulin sensitivity by the receptor cell thus conversion of blood glucose to glycogen (Bloomington, 2002). The patients therefore needed to be educated on ways of controlling diabetes so as to avoid diabetes related complications.

(ii) Knowledge on complications of diabetes

Majority of the NIDDM respondents were less knowledgeable on complications of diabetes (Table 4.8). The result, 75.8% were able to mention 1-2 complications of diabetes. About 24% mentioned more than three complications that were termed as having good knowledge. The complications that were mentioned were; hypertension, kidney problem, poor eyesight, failing memory and joint pains. It had been pointed out that informing diabetic people about complications that come as a result of diabetes might be a way to motivate health behaviors (Kamel et al., 1999; Badruddin et al., 2002). Poor knowledge on complications of diabetes could be attributed to the fact that counseling was usually geared towards some aspects such as nutrition ignoring others.

(iii) Knowledge on causes of diabetes

Regarding the specific knowledge on causes of diabetes, 81.7% of the respondents were able to mention at least one cause of diabetes. Those who had good knowledge were those who were able to name two or more causes of diabetes 18.3%. Similar findings on low knowledge on diabetes were observed in a study by Badruddin et al. (2002) and Kamel et al. (1999) with 54% and 90% having poor knowledge on diabetes (causes and complications) respectively.
Table 4.8: Frequency distribution of responses on type 2 diabetes of surveyed NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Knowledge on diabetes</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control of diabetes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less knowledgeable</td>
<td>89</td>
<td>74.2</td>
</tr>
<tr>
<td>More knowledgeable</td>
<td>31</td>
<td>25.8</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Complications of diabetes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less knowledgeable</td>
<td>91</td>
<td>75.8</td>
</tr>
<tr>
<td>More knowledgeable</td>
<td>29</td>
<td>24.2</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Causes of diabetes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less knowledgeable</td>
<td>98</td>
<td>81.7</td>
</tr>
<tr>
<td>More knowledgeable</td>
<td>22</td>
<td>18.3</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>100.0</td>
</tr>
</tbody>
</table>

4.6 Attitudes related to diabetes of diabetic respondents in Nakuru Provincial General Hospital

To obtain overall attitudes scores, total scores of the diabetic patients were computed by adding rating on the 1 - 5 point disagree/agree scale. The result sum was considered with higher total score above half (91-150) indicating positive attitude and negative attitude (30-90) for low scores. The cut off were adopted from a study done by Badrrudin et.al, (2002) to determine attitude of diabetic towards diabetes. Overall, 71.7% of the diabetic patients showed positive attitude towards nutritional management of diabetes and diabetes in general (Table 4.9) with 28.3% of diabetic patients having negative attitude. Most of women (65.3%) and men (82.2%) had positive attitude towards diabetes as
shown in Table 4.9. When one is diagnosed with diabetes, the news usually comes as a shock. This provokes a crisis which is associated with grief and sadness. The patients also feel overwhelmed by the amount of knowledge required to effectively manage the condition. But, with passage of time the patients comes into term with the condition (Kenya Diabetes Association, 2004). Psychological counseling is important for people with diabetes because it helps reduce the frustrations related to diabetes care and improves treatment outcome (Kenya Diabetes Association, 2004).

Table 4.9: Overall attitude scores of NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Attitude scores</th>
<th>% Proportion of males</th>
<th>% Proportion of females</th>
<th>Frequency/Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-90 (Negative attitude)</td>
<td>8 (23.5%)</td>
<td>26 (76.5%)</td>
<td>34.7</td>
</tr>
<tr>
<td>91-150 (Positive attitude)</td>
<td>37 (43.0%)</td>
<td>49 (57.0%)</td>
<td>65.3</td>
</tr>
</tbody>
</table>

4.6.1 Attitude on various issues of diabetic respondents in Nakuru Provincial General Hospital

Majority (88.3%) of the NIDDM patients did not believe that diabetes was a condition, which cannot be cured (Table 4.10) therefore there was no need to adhere to the dietary therapy which was considered to be a positive attitude. While 8.3% did not see the need to adhere to the therapy, about 3.4% were not decided on whether to agree or disagree
thus, negative attitude. This could have meant that an effort was made by NIDDM patients to adhere to the dietary therapy as most believed that diet was very important in management of the disorder.

A large proportion (55.9%) of the NIDDM patients had a negative attitude as they felt that food control their life while 31.7% had positive attitude, 12.4% did not agree or disagree with the statement. This could be attributed to the fact that people with diabetes are usually given a restricted diet by health professionals, which impact negatively on them. Most people with diabetes suffer from denial, and continue to engage in practices that will only exacerbate their conditions such as over indulging in the wrong foods or not eating enough. Although diabetes was a disease that can be successfully managed and does not translate to an automatic death sentence for the patient, these kinds of attitude and behavior certainly shed light onto the reason for the pathetic prognosis that some communities face (Kenya Diabetes Association, 2003).

People with diabetes should be made to understand that they can enjoy variety of foods and not being restricted to some as there is nothing like ‘diabetic diet’ (Kenya Diabetes Association, 2005). If the diet therapy was too restrictive could result in poor management as the patient become confused and frustrated in trying to obtain the listed food thus, feel that food control his/her life. The results showed that half (50%) of the NIDDM patients gave too much thought to food while the other half was not. Therefore health professionals have a challenging task of trying to change peoples’ attitude toward dietary therapy if at all NIDDM patients were to have good nutrition practices. Finding of
a similar study by Pivaral, Menchaca and Lopez (1991) were consistent to the findings of this study. Additionally, similar study showed that people with diabetes find it difficult to assume self care tasks especially in areas related to nutrition.

The results of the study demonstrated that diabetes represents a considerable burden to people. It had been demonstrated that education in self management designed to improve efficacy and coping skills help people with diabetes to overcome these effective roadblocks (Kenya Diabetes Association, 2004).

About 49% of the NIDDM patients had negative attitude towards carbohydrates while 40% held positive attitude with a small proportion (10.8%) not knowing whether to agree or disagree with the stand. This could be due to the fact that people with diabetes were usually advised to limit their carbohydrate intake without more comprehensive explanation on the effect of simple and complex carbohydrates in diabetes. More emphasis needs to be done so as to enable NIDDM patients gain more understanding about carbohydrates. Results obtained showed that majority (77.5%) felt that diabetes keep them from having enough money; 13.3% perceived it positively while 9.2% were neutral about the statement. This could be attributed to the fact that majority of the NIDDM patients were low income earners majority of them being farmers. This could have led to much trauma as the patient try to cope with the disorder, which comes with additional burden like long life medications. This could also be contributed to the fact that dietary therapy given to NIDDM patients by nutrition counselor and professional workers could be restrictive and could result to more stress as the patient try to obtain the
listed foods which could not be available or too expensive. Additionally, majority (80.9%) felt that diabetic drugs were too expensive while 13.3% felt that they were not. This could be attributed to their socio economic status.

The results obtained showed that 60.8% of the NIDDM patients were not worried about the disorder while 30.9% were worried with 8.3% neutral. Additionally, 59.2% were not terrified at the thought that they may have been exposed to other diabetes related complications while 34.1% were worried about diabetes complications. A small proportion (6.7%) did not hold any attitude towards the same. A large percentage (52.5%) of the NIDDM patients felt that diabetes was not life threatening which was considered a positive attitude, 41.7% perceived diabetes as life threatening while 5.8% not agreeing or disagreeing with the statement. It was considered a negative attitude to view the disease as a life threatening which was not the case; being worried about the disorder and being terrified at the thought that one could have been exposed to other complications. High level of fears has been shown to induce poor management. The positive attitude held by the majority could be attributed to the fact that majority of the NIDDM patients had lived with the disorder for many years and they could have accepted that the disorder could be controlled and some of related complications avoided. Those who perceive diabetes being severe and having fear of related complications have been associated with poor disease management (Shavit, 1990).

In a similar study (Kenya Diabetes Association, 2004) recorded that people with diabetes often feel alone and isolated and at times feel overwhelmed by the responsibility for
adequately managing their condition. These feelings contribute to levels of stress and anxiety. If people with diabetes are to sustain the behavioral changes and improved self efficacy initiated while participating in an educational programme, they need ongoing self management support. This support entails the provision of psychological and behavioral support (KDA, 2004).

When one was diagnosed to having diabetes it could be depressing and one could be confronted with a negative reaction (attitude) towards life. They are troubled more by emotional factors associated with diabetes which could range from the stress of a demanding daily regime, accumulated fear of disabling complications and the probability of pre mature death (Hoover, 1997). People with diabetes suffer from depression at a rate that is two to four times higher than the general population. Therefore patients with NIDDM if helped or counseled to come into terms with the disorder and accept that the disorder can be controlled with proper medications and diet, they can perceive it positively. People with diabetes should be made to understand that people who do well with diabetes are the people who, first of all, accept it. They take positive steps to deal with it and then they get on with their lives. They should feel that they have a mission, a purpose and a reason for living.

Information on the patients’ attitude towards food with sweet taste (sugars) showed that majority (70.8%) were inclined to believe that they should avoid anything with a sweet taste while 29.2% had a different opinion. This was a negative attitude towards sweet foods. People with diabetes are usually made to believe that they should avoid anything
with a sweet taste for good control of the disease. This could be due to the fact that diabetes was usually associated with sugars. Therefore people tend to believe that it was caused by excess intake of sweet foods, which was not usually the case. Health professionals need to educate people more on the relationship between sugars and diabetes and on causes of diabetes and why it is associated with sugars.

More than eighty percent (86.7%) of the patients with type 2 diabetes had a positive attitude towards attending clinic regularly. Only 7.5% held negative attitude as they did not see the need to attend clinic regularly since the disease was not curable while 5.8% did not agree or disagree on the same. This could be due to good understanding on the need to monitor their blood glucose to enable them know how well or poor they are controlling their blood sugars. This could also help them know whether they were at risk of any related complications. Additionally it could be due to the fact that the clinic staff inform the patients with diabetes on the need to attend clinic regularly as the patient are usually given return dates. Patients who go for regular treatment and counseling, awareness about the correct management of their diabetes are quite good (KDA, 2006).

Responses to what the respondents felt about exercise were sought. More than half (63.3%) held positive attitude as they perceived exercise important in management of diabetes while 36.7% held negative attitude. This concurs with most of these people with diabetes being involved in physical activities. Physical activity is important in management of diabetes as most of the patients tend to be overweight therefore need to burn body fats (Connor et. al., 2003; KDA, 2005). The remaining percentage of the
population that felt that physical activity is not important should be educated on the benefits of exercise.

Responses as to whether people with type 2 diabetes felt embarrassed eating alone in presence of others were sought. Overall 62.5% did not feel embarrassed which was considered a positive attitude while 29.2% held negative attitude. Diabetes was characterized by frequent hunger (polyphagia) leading to overeating (Mngola, 2001). Results also indicate that 58% of the NIDDM patients enjoyed eating protein rich foods. This was considered as a negative attitude with only 41.7% having positive attitude. This could be due to the fact that people with diabetes were not furnished with the appropriate information on the importance of a balanced diet. Additionally people with diabetes avoid carbohydrates as also indicated in this study therefore they result to excess intake of proteins in place of carbohydrates.

Most (68.3%) of the patients believed that they need professional help to be able to control their blood glucose effectively. This was considered a negative attitude while 19.2% held the primary responsibility which was considered a positive attitude with 12.5% not agreeing or disagreeing on the same. Similar findings were observed where people with diabetes found it difficult to assume self care task, especially in areas related to nutrition. They also reported need for improved emotional support and communication with their care givers (KDA, 2004). The results demonstrated that diabetes represents a considerable burden to people with the condition. To those individuals whose lives experience had led them to believe that they are able to exert little control over life
events, participation may seem irrelevant and feel powerless and this could lead to failure to seek relevant knowledge (Hoover, 1997). People with diabetes should be made to assume primary responsibility in controlling their disorder. The problem of diabetes management has been seen as a problem of self-management. Participation may be meaningful to individuals who had always perceived that they exert a great deal of control over their lives (William, 1994).
Table 4.10: Frequency of responses on attitude issues related to diabetes of NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>ATTITUDE ISSUES</th>
<th>Neutral</th>
<th>Negative attitude (NA) Disagree</th>
<th>Positive attitude (PA) Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
</tr>
<tr>
<td>Worried</td>
<td>10</td>
<td>8.3</td>
<td>37</td>
</tr>
<tr>
<td>Enjoy protein foods</td>
<td>23</td>
<td>19.2</td>
<td>47</td>
</tr>
<tr>
<td>Complications</td>
<td>8</td>
<td>6.7</td>
<td>41</td>
</tr>
<tr>
<td>Attending clinic regularly</td>
<td>7</td>
<td>5.8</td>
<td>9</td>
</tr>
<tr>
<td>Diabete is life threatening</td>
<td>7</td>
<td>5.8</td>
<td>50</td>
</tr>
<tr>
<td>Avoid sugar (sweet foods)</td>
<td>5</td>
<td>4.2</td>
<td>85</td>
</tr>
<tr>
<td>Avoid carbohydrates</td>
<td>13</td>
<td>10.8</td>
<td>59</td>
</tr>
<tr>
<td>No cure, no need for dietary restriction</td>
<td>4</td>
<td>3.4</td>
<td>10</td>
</tr>
<tr>
<td>No need to exercise</td>
<td>13</td>
<td>10.8</td>
<td>31</td>
</tr>
<tr>
<td>Medications too expensive</td>
<td>7</td>
<td>5.8</td>
<td>97</td>
</tr>
<tr>
<td>Lead to not having enough money</td>
<td>11</td>
<td>9.2</td>
<td>93</td>
</tr>
<tr>
<td>Life not the same as before diagnosis</td>
<td>7</td>
<td>5.8</td>
<td>58</td>
</tr>
<tr>
<td>Food control life</td>
<td>15</td>
<td>12.5</td>
<td>67</td>
</tr>
<tr>
<td>Feel anxious before eating</td>
<td>25</td>
<td>20.8</td>
<td>39</td>
</tr>
<tr>
<td>Give much thought to food</td>
<td>15</td>
<td>12.5</td>
<td>60</td>
</tr>
<tr>
<td>Embarrassed eating alone</td>
<td>10</td>
<td>8.3</td>
<td>35</td>
</tr>
</tbody>
</table>
4.7 Nutrition practices of diabetic respondents in Nakuru Provincial General Hospital

Research objective three of the study was on nutritional practices. This objective was considered under the following themes; meal patterns, food frequency, special diet, meal outside home and physical activity.

4.7.1 Meal patterns of diabetic respondents in Nakuru Provincial General Hospital

This is discussed under the following aspects; number of meals taken in a typical day and interval between meals.

(i) Frequency of snacks

About seventy percent of the respondents (71.7%) had snacks in between meals while 28.3% had no snacks in between meals (Table 4.11). More than a half (54.0%) had 2-3 times snacks, 9.2% had more than 3 times while 8.3% had 1 snack daily. Those who had 2-3 (54.2%) were considered as having a good practice as snacking was important for people with diabetes (Joe et al., 1999). Therefore those who took more than three snacks could be attributed to frequent hunger (polyphagia) which leads to excessive eating as body demand more glucose due to minimal glucose reaching the cells especially if the disorder was not well managed. Having no snacks in between meals was considered a poor practice, which could be attributed to lack of nutrition knowledge on the importance of snacking in between meals. This could also be attributed to low socioeconomic status as majority of the diabetic patients had income level below Kshs 5,000 therefore they could not afford small meals in between the main meals.
Distribution of snacks taken per day of the surveyed NIDDM respondents in Nakuru Provincial General Hospital

Figure 4.3 Distribution of snacks of the surveyed NIDDM respondent in Nakuru Provincial General Hospital

(ii) Total number of meals taken in a day

Regarding the total number of meals taken daily, the results (Figure 4.4) show that 40.9% of the respondents had 1-4 meals per day, 50.8% had 5-6 meals being the majority while 8.3% had more than six meals in a day. Having more than 6 meals per day was termed a poor practice similarly to those who had less than 5 meals, which could be attributed to frequent hunger. In addition to the three main meals, there should be snacks in the middle morning, early afternoon and probably at bedtime (KDA, 2005). Well distributed meals throughout the day would help minimize the high and low swings in blood glucose concentration (William, 1994; Barbara et al., 2002)
(iii) Interval between meals

Overall 63.3% had defined time when they took their meals with 36.7% having no defined time (Figure 4.5). Only 14.2% had an interval of 2 hours, 22.5% had 3 hours interval while 26.6% had more than three hours. Meal interval of 2-3 hours was considered as a good practice while meal interval of less or more than 3 hours was considered as a bad practice. Having a meal interval of more than three hours could be attributed to lack of snacks in between meals. Regular meal pattern with emphasis on
control of energy was important therapy in nutrition management of type 2 diabetes. Distributing meals throughout the day is important, as this helps minimize the high and low swings in blood glucose concentration. Meals should also follow a regular pattern (American Diabetes Association, 1994).

**Figure 4.5 Distribution of meals interval of NIDDM respondents in Nakuru Provincial General Hospital**

![Distribution of meals interval of NIDDM respondents in Nakuru Provincial General Hospital](image-url)
4.7.2 Food frequency

(i) Fruits and vegetables

According to Table 4.11 the consumption of fruit on daily basis was low with a frequency of 33.3%. Around 32.5% took fruits more than 3 times a week, 24.2% 2-3 times, 5.8% once a week and 4.2% did not take fruit in that week. Intake of vegetables was also low as those who took vegetables on daily basis were only 23.3%. Findings also indicated that 45% took vegetables more than 3 times a week, 29.1% 2-3 times, and 2.5% once a week. These findings were consistent with a similar study done in Karachi, which showed that consumption of fruits and vegetables was low as only 47% patients had fruit and vegetable intake daily (Badruddin et. al, 2002). In another consistent study by Ayieko, Tschitey and Mathenge (2005) in the Ministry of agriculture fruits and vegetables are important source of food for a larger number of Kenyans and comprise every household diet. They play an important role in nutritional balance, as they are rich in vitamins and other nutrients that are vital in controlling disease. The results show that while there are households consuming fresh produce at levels below WHO/FAO recommendations levels across all income groups. The poorest people in urban areas also tend to be the lowest consumers of fruits and vegetables. Also, as income increases, the level of fruits and vegetables consumption increases and approaches the WHO/FAO standards (Ayieko et. al, 2005).

Consumption of fruits and vegetables plays a vital role in providing a diversified and nutritious diet as they are good source of vitamins, minerals and fibre. It could also help ward off heart diseases, control blood pressure and stroke common problems in diabetes.
A low consumption of fruits and vegetables in many regions of the world is, however, a persistent phenomenon (WHO/FAO, 2003). At present, only a small and negligible minority of the population consumes the generally recommended high average intake of fruits and vegetables (WHO/FAO, 2003). Low intake could be attributed to economic level leading to inaccessibility of such foods and lack of knowledge on the importance of fruits and vegetables.

(ii) Proteins

The findings indicate that there was more consumption of beef (10%) on daily basis than chicken/fish (Table 4.11). Additionally, 48.3% took beef 2-3 times, 15.8% once, and 25.8% took no red meat that week. The finding also revealed that intake of fish/chicken was low with only 1.7% taking once the rest (98.3%) did not. Consumption of eggs was low as shown in table 4.11. About (35%) took eggs 2-3 times a week, 28.3% once, and 46.7% did not. Similar findings carried out by Ministry of agriculture by Gamba (2005) indicated that meat consumption in Kenya is essentially remains a luxury good whose consumption increases with increasing income. Middle and high income households consume significantly large amounts of beef, chicken and eggs within the home compared to low income households. This phenomenon reveals that health concerns especially for red meat do not necessarily influence consumption levels for both low and high income groups (Gamba, 2005). The intake of milk was low; only 44.2% of the respondents took milk daily, 29.2% 2-3 times a week, 6.7% once while 20% did not. Similar findings on the same trend in Kenya were observed by Gamba (2005). Those who took legumes daily were only 14.2%, 59.2% 2-3 times a week and 7.5% more than three
times. Additionally, 1.7% took legumes once a week while 17.5% did not. There was more intake of plant protein than animal protein which could be attributed to issue of cost as animal protein is more expensive. High intake of red meat (beef) in relation to white meat could be attributed to the same reason. Protein is needed for the growth, maintenance and repairs of body cells. However, protein is a slower burning fuel and does not provide energy as quickly as carbohydrates (Kenya Diabetes Association, 2006).

A diet-containing animal and plant protein complement each other in terms of protein. It was important to consider variety to ensure sufficient intake of micronutrients and macronutrients. High intakes of animal protein, which are high in saturated fatty acids, have been associated with a higher risk of impaired glucose tolerance, and higher fasting glucose and insulin level. While a higher unsaturated fatty acids have been associated with a lower fasting glucose (WHO/FAO, 2003, KDA, 2006). Diets that are traditionally consumed by most African are ideal as they are low in animal fats (KDA, 2004).

(iii) Carbohydrates

Consumption of sugars and refined cereals was low as shown in table 4.11. The findings indicate that only 9.2% took refined flour ugali daily, 17.5% 2-3 times a week, 5.8% once, and 67.5% not taking at all. Those who took whole meal ugali daily were 27.5% a percentage higher than those who took refined flour ugali. Additionally, 30.8% took whole meal flour ugali 2-3 times a week, 32.5% once, and 9.2% did not. Intake of white bread in comparison to brown bread was also low. Majority of the patients (46.7%) took brown bread daily with no one taking white bread daily. Additionally 7.5% took brown
bread more than 3 times a week, 26.7% 2-3 times, 14.2% once, and 5% did not take at all. Similar findings were observed in urban Kenya by Muyanga et al (2005) in the Ministry of agriculture. The results indicated that while generally the volume of staple carbohydrates consumption has declined it is the poorest section of the population that has been affected more. Whole meal consumption continues to be a preserve of the poor because it is relatively inexpensive compared to sifted maize flour.

Intake of whole grain cereals was therefore higher than consumption of refined cereals consistent to results of a similar study by Badruddin et al (2002). In Africa most communities consume diet that is high in fibres. Fibres play a protective role in the body as slowing high rise in blood glucose and weight control (Kenya Diabetes Association, 2006).

The percentage of calories from carbohydrates varies and is individualized based on the patient’s eating habits and glucose and lipid goals. The widely held belief about the dietary treatment of diabetes has been that “simple” sugars should be avoided and replaced with complex carbohydrate. This belief appears to be based on the assumption that sugars were more rapidly digested and absorbed than are complex carbohydrates and thereby aggravates hyperglycemia to a greater degree. This could have contributed to the high intake of whole carbohydrates in comparison to the refined carbohydrate among NIDDM patients. Priority therefore should be given to the total amount of carbohydrates consumed rather than the source of the carbohydrate (Parillo et al., 2004).
There was little scientific fact that supports this assumption. This is because fruit and milk have been shown to have a lower glycemic response than most starches, and sucrose produces a glycemic response similar to that of bread, rice and potatoes (ADA, 1994). The study also indicated that all the respondents did not indulge in alcohol drinking. This was in line with the good knowledge they had as regards alcohol being a threat to health especially for diabetic people.
Table 4.11: Frequency of consumption of various foods by the NIDDM respondent in the past one week before study

<table>
<thead>
<tr>
<th>Foods</th>
<th>Daily</th>
<th>2-3 per week</th>
<th>More than 3 times/week</th>
<th>Once per week</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruits</td>
<td>33.3%(40)</td>
<td>24.2%(29)</td>
<td>32.5%(39)</td>
<td>5.8%(7)</td>
<td>4.2%(5)</td>
</tr>
<tr>
<td>Vegetables</td>
<td>23.3%(28)</td>
<td>29.1%(35)</td>
<td>45%(54)</td>
<td>2.5%(3)</td>
<td>0.0%(0)</td>
</tr>
<tr>
<td>Proteins</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>0.0%(0)</td>
<td>35%(42)</td>
<td>0.0%(0)</td>
<td>28.3%(34)</td>
<td>46.7%(44)</td>
</tr>
<tr>
<td>Beef</td>
<td>10%(12)</td>
<td>48.3%(58)</td>
<td>0.0%</td>
<td>15.8%(19)</td>
<td>25.8%(31)</td>
</tr>
<tr>
<td>Chicken/fish</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>1.7%(2)</td>
<td>98.3%(118)</td>
</tr>
<tr>
<td>Legumes</td>
<td>14.2%(17)</td>
<td>59.2%(71)</td>
<td>7.5%(9)</td>
<td>1.7%(2)</td>
<td>17.5%(21)</td>
</tr>
<tr>
<td>Milk</td>
<td>44.2%(53)</td>
<td>29.2%(35)</td>
<td>0.0%(0)</td>
<td>6.7%(8)</td>
<td>20%(24)</td>
</tr>
<tr>
<td><strong>Bread and Cereals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread (brown)</td>
<td>46.7%(56)</td>
<td>26.7%(32)</td>
<td>7.5%(9)</td>
<td>14.2%(17)</td>
<td>5%(6)</td>
</tr>
<tr>
<td>White bread</td>
<td>0%(0)</td>
<td>17.5%(21)</td>
<td>10.8%(13)</td>
<td>10%(12)</td>
<td>61.7%(74)</td>
</tr>
<tr>
<td>White rice</td>
<td>1.7%(2)</td>
<td>31.7%(38)</td>
<td>28.3%(34)</td>
<td>6.7%(8)</td>
<td>31.6%(38)</td>
</tr>
<tr>
<td>Millet/sorghum</td>
<td>28.3%(34)</td>
<td>11.7%(14)</td>
<td>8.3%(10)</td>
<td>5%(6)</td>
<td>46.6%(56)</td>
</tr>
<tr>
<td>Whole meal ugali</td>
<td>27.5%(33)</td>
<td>30.8%(37)</td>
<td>0%(0)</td>
<td>32.5%(39)</td>
<td>9.2%(11)</td>
</tr>
<tr>
<td>Refined flour ugali</td>
<td>9.2%(11)</td>
<td>17.5%(21)</td>
<td>0%(0)</td>
<td>5.8%(7)</td>
<td>67.5%(81)</td>
</tr>
<tr>
<td>Sugars</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>3.3%(4)</td>
<td>96.7%(116)</td>
</tr>
<tr>
<td>Cookies/cakes/biscuits</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100%(120)</td>
</tr>
<tr>
<td>Alcohol</td>
<td>0.0%(0)</td>
<td>0.0%(0)</td>
<td>0.0%</td>
<td>0.0%</td>
<td>100%(120)</td>
</tr>
</tbody>
</table>
4.7.3 Need for special diet

Findings on whether the respondents ate similar foods with other family member show that 57.5% ate same foods while 42.5% ate from a different pot. Similar findings were observed by Nthangeni et al. (2002) with most of the patients having special diet either given to them by doctor or a nurse. For those who ate similar foods with other members of the family most of them complained of financial problem as the major reason while a few 25.8% understood the need of not having special meals as advised by doctors and nutritionist. Additionally, most of the respondents who ate differently from other family members did so to avoid complications while other reasons were; high carbohydrate content and to meet their special needs. Doctors’ and nutritionist advice also played part among those who had special diet. Diet was an important part of diabetes management. Each person with diabetes needs to be provided with an individualized plan, appropriate counseling in the use of the plan and follow up as necessary. In general most persons with diabetes could have a normal diet based on the six food groups (IDF, 2006; KDA, 2005). Therefore most foods provided for the rest of the family were good for the diabetic. Special diabetic foods were not necessary (Macmillan, 1993).

4.7.4 Physical activity

The activity level of the respondents was established which was very important in management of diabetes. Physical activity was considered under the following themes; Level and type of physical activity, frequency of physical activity, duration of physical activity, balance between physical activity and time of exercise.
(i) Level and type of physical activity

The study revealed that out of the hundred and twenty respondents 83.3% were engaged in physical activities while only 16.7% were not involved. Out of those who were involved in exercise 47.5% of them were moderately active while 35.8% were active (Table 4.12). The respondents were involved in various types of exercise, majority (43.3%) being involved in walking; 14% were involved in manual work while 18% were involved in both walking and manual work. Additionally some were involved in cycling. Those who did not engage themselves in any kind of physical activities gave different reasons as to why they were not involved. About 4.0% mentioned age as the main reason, while 4.2% had no reason. Other reasons that were given were; lack of interest (2.5%); lack of time (1.7%); presence of complications (1.7%); being a bother (1.7%); age and lack of interest (0.8%). There were more active women (40%) than men 28.9%. This could be attributed to the fact that most of the women in this study were house wives and farmers. Thus, they were actively involved in domestic work and farm activities than men. The findings also reveal that there were more women (21.3%) compared with men (8.9%) in less active category. This could be attributed to the large proportion of women in comparison to men in white collar jobs who could be having a sedentary lifestyle. Similar findings were observed by Badruddin et. al (2002).

Exercise is important for all as it keeps the body healthy and more so for diabetic people is of great significance as it saves one from adding excessive weight or helps in cutting down weight and keeps a check on blood pressure, a common complication for people with diabetes (IDF, 2006; WHO/FAO, 2003). According to a study done in United
Kingdom, it was found that compared with those people with type 2 diabetes who were not engaged in physical activity, participants who were enrolled lost significantly more fat around their abdominal organs. This effect is of particular importance in diabetes care and prevention as abdominal adiposity is strongly associated with the metabolic syndrome (IDF, 2006). Vigorous exercise (for at least 20 minutes, at least for five times a week) has the potential to substantially enhance insulin sensitivity. Activity of moderate intensity was found to be beneficial on most of metabolic diseases, diabetes being one of them (WHO/FAO, 2003).

Table 4.12: Distribution of activity level of the surveyed NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Category</th>
<th>Males</th>
<th>% proportion of males</th>
<th>Females</th>
<th>% proportion of females</th>
<th>Frequency/ Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less active</td>
<td>4 (20.0%)</td>
<td>8.9</td>
<td>16 (80%)</td>
<td>21.3</td>
<td>20 (16.7%)</td>
</tr>
<tr>
<td>Moderately active</td>
<td>28 (49.1%)</td>
<td>62.2</td>
<td>29 (50.9%)</td>
<td>38.7</td>
<td>57 (47.5%)</td>
</tr>
<tr>
<td>Active</td>
<td>13 (30.2%)</td>
<td>28.9</td>
<td>30 (69.8%)</td>
<td>40</td>
<td>43 (35.8%)</td>
</tr>
<tr>
<td>Totals</td>
<td>45</td>
<td>100%</td>
<td>75</td>
<td>100%</td>
<td>120 (100%)</td>
</tr>
</tbody>
</table>

(ii) Frequency of physical activity

The results (Figure 4.6) revealed that 65.8% involved themselves in physical exercise on daily basis, 7.5% twice a week, 7.5% once per a week and 1.7% for more than two times in a week. Only one respondent (0.8%) had no specified time of exercise. High level of
physical activity could be attributed to the type of occupation. Majority of NIDDM respondents were farmers therefore they were more involved in farm activity for most days of the week.

Persons with diabetes should have some form of regular physical exercise. This helps the diabetic to be more sensitive to insulin so even smaller amounts of insulin needed for the exercising muscle to take up glucose can be stored and used. This causes the blood sugar levels to be more stable in any one day. It also helps to reverse the resistance to insulin that occurs as a result of obesity (Macmillan, 1993). Regular physical activity improves lipid profile (reduction in triglyceride and increase in total high density lipoprotein). It also lowers blood pressure. The metabolic benefits in type 2 diabetes are lost within 3-10 days of stopping regular exercise. Most people with diabetes should be encouraged to have sustained physical activities (Connor et. al., 2003).
Distribution of frequency of exercise of surveyed NIDDM respondents in Nakuru Provincial General Hospital

Figure 4.6 Distribution of frequency of exercise of NIDDM respondents in Nakuru Provincial General Hospital

(iii) Duration of physical activity

It was noted that 44.2% were involved in physical activities for one hour and beyond while 25.8% were only engaged for 30 minutes (Table 4.13). In addition, 12.5% of the respondents exercised for less than 30 minutes while 0.8% had no time limit for exercise. It was therefore observed that majority of the respondents were engaged in physical activity for 30 minutes and above which was a good practice, which could be attributed to occupation. These findings were consistent with findings of a study by Kruger et al.
People with diabetes should be encouraged to take 15-30 minutes of physical activity on most days (at least thrice per week), the activity level being adjusted to age and fitness (Parillo and Riccardi 2004; Kruger et al., 2002). They should also be well educated on duration and how often to exercise so as to achieve the maximum benefits in improving glycemic control.

Table 4.13: Distribution of duration of physical exercise of surveyed NIDDM respondents in Nakuru Provincial General Hospital

<table>
<thead>
<tr>
<th>Duration of exercise</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 hour and beyond</td>
<td>53</td>
<td>44.2</td>
</tr>
<tr>
<td>30 minutes</td>
<td>31</td>
<td>25.8</td>
</tr>
<tr>
<td>Less than 30 minutes</td>
<td>15</td>
<td>12.5</td>
</tr>
<tr>
<td>No time limit</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Totals</td>
<td>100</td>
<td>83.3</td>
</tr>
</tbody>
</table>

Balance between physical activity and number of meals

About half of the respondents (53.3%) had no specific time when they exercise either before or after meals. The finding shows that 24.2% exercised after meals while 5.8% were engaged in exercise before meals. This could be due to lack of the right advice on the right time to exercise so as to prevent hypoglycemia during and after exercise that is balancing meal and exercise. Timing of meals and physical activity are very important in NIDDM management. People with type 2 diabetes are expected to take a meal with carbohydrate content before exercise to avoid hypoglycemia and immediately after exercise to replenish glycogen stores which could have been used up during exercise.
(Connor *et al.*, 2003). If the exercise is planned to take long, additional carbohydrate must be taken before or during exercise as muscle continue to replenish glycogen stores for many hours after exercise, and increase insulin sensitivity (Parillo and Riccardi 2004).

**Table 4.14 Distribution of physical activity and meal of NIDDM respondents in Nakuru Provincial General Hospital**

<table>
<thead>
<tr>
<th>Time of exercise</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>After meals</td>
<td>29</td>
<td>24.2</td>
</tr>
<tr>
<td>Before meals</td>
<td>7</td>
<td>5.8</td>
</tr>
<tr>
<td>No specific time</td>
<td>64</td>
<td>53.3</td>
</tr>
<tr>
<td>Totals</td>
<td>100</td>
<td>83.3</td>
</tr>
</tbody>
</table>

### 4.8 Relationship between knowledge and other variables

To test for relationship between nutritional knowledge and other variables Pearson product correlation and chi square test were used for non-categorical and categorical data respectively at 0.05 level of significance. Results are summarized in Table 4.15 and 4.16.

**4.8.1: Relationship between knowledge and practices**

One of the research hypotheses of the study concerned the relationship that exists between nutritional knowledge and nutrition practices. A positive relationship was defined as when high correct knowledge was directly associated with good nutrition practice (numbers of snacks and meals taken per day).
i) *Nutrition knowledge and number of snacks taken in a day*

Regarding the number of snacks that they had per day (Table 4.15), there is no significance relationship with the level of nutrition knowledge ($p = 0.275$). Thus, the hypothesis that there is no relationship between nutrition knowledge and the number of snacks taken by diabetic people can be accepted. This shows that the level of nutrition knowledge did not influence the number of snacks taken per day.

(ii) *Nutrition knowledge and number of meals taken per day*

Regarding feeding habits which was reflected by the number of meals taken in a day, the key trend from the results is that there was no significant relationship between nutritional knowledge and the number of meals taken in a typical day ($p=0.069$) thus accepting the hypothesis. This indicates that the level of nutrition knowledge did not influence the number of meals taken in a day.

Overall, the notion that higher nutrition knowledge would be predictive of good practices was somehow not supported in this study. Similarly findings have been reported by other researchers (Kamel *et. al.*, 1999; Badruddin *et. al.*, 2002; Pivaral *et. al.*, 1991 and Nthangeni *et al.*, 2002) where no significant association was observed between knowledge and dietary regimen and compliance to the required regimen. The reason as to why people with type 2 diabetes do not act on their knowledge regarding many nutrition practices seems to be that they would be having a problem in putting into practice what they know, perhaps denying the risks of not indulging in good practices.
The success of diabetes management depends largely upon peoples' compliance with the management plan given (Kamel *et al.*, 1999; Collor, 2003). Some of the reasons as to why people with diabetes had some poor practices; dietary and physical activity could have been due to the failure of the educators. This was because many educators provide information and skills training without incorporating learning theories to influence peoples' attitude towards management of the disease (Kenya Diabetes Association, 2004). Knowledge on management of diabetes should enable people with diabetes to take charge of care on a daily basis (Kenya Diabetes Association, 2004)

4.8.2 Relationship between socio-demographic characteristics and nutrition knowledge on diabetes

The socio-demographic variable that were included (or considered) in testing the relationships with nutrition knowledge on diabetes were income, duration stayed with diabetes, age, gender and level of education.

(i) Level of knowledge and age

The results in Table 4.15 showed that there was no significant relationship between nutritional knowledge and age (p=0.052) thus accepting the hypothesis. Findings of this study are similar with result of a study by Kamel *et al.* (1999) which stipulated that there was no significant linear association between age and level of knowledge. This is not expected because the older the patient the more knowledgeable he/she should be. It appears that people with diabetes were acquiring nutrition knowledge from other sources and not necessarily from the life experience.
(ii) **Level of knowledge and income**

Table 4.15 indicated also that there was no significant relationship between level of income and level of knowledge concerning nutrition ($p = 0.295$). Therefore we accept the hypothesis that there is no relationship between nutrition knowledge and income. It was expected that the higher the income the high the chances of accessing information from various sources like literature, internet and from other sources as they could be able to meet the cost of accessing information.

(iii) **Level of knowledge and duration stayed with diabetes**

As shown in Table 4.15 those who had lived with diabetes for many years were more knowledge than those who had lived with diabetes for only few years ($p = 0.034$). Similar results were obtained in a study by Kamel *et. al.* (1999) which showed that the older the patient had stayed with diabetes the more knowledgeable he/she tended to be than those who had stayed with diabetes for few years. The more years a patient has had diabetes the more knowledgeable he/she should be as he/she is expected to have acquired more knowledge from health professionals. The high level of knowledge among those who have had diabetes for many years could be attributed to the fact that at diagnosis patients are usually provided with a lot of knowledge on diabetes and how to manage it. The patients were usually eager to grasp more knowledge on how to manage the disorder and as time passes by if the health education becomes consistent the patients become more knowledge about the disorder.
Table 4.15: Relationship between nutrition knowledge and non-categorical test variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>P-value</th>
<th>R</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years suffered</td>
<td>0.034</td>
<td>0.194</td>
<td>S</td>
</tr>
<tr>
<td>Age</td>
<td>0.052</td>
<td>0.488</td>
<td>NS</td>
</tr>
<tr>
<td>Monthly income</td>
<td>0.295</td>
<td>0.097</td>
<td>NS</td>
</tr>
<tr>
<td>Number of meals</td>
<td>0.069</td>
<td>0.166</td>
<td>NS</td>
</tr>
<tr>
<td>Number of snacks</td>
<td>0.275</td>
<td>-0.100</td>
<td>NS</td>
</tr>
</tbody>
</table>

NB/ S Denotes significant relationship between the two test variables
NS denotes non significant relationship between the two test variables

(iv) Level of knowledge and gender

No significant difference was observed between males and females (Table 4.16) with regard to their overall nutrition knowledge (p=0.421). This could be attributed to equality in diabetes education provided for both sexes therefore women are equally knowledge. These findings are consistent with findings of a study by Kamel et. al (1999) in which there were no association between sex and level of knowledge about nutrition. Therefore we accept the hypothesis that there is no relationship between nutrition knowledge on diabetes and gender of a patient.

(v) Level of knowledge and education

The study also found that there was no significant relationship between levels of education and knowledge (p= 0.732). Therefore we accept the hypothesis that there is no relationship between knowledge and education. This suggests that the source of nutrition
knowledge on diabetes is perhaps the same even for more educated people. Kamel et al., (1999) observed that knowledge related to disease improves with a corresponding increase in the level of education and socioeconomic status. Those with a higher academic level and of a better socioeconomic standard had a greater chance of obtaining knowledge from the press, books and other mass media sources. They had no barrier in communication with the health care team, and were more likely to grasp knowledge correctly. Patients with low levels of education are more likely to have a poor level of knowledge and to a lesser extent those with primary to secondary school education as compared with university graduates.

4.8.3 Relationship between nutrition knowledge and attitudes of adults with type 2 diabetes

The other hypothesis of this study concerned the relationship between nutrition knowledge about type 2 diabetes and attitudes related to diabetes. Relationship on nutrition knowledge and attitudes was established using Chi-square. In this analysis, a positive relationship was defined as when high correct knowledge was directly (significantly) associated with more positive attitude.

The results indicate that there was significant relationship (p = 0.047) between level of nutrition knowledge and attitude towards diabetes. This is expected assuming that the more accurate people are in their knowledge about nutrition management of diabetes the more positive their attitude would be towards diabetes and nutrition management. The findings show that those NIDDM patients who had higher level of nutrition knowledge
held more positive attitude toward diabetes. This is consistent to a study by researchers Pivaral et. al., (1991) who found that there existed a relationship between high level of knowledge on dietary education and attitude. Therefore, we reject the hypothesis that there was no relationship between knowledge and attitude.

It was important that own experience and concern of people with diabetes are met in diabetes care in order to self manage their disease besides offering of healthy education. It is important that psychological needs are treated as seriously as their medical and educational needs and become an integral part of care for everyone (Castadena et. al., 1999; Kenya Diabetes Association, 2004).

From the time of diagnosis, people with diabetes attend to emotional experience and meaning of having diabetes alongside the physical, treatment and educational aspects. This brings in it a range of mixed feelings and a need to make sense of the experience. The meaning diabetes has for one person is likely to be very different and changes with time, knowledge on diabetes. This would enable the person get to know more about the whole aspect of the disease. This way his or her attitude can be influenced positively to correlate with knowledge (Hoover, 1997). Therefore, psychological wellbeing needs to be monitored alongside the monitoring of knowledge held. This would empower the person with diabetes to confidently manage the condition (Kenya Diabetes Association, 2004).
4.9 Relationship between attitude and socio-demographic characteristics

Further analyses were done to show the relationship between attitude and socio-demographic characteristics. Pearson product correlation was used for non-categorical variables while chi-square was used for categorical variables.

Table 4.16 Relationship between nutrition knowledge and categorical test variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>X²</th>
<th>df</th>
<th>P value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>1.728</td>
<td>2</td>
<td>0.421</td>
<td>NS</td>
</tr>
<tr>
<td>Level of education</td>
<td>3.589</td>
<td>6</td>
<td>0.732</td>
<td>NS</td>
</tr>
<tr>
<td>Attitude</td>
<td>5.816</td>
<td>2</td>
<td>0.047</td>
<td>S</td>
</tr>
</tbody>
</table>

NB/ S denotes significant relationship  
NS denotes non significant relationship

(i) **Attitude and monthly income**

The study indicated that there was a significant relationship between attitude held by NIDDM patients and income level (P = 0.045). More positive attitude towards diabetes was expected among those with high income as they are less economically challenged. Thus they could afford the extra cost that comes with diabetes that was, medications and diet. Therefore, we reject the hypothesis that there is no relationship between attitude and monthly income.

(ii) **Attitude and number of year(s) suffered**

The results show that there was a significant relationship between attitudes held toward diabetes (p = 0.035) and the number of year(s) suffered as shown in Table 4.17 thus
rejecting the hypothesis. Those who had suffered for many years showed more positive attitude than their counterparts who have lived with the disease for only few years. The number of years a patient has had diabetes should have a positive effect on attitude held which mean better chance of control. With passage of time patients are expected to familiarize with the disease, and appreciate the role to play in management. Most diabetic people are troubled more by psychological stress as they try to come in to term with the situation (William, 1994). At the onset of the disease the patient tend be bothered with the disorder which could lead to psychological torture thus leading to negative attitude but as the years pass by the patient start coping well with the disease leading to more positive attitude which could have been the case.

(iii) Attitude and age in years

As shown in Table 4.17, there was no significant relationship on attitude held across the age (p = 0.402) thus accepting the hypothesis. This meant that age has no influence on attitude held by NIDDM respondents, which is not expected. The findings are consistent to another study where the researcher found no relationship between attitude and age (ADA, 2005). The older the patient the more positive attitude he/she held. With maturity one is expected to come to term with additional responsibility and to cope easily.
Table 4.17: Relationship between attitude and non categorical test variables

<table>
<thead>
<tr>
<th>Socio economic information</th>
<th>P-value</th>
<th>r</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years suffered</td>
<td>0.035</td>
<td>0.095</td>
<td>S</td>
</tr>
<tr>
<td>Age</td>
<td>0.402</td>
<td>-0.077</td>
<td>NS</td>
</tr>
<tr>
<td>Monthly income</td>
<td>0.045</td>
<td>0.065</td>
<td>S</td>
</tr>
</tbody>
</table>

NB: S denotes significant relationship
NS denotes non significant relationship

(iv) Attitude and gender

The results in Table 4.18 show that there was a significant relationship between attitude and gender ($0.047$). Males had more positive attitude towards diabetes than their counterparts. Therefore we reject the hypothesis that there is no relationship between attitude and gender.

(v) Attitude and education level

There was no significant relationship between attitude and education level ($P = 0.358$) thus accepting the hypothesis (Table 4.18). It is expected that education level has a positive effect on attitude held by respondent with Type 2 diabetes as they are expected to have acquired more knowledge and counseling from health workers, doctors and from literature thus understanding the disorder better, consequently having influence on attitude held towards diabetes. According to Sievenpiper et al. (2002) people who know more about diabetes and how it affects their bodies manage their diabetes more effectively and perceive it positively.
Table 4.18 Relationship between attitude and categorical test variables

<table>
<thead>
<tr>
<th>Categorical variables</th>
<th>$x^2$</th>
<th>P value</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>3.951</td>
<td>0.047</td>
<td>S</td>
</tr>
<tr>
<td>Level of education</td>
<td>3.224</td>
<td>0.358</td>
<td>NS</td>
</tr>
</tbody>
</table>

NB/ S denote significant relationship  
NS denotes non significant relationship

4.10 Relationship between Blood sugar levels and some selected characteristic of the diabetic patients in Nakuru Provincial General Hospital

(i) Blood sugar level and Body Mass Index

The results in Table 4.19 indicates that there was a significant relationship between blood sugar level and body mass index ($p=0.014$), thus rejecting the hypothesis. Blood sugar level increased with obesity and overweight. Obesity associated with oversized fat cells increases the risk for insulin resistance by the body leading to elevated blood sugar (Tuomilhihto et al., 2004). The recommendation to treat overweight and obesity is based not only on evidence that relates obesity to increased mortality but also on evidence that weight loss reduces disease related complications such as hypertension and serum/plasma lipid concentration. A key element in the treatment of obese patients with type 2 diabetes is weight reduction in order to improve glycemic control (Torgerson, 2004). There is strong evidence from lifestyle therapy trials that weight loss produced by lifestyle modification reduces blood glucose levels in overweight and obese persons with type 2 diabetes (Torgerson, 2004).
(ii) Blood sugar level and frequency of physical activities

Table 4.19 also shows blood sugar levels to be positively correlated with frequency of physical activity (p=0.036), thus rejecting the hypothesis. This means that frequency of physical activity determined blood sugar levels. An increase in physical activity is an important component of weight loss therapy which in return reduces blood glucose level. Sustained physical activity is most helpful in the prevention of weight regains. In addition, it has a benefit in reducing cardio vascular and diabetes risk beyond that produced by weight reduction alone. Patients should therefore be encouraged to increase everyday activity that is reducing sedentary lifestyle. Physical activity is recommended as part of a comprehensive weight loss therapy and weight control program because it contributes to weight loss in overweight and obese adults, may decrease abdominal fat and increase cardio- respiratory fitness. Physical activity also lowers blood glucose by burning glucose for energy and by increasing the cell ability to take glucose from the blood (Wardlaw et. al., 2002; Barbara et. al., 2002). Initially moderate levels of physical activity for 30-45 minutes 3-5 days a week should be encouraged. All adults should set a long term goal to accumulate at least 30 minutes or more of moderate intensity physical activity on most and preferably all days of the week.

(iii) Blood sugar levels and number of meals taken per day

The results in Table 4.19 also indicates a nearly significant relationship between blood sugar level and number of the meal, (p=0.075) at 0.05 level of significance. Therefore we accept the hypothesis that there is no relationship between blood sugar level and the number of meals. Diabetic patient taking medication should space their meals to cover
the peaks and basal effect of medication. This helps minimize the high and low swings in blood glucose concentration (Barbara et.al. 2002). If there is delay in eating, hypoglycemia may occur (Bendixon et. al, 2004). In a majority of patients, mid afternoon and bedtime snacks should be provided. Over eating or consuming more than one third of the total caloric requirements at one meal is not generally recommended (Bendixon et. al, 2004).

Table 4.19 Relationship between Blood sugar levels and non-categorical test variables

<table>
<thead>
<tr>
<th>Blood sugar levels</th>
<th>P- Value</th>
<th>R</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Mass Index</td>
<td>0.014</td>
<td>0.224</td>
<td>S</td>
</tr>
<tr>
<td>Frequency of physical activity</td>
<td>0.036</td>
<td>0.191</td>
<td>S</td>
</tr>
<tr>
<td>Nutrition knowledge scores</td>
<td>0.263</td>
<td>0.103</td>
<td>NS</td>
</tr>
<tr>
<td>Number of meals</td>
<td>0.079</td>
<td>0.443</td>
<td>NS</td>
</tr>
</tbody>
</table>

NB/ S denote significant relationship
NS denotes non significant relationship

4.11 Relationship between Body Mass Index and gender

The chi-square results indicates a near significant relationship at 0.05 level of significance between body mass index and gender (p=0.06), thus accepting the hypothesis. The number of overweight men and women has risen since 1960s. The prevalence of obesity and overweight is occurring far more rapidly in women than men (Bendixon et. al, 2004). This suggest that overweight might be as profound in women as in men in the foreseeable future according to Bendixon et. al (2004).
CHAPTER V
SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary and implications of the findings

This chapter gives a summary of the study findings and conclusion that emanate from them. It also gives recommendations for policy, practice and further research work. The thesis presents the main findings of a research project, which focused on nutrition knowledge, attitude and practices in management of type 2 diabetes among adults who had type 2 diabetes. It also looked at the relationships that exist between these variables.

The purpose of the study was to assess nutrition knowledge, attitude and practices in management of type 2 diabetes among adults in Nakuru Provincial General Hospital. The following objectives were formulated to achieve this purpose: (1) To assess nutrition knowledge of diabetic people in management of type 2 diabetes, (2) To determine attitude of diabetic people towards diabetes and nutrition management, (3) To determine the practices undertaken by diabetic people in management of type 2 diabetes (4) To determine possible relationship between knowledge, attitude, practices and socio-demographic information and (5) Determine nutrition status of people with type 2 diabetes.

The research used descriptive survey design involving 120 people with type 2 diabetes aged 25-75 years drawn from Nakuru Provincial General Hospital. The study used simple random sampling procedures. To collect data a pre-tested questionnaire was used to obtain information to achieve set objectives. Data were computer coded and entered
using Statistical Package for Social Sciences software. To make meaning of the data obtained, data were analyzed using descriptive statistics. Chi-square statistic and Pearson product correlation were used to test hypotheses to establish relationship between study variables. A p value of less than 0.05 was considered significant. Anthropometry data were processed using Epi -Info to obtain BMI values. Results were presented using tables and graphs.

About 36% of the respondents were within the age bracket of 61 years and above being the modal age bracket. There were more females (62.5%) than males (37.5%) among the respondents. Most of the respondents had primary school education (41.7%). Most earned their living through farming (34.2%). The research also revealed that most (45%) had an income not exceeding 5,000 Kshs. Most of NIDDM respondents were overweight (43.3%), 80.8% of the diabetic patients had high blood sugars and 57.5% had suffered from diabetes for a period of 1-5 years. The majority (75.8%) of the diabetic patients had diabetes related complications.

People with diabetes were not highly knowledgeable about nutritional management of type 2 diabetes with most (63.3%) having fair knowledge. Despite the various beliefs, fears and concern related to diabetes and dietary management, people with diabetes (71.7%) held a positive attitude towards diabetes. The main findings on the nutritional and health practices of the people with diabetes are that there were some aspects of good practices while others were wanting. Most of the people with diabetes engaged themselves in physical activities (83.3%) quite often. However, the element of when to
exercise (that is before or after meals) was not clear to them. Practice on blood sugar monitoring was poor due to lack of personal glucometer among majority (82.5%) of them.

The study observed that 50.8% had 5-6 meals a day while most of the respondents (54.2%) had 2-3 snacks daily. About 37% had no defined meal intervals. The consumption of fruits and vegetable on daily basis was low which can be considered as a poor practice. Intake of fruits on daily basis was only 33.3% and 45% for vegetables. Intake of whole grain cereals was high in comparison to refined cereals. About (28%) of the respondents took whole meal flour ugali compared to only 9.2% who took than refined flour. Similarly intake of brown bread on daily basis was high (46.7%) than white bread (0.0%) The study also revealed that there was more consumption of red meat (10%) than white meat (0.0%) on daily basis. Additionally, consumption of plant proteins (legumes) was high compared with animal proteins. About 14% of the respondents took legumes daily.

An assumption of human rationality, or need for consistency which leads to the expectation that greater amount of correct knowledge about nutritional management of diabetes should be associated with more favorite attitudes was confirmed in this study as there was significantly relationship between them (P=0.047). The study also established that higher level of nutrition knowledge was not significant associated with practices such as the number of meals and snacks taken per day (P>0.05) as it would be expected. The study found that knowledge and attitude were significantly associated with some of the
socio-demographic characteristics of the respondents \( (P<0.05) \). Among these factors number of years suffered was the most important in determining level of knowledge \( (P=0.034) \) and attitude held \( (P=0.035) \). The study also found that blood sugar level was significantly associated with physical activity and BMI \( (P=0.036) \). Additionally blood sugar level was not significantly associated with knowledge of nutrition and number of meals taken per day \( (P=0.069) \).

5.2 Conclusion

The conclusion of the study is discussed under different objectives of the study.

i) Nutritional knowledge

People with diabetes were aware about some aspects of diabetes. However, their in depth knowledge regarding diabetes was still wanting. The management of diabetes mellitus not only requires the prescription of the appropriate nutritional and pharmacological regimen by the physician, but also intense education and counseling of the people with diabetes. It is possible that counseling done by doctors, nutritionist or other health workers are cued to certain knowledge aspects only but people with diabetes need whole detail knowledge of the disease.

In addition people with diabetes must develop a healthy awareness of the ways in which diabetes touches their lives. They should have opportunities to learn about diabetes and more on nutrition management for it is this knowledge base that is needed for attitude and behavior change.
ii) **Nutritional practices**

The study revealed that majority of the respondents had snacks in between meals. The importance of snacking and having regular meals should be emphasized to avoid high and low swings of blood sugar levels. It should be made clear that there is nothing like diabetic diet and people with diabetes can enjoy food diversity as what matters most is the quantity and the presenting symptoms.

Regular blood sugar monitoring is important for diabetic people as this could help them know whether they are at risk of any related complications. Diabetic people should be encouraged to be monitoring their blood sugars regularly and advised based on their blood sugar levels. Regular physical activity is important as it keeps body healthy. The study revealed that majority of the respondents involved themselves in physical activity, which was a good practice, and they should continually be encouraged. Emphasis should be placed on timing and duration of exercise on individual basis.

iii) **Nutritional status**

The study demonstrated that most of the NIDDM respondents were overweight. Information for promoting weight loss for the obese and overweight diabetic people, its benefits and why it is necessary as a prevention intervention against diabetes related complications should be emphasized. This should be accompanied with individualized counseling and practical advice on how to lose weight.
iv) Attitude towards diabetes

The study demonstrated that majority of the diabetic people held positive attitude about the disease. Positive attitude is vital in management of the disease. People who do best with diabetes are the people who first of all, accept it. They take positive step to deal with it and then they get on with their lives. People with diabetes should be made to understand that their diabetes and health are completely under their control. By taking good care of themselves they can live a long, happy and healthy life.

v) Relationship between variables

An assumption of human rationality, or need for consistency which leads to the expectation that greater amount of correct knowledge about nutritional management of diabetes should be associated with more favorite attitudes was confirmed in this study as there was significantly relationship between them. The study also established that higher level of nutrition knowledge was not significant associated with practices such as the number of meals and snacks taken per day as it would be expected. The study found that knowledge and attitude were significantly associated with some of the socio-demographic characteristics of the respondents. Among these factors number of years suffered was the most important in determining level of knowledge and attitude held. The study also found that blood sugar level was significantly associated with physical activity and BMI.

5.3 Recommendations

Based on the findings, the main recommendations that emerge from this study are outlined below.
5.3.1 Recommendation for policy makers

Policy maker at national level in the Ministry of health should ensure that nutrition education focusing on meal pattern, pattern of food consumption and physical activity should be emphasized in management of type 2 diabetes. Therefore, dieticians/nutritionists in the hospitals should always be updated on new ideas on nutrition management of NIDDM. They should also conduct campaigns on nutritional management of diabetes.

5.3.2 Recommendation for nutritional knowledge, attitude and practices

(i) Education programs

There is need for health teams such as doctors, nutritionist and nurses among others to enhance education of people with diabetes in order to promote compliance with recommendations regarding diet. This also highlights the need of having dieticians and educators alongside consultant diabetologists in diabetes care centers to educate people with diabetes about all aspects of nutrition management of diabetes. They should also educate people with diabetes about their body weight as well as assessment of overweight and obesity.

(ii) Attitude and practices (behavior changes)

The health team in diabetic clinic should reinforce the need of having a regular meal pattern and snacks in between meals, reinforce the ongoing need and benefits of physical activity at each visit, offering support and advice on ways to incorporate 30 minutes of physical activity into most days of the week and balancing meals and exercise. The health
team also should encouraged people with diabetes to take variety of foods and not necessary high fibre diets emphasizing more on quantity and not the source. People with diabetes should also be encouraged to be checking on their blood sugars regularly especially for those who could not afford to buy their own glucometer by attending clinic regularly.

Diabetic clinic health staff should hold seminars, workshops and conferences to provide platforms for people with diabetes to express their worries and queries in relation to management of diabetes. This should also be a good avenue in creation of public awareness on NIDDM disorder and management practices based on both nutrition and health practices.

5.4 Suggestion for further research

An in-depth study, covering a wider geographical region and embracing greater demographic, economic and social diversity than what was achievable in this study would be valuable, to establish whether the conclusions can be generalized.

A similar research targeting those people with type 1 diabetes and compare findings in respect to knowledge, attitude and practices in dietary management of diabetes.

An in-depth study covering a wider range of practices including 24 hours dietary intake recall method, menu planning and nutrient intakes in order to determine nutritional status in a broader perspective.
REFERENCES


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APPENDICES

Appendix I: Questionnaire:

ASSESSMENT OF KNOWLEDGE, ATTITUDE AND PRACTICES IN NUTRITIONAL MANAGEMENT OF TYPE 2 DIABETES AMONG ADULTS

INTRODUCTION

In the following pages you will find a questionnaire, which seeks information about knowledge, attitude and practices in nutritional management of type 2 diabetes. The questionnaire has been designed to enable you to answer quickly and easily. We assure you that all the information you give will be kept in strictest confidence. Please answer frankly where choices are given. Tick the option(s) which matches your answer otherwise write out the information asked for in the blank space after the question.

Thanks for your co-operation.

DEMOGRAPHIC INFORMATION

1. Code ____________ 2. Sex ______________ 3. Date diabetes was diagnosed ____________
8. What is your highest education level?

University / college [ ] (c) K.C.P.E holder [ ]
K.C.S.E holder [ ] (d) Other specify ____________

9. What is your occupation?
Civil servant  (d) Non Governmental Organization
Farmer  (e) Business man/woman
None  (f) Others state

10. What is your family monthly income?

MEDICAL HISTORY

At what age was your condition diagnosed?

2. For how long have you suffered from diabetes?

3. How did you come to know that you are diabetic?
   Through symptoms  (c) By screening
   By hospitalization  (d) Other

Were you given any information concerning diabetes at first diagnosis?
   (a) Yes  (b) No

5. Is there member of your family who is suffering from diabetes?
   (a) Yes  (b) No

6. If yes, who?

7. Have you suffered from any complications due to diabetes in the recent past years?
   (a) Yes  (b) No

8. If yes, specify
   Hypertension  (d) Paling memory
   Poor wound healing  (e) Poor eyesight
   Kidney problem  (f) Others specify

9. How do you go about it?
10. When is the last time you visited the clinic?

11. Do you monitor your glucose level?
   (a) Yes   (b) No
   If yes, how?

13. What is your blood glucose level?

14. Do you take any medication?
   (a) Yes   (b) No

KNOWLEDGE ABOUT DIABETES AND NUTRITION MANAGEMENT

1. How should a person control the disease?

2. State four complications that come as a result of diabetes

3. What are the causes of diabetes

Please write whether you agree or disagree with the following statements by indicating true for agreement and false for disagreement.

4. People with diabetes should balance meals and exercise

5. If strict diet control is done diabetes related complications can be avoided.

6. Sugar is not allowed in diabetes

7. Excessive intake of protein can result to other complications such as kidney related problems.

8. Milk should be taken liberally
9. No diet control is needed after diabetic tablets
10. I should avoid fatty foods and animal fats (saturated fats)
11. I should avoid eating anything with a sweet taste
12. It is possible to manage this condition with diet alone
13. Carbohydrates should be avoided
14. Diabetic people should take whole carbohydrates instead of refined.
15. Diabetic people should not take sodas
16. There are no restrictions on vegetables and fruit intake.
17. Meals should follow a regular meal pattern
18. Drinking alcohol is a threat to people with diabetes.

NUTRITION PRACTICES

1. What advice were you given by clinician / nurse / doctor at diagnosis?
   (a) Exercise  (b) Diet counseling
   (c) Insulin use  (d) Tablet use
   (e) More information on diabetes

2. Have you ever received any extra education on diabetes during subsequent visit in
other education after diagnosis?
   (a) Yes  (b) No

3. If yes, where?

4. Have you followed advice strictly?
   (a) Yes  (b) No

5. If yes, why?

6. If no, do you have any reason for not complying?
(a) Yes  (b) No

7. If yes, which one?

8. How many meals do you eat daily?

9. How many snacks daily?

10. How long does it take you before eating again?

11. Do you eat similar food with other family members?
   (a) Yes  (b) No

12. If yes why do you think there is no need for a special diet?

13. If no, what make you feel that you need a different diet?

14. Do you smoke cigarette?
   (a) Yes  (b) No

15. Do you drink alcohol?
   (a) Yes  (b) No

EXERCISE

1. Do you consider yourself (1) Less active  (2) Moderately active  (3) Active?

2. Are you involved in any physical activity?
   (a) Yes  (b) No

3. If yes, which ones? (State all)

4. If no, why?
5. How often do you exercise?
(a) Daily (b) Twice per week
(c) Once per week (d) others specify

6. For how long do you carry out the exercise?
(a) 1 hour or beyond (b) 30 minutes
Less than 30 minutes

7. What influences your choice on type of exercise? Specify

8. At what time do you exercise?
(a) After meals (b) Before meals (c) No specific time (d) others (state)

---

**FOOD FREQUENCY**

What is the frequency of consumption of the following foodstuffs in the past one week? Please indicate in the boxes provided against each food item.

<table>
<thead>
<tr>
<th>FOODS</th>
<th>DAILY</th>
<th>MORE THAN 3 TIMES</th>
<th>2-3 TIMES</th>
<th>ONCE</th>
<th>NEVER</th>
</tr>
</thead>
<tbody>
<tr>
<td>MILK/MILK SUBSTITUTE</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low fat milk</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Yogurt</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole milk</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Margarine</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Legumes</td>
<td>FRUITS</td>
<td>VEGETABLES</td>
<td>EGGS/MEAT</td>
<td></td>
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<tr>
<td></td>
<td>Bananas</td>
<td>Spinach</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apples</td>
<td>Kales</td>
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</tr>
<tr>
<td></td>
<td>Oranges</td>
<td>Cabbages</td>
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<td>Pawpaw</td>
<td>Tomatoes</td>
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<td>Mangoes</td>
<td>Others</td>
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<td></td>
<td>Pearls</td>
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<tr>
<td></td>
<td>Pineapple</td>
<td></td>
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<tr>
<td></td>
<td>Citrus</td>
<td></td>
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<td></td>
<td>Melon</td>
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<tr>
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<td>Pawpaw</td>
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<td>Mangoes</td>
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<td>Pearls</td>
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<td></td>
<td>Pineapple</td>
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<tr>
<td>Eggs</td>
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<tr>
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<tr>
<td></td>
<td>Pork</td>
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<td></td>
<td>Fish</td>
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<tr>
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<tr>
<td></td>
<td>White rice</td>
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</tr>
<tr>
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<td>Potatoes</td>
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<tr>
<td></td>
<td>Sorghum / wimbi</td>
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<tr>
<td></td>
<td>Others</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Beverages</td>
<td>Soda</td>
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<tr>
<td></td>
<td>Beer</td>
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<tr>
<td></td>
<td>Wine</td>
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<tr>
<td></td>
<td>Cake/cookies</td>
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<td></td>
<td>Peanut butter</td>
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<tr>
<td></td>
<td>Jam</td>
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</tbody>
</table>
**ATTITUDE**

Please indicate your opinions of the following statements by putting a tick against "SD" (1), "D" (2), "N" (3), "A" (4), or "SA" (5) on the box provided after each question. SD stand for strongly disagree with the statement, D stand for disagree with the statement, N means neither agree nor disagree with the statement, A stand for agreement with the statement, while SA stand for strongly agree with the statement.

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since my condition is not curable there is no need to avoid certain foods</td>
<td></td>
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<tr>
<td>I feel that food control my life.</td>
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<tr>
<td>I feel anxious prior to eating</td>
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<td></td>
</tr>
<tr>
<td>I give too much time and thought to food</td>
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<tr>
<td>Enjoy eating protein rich foods</td>
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<td></td>
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<tr>
<td>Avoid foods with sugar in them</td>
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<tr>
<td>Particularly I avoid foods with a high carbohydrate content example;</td>
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<td>bread, potatoes, rice among others</td>
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<td>In my case maintaining control over my problem is due mostly to luck</td>
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<td>To continually manage my problem I need professional help</td>
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<td>I can anticipate difficulties and take action to</td>
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<td><strong>Avoid them</strong></td>
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<td>Run my life the same as I would if I didn’t have diabetes</td>
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<tr>
<td>Controlling my diabetes well imposes restrictions on my whole lifestyle</td>
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<td>It is just not possible to control my diabetes properly and live in a way that is acceptable to me</td>
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<td>Controlling my diabetes well when I am away from home often causes me embarrassment</td>
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<td>I find it difficult to tell a friend that I have diabetes</td>
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<td>I find it difficult to judge the amount of food that I should eat before exercise</td>
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<td>My diabetes and its treatment and management keep me from having enough money</td>
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<tr>
<td>My diabetes keep me from doing my work and other responsibilities</td>
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<td>It is embarrassing to eat when the people around me are not eating</td>
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<td>It is inconveniencing to inject my insulin when I am not at home</td>
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<td>I just don’t like exercising</td>
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<td>I should not attend clinic regularly because the condition is not curable</td>
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<td>My condition is life threatening</td>
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<td>When I visit my friends or a restaurant and I am offered foods or a drinks I let them know my condition</td>
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<td>The drugs are too expensive</td>
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<td>I feel uncomfortable when my friends start discussing about diabetes</td>
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<td>I feel uncomfortable discussing diabetes with other people</td>
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<td>My family believe that my condition is a burden, punishment or a curse</td>
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<td>I am worried about my condition</td>
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<td>I am terrified at the thought that I may have been exposed to other related complication</td>
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Appendix 11: Letter of Authorization (Kenyatta University)

KENYATTA UNIVERSITY
GRADUATE SCHOOL
P.O. Box 43844,
NAIROBI
Tel. No. 810901/9 Ext. 57530
E-mail: kuhps@yahoo.com

Our Ref: H60/5414/03

Date: 11th March 2004

Your Ref:

The Permanent Secretary,
Ministry of Education, Science & Technology,
P.O.Box 30040
NAIROBI.

Dear Sir/Madam,

RE: RESEARCH AUTHORIZATION:

I write to introduce Ms. Lucy Gathoni Waithaka who is a Postgraduate Student of this University. She is registered for a M.Sc. degree programme in the Department of Foods' Nutrition and Dietetics.

Ms. Waithaka intends to conduct research for a project entitled, "Nutritional Knowledge, Attitude and Practices in Management of Type 2 Diabetes among Adults Case of Nakuru Provincial General Hospital", as a partial fulfillment of the requirement for her degree programme.

Any assistance given to her will be highly appreciated.

Yours faithfully,

P.K. MUCHEMI
FOR: AG. DEAN, GRADUATE SCHOOL

C.C. Registrar (Academic)
Dean, Graduate School - to see on file
Dean, School of Environmental Studies & Human Sciences
Chairman, Foods, Nutrition & Dietetics
PKM/mb.

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

JOGOO HOUSE "B"
HARAMBEE AVENUE
P.O. Box 30040-00100
NAIROBI

MOEST 13/001/35C 105/2

Lucy Gathoni Waithaka
Kenyatta University
P.O. BOX 43844
NAIROBI

Dear Madam

RE: RESEARCH AUTHORISATION

Please refer to your application for authority to carry out research on "Nutritional knowledge, attitude and practices in management of type 2 diabetes among Adults in a case of Nakuru Provincial General Hospital", I am pleased to inform you that you have been authorised to carry out research in Nakuru District for a period ending 31st December, 2006.

You are advised to report to the District Commissioner, the District Education Officer and the Medical Officer of Health Nakuru District before embarking on your research project.

Upon completion of your research you are advised to submit two copies of your research report to this Office.

Yours faithfully

B. O. ADEWA
FOR: PERMANENT SECRETARY

Cc
The District Commissioner
Nakuru
The District Education Officer
Nakuru
The Medical Officer of Health
Nakuru
The Medical Officer In charge
Nakuru Provincial General Hospital
Nakuru
Appendix IV: Location of Nakuru district in Kenya
Appendix V: Administrative boundaries of Nakuru district

Nakuru District

Administrative Boundaries

Laikipia District

Baringo District

Mbogoini

Rongai

Bahati

Njoro

Gilgil

Molo

Olenguruone

Nyeri

District Boundary

Division Boundary

Kajiado District

Nairobi District

Kenya University Library