PREVALENCE, SEVERITY, RISK INDICATORS AND IMPACT OF VISUAL IMPAIRMENT AMONG DIABETIC PATIENTS IN MKURANGA DISTRICT, TANZANIA

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A mini-thesis submitted in partial fulfilment of the requirements for the degree of Masters in Public Health at the School of Public Health, University of the Western Cape.

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Ten keywords: Visual impairments; Blindness; Diabetes mellitus; Prevalence; Severity; Risk factors; Survey; Diabetic eye disease, Mkuranga District, Tanzania.

DECLARATION

I declare that "*PREVALENCE, SEVERITY, RISK INDICATORS AND IMPACT OF VISUAL IMPAIRMENT AMONG DIABETIC PATIENTS IN MKURANGA DISTRICT, TANZANIA*" is my own work that it has not been submitted before for any degree or examination in any other University and that all the sources I have used or quoted have been indicated and acknowledged as complete reference.

Name: Emeritus Bugimbi Chibuga November 2012

Signed…….

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LIST OF ABBREVIATIONS AND ACRONYMS

AODL	Activities of Daily Living
CI	Confidence Interval
DM	Diabetes Mellitus
DR	Diabetic Retinopathy
NCDs	Non Communicable Diseases
OR	Odds Ratio
SSA	Sub-Saharan Africa
USD	United States Dollar
UWC	the University of the Western Cape
WHO	World Health Organisation

DEFITION OF TERMS

Visual impairment in this context is defined according to classification of WHO for visual impairment, where is defined as all individual who have any form of visual impairment accounted for Snellen's visual acuity of 6/24 or less. Therefore, people who are blind are included in this group of visual impairment.

ABSTRACT

PREVALENCE, SEVERITY, RISK INDICATORS AND IMPACT OF VISUAL IMPAIRMENT AMONG DIABETIC PATIENTS IN MKURANGA DISTRICT, TANZANIA

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INTRODUCTION

Visual impairment is one of the major problems affecting diabetic patients worldwide. This problem is preventable if appropriate measures are taken early. Socio-economic consequences of this problem are significant especially in developing countries, since the treatment of diabetes mellitus is expensive and requires close monitoring. In fact, the management of diabetes mellitus is much more successful when the public health measures such as screening and health education aimed at raising diabetic awareness are effectively undertaken. Generally, prompt management of any ocular problem identified helps to reduce the burden of visual impairment among diabetics, and yet visual impairment remains a common complication of diabetes mellitus. Knowledge of the epidemiology and the burden of this co-morbidity (visual impairments and diabetes mellitus) in Mkuranga district is needed to inform appropriate interventions

AIM AND OBJECTIVES

To determine the prevalence, severity and risk indicators of visual impairment among diabetic patients attending Mkuranga district hospital, and to evaluate its impacts on their activities of daily living and socio-economical consequences encountered by diabetic population with visual impairment as compared to those with normal vision.

METHODS

Quantitative cross-sectional descriptive and analytical study of all diabetic patients attended the diabetic clinic in Mkuranga District Hospital between August 2012 and October 2012.

Data collection: Structured questionnaires were used as a tool for data collection regarding the prevalence, severity, risk indicators and impact of visual impairment among diabetic patients.

Data analysis: Data were entered in coded form and later analysed using Epi Info 2000 software.

RESULTS

Prevalence of visual impairment among diabetic patients attending Mkuranga District Hospital was found to be 23.3%, with males had a higher prevalence than females (27.0% and 19.9% respectively). The cause of visual impairment was predominantly retinopathy (50.0%) and cataract (17.1%). The risk indicators for visual impairment identified were duration of DM (p-value less than 0.05). Visual impairment was noted to have a greater impact for activities of daily living and quality of life.

DISCUSSION

The prevalence of visual impairment in the study area was found to be within the African range; however, it was slightly higher than predicted before the beginning of the study. Glycemic control had no association with visual impairment.

Poor attendance for eye-examination was due to lack of knowledge. Women were given low priority in access to eye-care and knowledge regarding diabetes mellitus.

CONCLUSION AND RECOMMENDATIONS

Dealing with the management of eye complications due to diabetes is not the best option in developing countries due to scarce financial resources and inadequate eye health/care providers.

The best way of dealing with such problem, therefore, is early case detection and identification of complications at an earlier stage through screening especially by using trained village or local health workers. Thus, public health approach towards the prevention or elimination of risk factors will be successful only if it is incorporated in the district health plan and budget, which will then focus on the identification of high risk case and intervention in high risk groups through community health education. Moreover, it should pay close attention to non-communicable diseases, health policies and practices by appropriate integration of this programme in health practices system.

CHAPTER ONE

INTRODUCTION

1.1. Background and rationale

Diabetes mellitus (DM) is a group of metabolic disease, whose main feature is high blood sugar (Molleutze and Levitt, 2006). The high blood sugar is caused by deficiency of insulin production, insulin action or both (National Institute of Health, 2011). DM is classified as a non-communicable disease (NCD). NCDs constitute a group of diseases that gets special attention in the global health care because the prevalence of individual diseases is increasing and another factor is their silent nature, but significant long-term fatality rates (Boutayeb and Boutayeb., 2005, Chand, 2012). There are two main types of DM: Type 1, which is insulin-dependent, and Type 2, which is referred to as insulin-independent DM. Gestational diabetes is an additive group noted to be related with pregnancy (Garratt *et al.*, 2000, National Institute of Health, 2011). This disease can affect all ages, sexes, ethnicities and socio-economic groups (Ward and MacKinnon, 1992).

DM affects nearly 2–4% of the world's population (King *et al*., 1998; Wild *et al.*, 2004). One study, which was conducted in 91 different countries to calculate the age and sex specific DM prevalence, before being applied to national population estimates in 216 countries to determine the prevalence, estimated that the global DM prevalence in 2010

would reach 6.4% (Shaw, Sicree and Zimmet, 2010). In Africa, it is estimated that about 1% of the population is affected by this disease (Sobngwi *et al.*, 2001). In future, the burden of DM in Africa is expected to rise and, if nothing changes, the burden of DM in developing countries will outnumber that of the developed countries (King *et al.*, 1998).

The long-term consequences of high blood sugar include damage to multiple organs and body systems such as the kidneys, cardio-vascular system, lower extremities, nervous system and the eyes. If DM is not well controlled, it may cause visual impairment with subsequent permanent blindness as one of severe complication. Visual impairment and blindness have a great impact on activities of daily living and the global economy in general, since it affects mostly the productive age population (Marshal & Flyvbjerg, 2006; Ciulla *et al*., 2003). Although appropriate early management of diabetes mellitus has been found to control most diabetic complications (National Institute of Health, 2011), many developing countries have not achieved effective mechanisms to control DM for various reasons.

In Tanzania, the management of DM is a new emerging health challenge. It has been reported that there is a rapid increase in diabetic prevalence (Ramaiya, 2005, Mayige, Kagaruki, Ramaiya, Swai, 2012). In fact, it accounts for 4.0% of the urban population and 1.9% of the rural population. Initially, the prevalence was estimated to be around 0.8% of the population. This rise was experienced within a short period (Ramaiya, 2005). Deliberate efforts have been made and kept in place to cope with the increasing number of diabetic patients. Through the Tanzania Diabetic Association (TDA) initiatives, 19

regional diabetic centres, open to all diabetic patients, were created. Services provided by these centres are subsidised by the government to make them affordable for all diabetic patients. These subsidised services also seek to reach the ever rising demand of diabetic patients seeking diabetic care. However, diabetic patients face challenges in utilising these centres, mainly because most of these centres are located in regional urban settings, hence limiting the access of people living in districts and rural areas (Ramaiya, 2005).

Mkuranga district likely faces these challenges. However, the prevalence of DM and visual impairment within the district remains unknown due to the absence of appropriate data with which to determine the true burden of DM and visual impairment cases. From extrapolations, it is likely the burden of visual impairment in Mkuranga district is high when we do projection from a study which was conducted in close geographical proximity to Mkuranga district (Majaliwa *et al.*, 2007).

A large population of Mkuranga district lives in the rural areas (National Bureau of Statistics, 2005), and depends on subsistence farming and fishing as the source of making living. The majority of these Mkuranga residents earns less than 1 USD per day (Institute of Resource Assessment, 2005). This low income has a considerable socio-economic impact when it comes to the management of DM.

1.2 Problem Statement:

There are several problems within Mkuranga district that further hinder DM management. These include lack of drugs, diagnostic and monitoring tools as well as

scarce diabetic care specialists who can manage diabetic patients appropriately within the district. As a result, patients experience additional financial burden in terms of travelling costs which they encounter when they seek diabetic management from other regions.

Since visual impairments are known complications of DM, knowledge of the epidemiology and burden of this co-morbidity with diabetes mellitus in Mkuranga district is needed to inform appropriate interventions. In order to establish a well and organised management programme for visual impairment in diabetics, we have to know the magnitude, risk factors for progression of visual impairment and facilities available to manage the DM. Such information is a key for establishing locally appropriate public health measures against DM within Mkuranga district.

1.3 Aim and Objectives

To determine the prevalence, severity and risk indicators of visual impairment among diabetic patients attending Mkuranga district hospital, and to evaluate its impacts on their activities of daily living and socio-economical consequences encountered by diabetic population with visual impairment as compared to those with normal vision.

CHAPTER TWO

LITERATURE REVIEW

Prevalence and burden of Diabetes Mellitus:

The global prevalence of diagnosed diabetes mellitus is estimated to be between 2–4% (King *et al.,* 1998; Wild *et al*., 2004). However, the true global burden of DM might be higher than predicted prevalence since a good number of patients with type 2 DM are yet to be diagnosed even in developed countries (Garratt *et al.,* 2000, National Institute of Health, 2011). It is estimated that by the year 2030, there will be a two-fold increase in diabetic cases worldwide (Wild *et al.,* 2004). These estimates assume that the risk factors for acquiring DM remain almost the same. There is however evidence indicating that the rate of urbanisation is increasing especially in developing countries (UN-HABITAT, 2010, United Nations, 2004). The UN-HABITAT report (2010) showed that cities in Eastern Africa have had an annual urban growth rate of 3.86% which is higher than the global trend of 2.5%. Data exists in support of the fact that for the past 50 years, the population in Eastern Africa cities have risen from 6 million to over 77 millions in an exponential pattern, and if this pattern will be maintained, then the population in East African cities is projected to rise up to 116 million by the year 2020, and by the year 2030, to be over 172 million. Most of people who migrate to urban areas acquire new

lifestyle which is characterised by significant dietary changes and lack of physical activity when compared to rural dwellers, this exposes them at an increased risk of acquiring DM (Mennen *et al.*, 2000). For this factor, it seems there is an exponential increase in the risk factors for DM which may make the suggested doubling in the prevalence rates for 2030 to be under-estimated.

Currently, developed countries are estimated to carry larger proportion of diabetic patients. A study in Australia revealed that they had higher prevalence than the global estimates where men had a diabetic prevalence of 8% while female had 6.8% (Dunstan *et al.*, 2002). But situation might change in future, where the developing countries might carry the higher burden of DM, as King and his co-authors (1998) had made a projection that by the year 2025, the global burden of DM will increase by 42% in developed countries and by 170% in developing countries.

Prevalence of DM in Africa is estimated to be 1–2% in rural and 1–13% in urban areas depending on risk factors among the population. Type 2 DM is a predominant type, accounting for 70–90% of all diabetic cases (Sobngwi *et al.*, 2001). However, in reality, this prevalence does not reflect the actual burden of DM in Africa, and in particular, sub-Saharan Africa (SSA). This is because, the referred prevalence rates were obtained from studies conducted in few countries and subsequent results obtained were projected to other countries depending on their geographical proximities, ethnical background and socio-economic parameters (Wild *et al.*, 2004). The methodologies used in these studies

were different, and in addition, the prevalence obtained from respective studies was based on different contextual assumptions. In some studies, assumptions were made that the prevalence of DM in rural areas were half of those obtained in their respective urban areas, whereas other studies made an assumption of a quarter of that obtained in urban and some even made a prediction of equal prevalence between urban and rural areas, thus leading to unanimously incomparable conclusions. A study conducted by Majaliwa and colleagues (2008) recognised that, the true burden of DM in SSA is unknown. Lewallen and Courtright (2001) when summing up their systematic review and meta-analysis of epidemiological estimates on the burden of blindness in Africa especially that caused by effects of DM, averred that it was "*safe to say that treatment of diabetes in Africa is poor and very few diabetics have access for treatment for retinopathy*". This is an indicative statement that the burden of blindness is unanimously bigger than what is known, and management is a big challenge which may increase the burden to the economic growth for developing countries.

The situation of DM in Tanzania is similar to other developing countries, where the actual burden is not known due to limited studies which have been done to determine the magnitude of the problem. Few studies available show the prevalence of DM, and many years have elapsed since they were done, therefore studies presented do not give a true reflection. A study which was done in six villages in Tanzania revealed diabetic prevalence of 0.87% and impaired glucose tolerance test of 7.8% (McLarty *et al.*, 1989). Another study was done in two different communities, it was found that for both men and women living in urban areas had a higher prevalence of diabetes, impaired fasting blood

glucose, overweight and were less active than those from the rural communities despite that they were done in different communities differing in many characters (Aspray *et al.*, 2000).

Risk factors for Diabetes Mellitus:

Longevity and increased urbanisation are among the factors hypothesised to contribute to the increase in DM prevalence (Gwatkin *et al*., 1999, Sudeep, 2012). It has been found that people who live in urban areas have a higher prevalence of DM compared to those who live in rural areas (Sobngwi *et al*., 2001). The main reason for having an increased risk for developing DM is due to lifestyle changes associated with urbanisation. Similarly, rural set-up which is relatively more urbanised, has higher prevalence of DM as compared to less urbanised rural area, this finding was obtained from a study done in two communities of Cambodia the prevalence of diabetes was 11% in a more developed rural community as compared to 5% on a less developed community (King *et al.*, 2005). Another interesting finding was that about two-thirds of studied population were not aware that they were diabetics. This finding gives a picture that, it is likely that the current global prevalence of DM might be under-estimated especially when case ascertainment for DM prevalence is based only on self-report.

Knowledge related to DM in some of the developing countries is still low resulting in low or no attendance to health facilities for diabetic check-up, screening and management. Therefore, it is likely many undiagnosed diabetic patients are still at higher risk of

developing complications including visual impairment which projects increase in the burden of the diabetic complications in the developing world.

Diabetes Mellitus and Visual Impairment:

Visual impairment is one of the commonest problems faced by diabetics. Many diabetic patients live with some form of visual impairment (Williams, 2008). A cross-sectional study conducted in Oman to determine the magnitude and determinants of visual impairment among diabetics, had a main aim to identify additional risk factors for diabetics to develop visual impairment. The results of this study found that the prevalence of visual impairment was 28.4% among patients with DM. Other studies which were done in Ethiopia and South Africa investigating the burden of visual impairment among diabetics found the rate to be higher ranging from 36.8% - 84% (Teshome *et al.*, 2004; Mash, *et al.*, 2008). These points to a pervasive co-morbidity of DM and visual impairments especially when it is noted that in the study by Teshome and colleagues (2004), only problems related to the retina were considered rather than other causes of visual impairment.

Majority of visual impairments in diabetic patients has been noted to be secondary to diabetic retinopathy (DR). There are some studies which investigated the diabetic-related ocular complications, whereby DR was found to be the leading cause of visual impairment. The rate of prevalence for diabetic retinopathy was found to range from 9.2% to 55.4% (Levitt *et al*., 2004; Teshome *et al.*, 2004; Mengesha, 2006; Gill *et al.*, 2008; Majaliwa *et al.*, 2008). Some studies which were done in developed world had

contrary results for DR, where this condition was among the minor causes of visual impairment in diabetics (Delcourt *et al.,* 1995, Prasad *et al.,* 2001).

Risk factors of Visual Impairment in DM:

Poor glycemic control and duration of DM has been observed to be a risk factor for developing retinopathy, while diabetic retinopathy is the leading cause for developing visual impairment among diabetics. In an Ethiopian study which was done in two communities found these risk factors had an association with the development of retinopathy (Gill *et al.,* 2008), similarly a study done in Nigeria shows the same relationship where high fasting blood sugar was found to carry a threefold increased risk of developing retinopathy when compared to low fasting blood sugar (Rotimi *et al.*, 2003), however, other risk factors were not measured in this study, which were important as well. A meta-analysis study which was done by clustering researches based on clinical course of DR, found that the duration of DM had an effect for the progression of DR (Wong *et al*, 2009).

The Wisconsin population-based prospective cohort study (Klein *et al.,* 1984) determined risk factors which pre-determine the progression of DR. They took a random sample of diabetic patients and investigated “pre-determining” risk factors. Among the risk factors identified which were related to progression of DR were increasing age, duration of DM, higher glycosylated haemoglobin and presence of cardiovascular problems such as hypertension. The same study population was followed by another study (Klein *et al.*, 2010) where newly adopted standard definition of visual impairment was used. Results of

factors carrying an increased risk for DR were similar to the initial study by Klein *et al.* (1984). Same findings of higher level of glycosylated haemoglobin (which indicates poor glycemic control) were obtained in other studies conducted in Denmark (Olivarius *et al.*, 2011), the Indian state of Andhra Pradesh (Krishnaiah *et al.*, 2007) and Malawi (Cohen *et al.*, 2010).

In Tanzania, poor glycemic control which is known to be a risk factor for developing diabetic complications is still a problem. A study conducted among children and adolescents in Dar es Salaam found only 1% had a good glycemic control, while 60.6% had a moderate control and 14.1% poor control (Majaliwa *et al.*, 2007). Diabetic eye complications are among the leading diabetic complications, prevalence of retinopathy was found to be 25% among all diabetic complications (Mhando and Yudkin, 1980), and again this is an old study which the situation might have changed today.

Lack of awareness of DM and its complications among Tanzanians might be a contributing factor for late attendance to the hospitals, and therefore might be the factor contributing the development of complications. In 2004, a survey done in the Tanzania hospitals as reported by Ramaiya (2005) found that more than two-third of diabetic patients were not aware that their problem was related to different blood sugar levels. Similarly, the health care personnel were not well aware of the key aspects of diabetic diagnosis, treatment, complications and education for management. Therefore, it is not surprising that in a study conducted in Dar es Salaam (Majaliwa *et al.*, 2007) found that 75% of children and adolescent brought to the hospital, the first presentation was diabetic

keto-acidosis which is a serious complication after having very high uncontrolled blood sugar. Another study which was done in Kilimanjaro found only 28.8% of diabetic patients had their eye checked within the past 12 months, despite the hospital being well staffed and the eye department within the hospital being well equipped (Mumba *et al.*, 2008). The authors in this study concluded that the eye examination was improved to 47% after intervention, but the study was conducted for six months, and it is possible that some of the patients might have just gone to have their eye checked because they were advised to go under the influence of that study. There is scope for anthropological investigations to further explore the reasons why patients do not go for eye examination.

Cost of diabetic treatment might be another barrier, a study which was done in Kilimanjaro for cost analysis of diabetic management (Neuhann *et al.*, 2002), showed that the cost was approximately 25% of the minimum monthly wage. This has a great impact for communities living below the world poverty line of earning less than 1 USD per day and might have relevance in Mkuranga where residents are poor and the cost of diabetic management might be high taking into account that majority live under 1 USD per day (Institute of Resource Assessment, 2005).

Public health Impact of Visual Impairment in diabetic patients:

Diabetic eye disease which is usually characterised by visual impairment is one of the major preventable public health problems (Stefánsson, 2006). The cost of treating diabetic complications has been reported in the WHO report as cited in Tesfaye and Gill

study (2011), that it accounts for 31% of all outpatient costs. Cost per person in a year was estimated to be 19 times more than the average cost.

Visual impairment in DM has great effect on individual quality of life and global economy. It has been shown in an Indian study that diabetics are at higher risk of getting blindness which is 25 times more than the general population (Ward and MacKinnon, 1992), and the most affected population is adults in the economically-productive age group (Marshal & Flyvbjerg, 2006; Ciulla *et al*., 2003).

A South African study (Levitt *et al.*, 2004), among blacks in Cape Town attending diabetic ambulatory clinics, apart from finding more than half of diabetics patients studied to have diabetic retinopathy, also it was discovered that most diabetic complications which patients presented with at mobile clinics were never recorded in their case notes for the past year prior to the study. They then concluded that it was a major deficit at primary level intervention which needed to be addressed. This is just an example of poor diabetic care in developing countries which predispose them to more diabetic complications, and thus, increase the unnoticed burden of this disease.

Despite the above mentioned shortcomings, it has been shown that public health approaches in the management of DM have positive effects in reducing most preventable diabetic complications including retinopathy. Combined effort of ophthalmologists and public health specialists using the available technology plays a large role in the reduction of potential blinding diabetic complication. This is achieved by detection of complication and giving appropriate management at earliest stage. This can be largely achieved if appropriate diabetic knowledge is addressed to all diabetic patients at the community

level, so as to increase the knowledge related to diabetic complications and their management which will potentiate diabetic patients to have their eyes check regularly (Stefánsson, 2006). Diabetes Association of Greater Cleveland (DAGC) project named "Working Together for a Change", was successful in diabetic educative approach in such a way they admitted that by working together with public health specialists, they were able to disseminate successfully the diabetic knowledge among the visually impaired diabetic patients which influenced their annual eye examination (Williams, 2008). Intervention using community-based programmes for early detection of diabetic eye disease which involves screening procedures has proven to reduce the rate and severity of diabetic eye disease (Agardh *et al.*, 1993, National Institute of Health, 2011). Intensive treatment is another approach which has shown successes in reducing the rate of progression for visual impairment in diabetics (Diabetes Control and Complications Trial Research Group (DCCTRG), 1993). The DCCTRG in their conclusive statement, they admitted that their success in their study and management of diabetic patients was obtained through incorporation of both medical and non-medical specialists.

In conclusion, there is a paucity of thorough and systematic investigations on visual impairment among diabetic patients in Mkuranga district in particular and Tanzania in general. In order to establish a well and organised management programme for visual impairment in diabetics, we have to know the magnitude, risk factors for progression of visual impairment and facilities available to manage the DM. Such information is a key for establishing locally appropriate public health measures against DM within Mkuranga district.

AIM AND OBJECTIVES:

AIM

To determine the prevalence, severity and risk indicators of visual impairment among diabetic patients attending Mkuranga district hospital, and to evaluate its impacts on their activities of daily living.

OBJECTIVES

1. To determine the prevalence of visual impairment among diabetics patients attending diabetic clinic in Mkuranga district hospital.
2. To determine the severity of visual impairment among diabetics patients with visual impairment attending diabetic clinic in Mkuranga district hospital
3. To determine the risk indicators for visual impairment among diabetic patients with visual impairment attending diabetic clinic in Mkuranga district hospital.
4. To determine the socio economical impact of visual impairment on the activities of daily living of diabetic patients with visual impairment compared to the diabetic patient without visual impairment attending diabetic clinic in Mkuranga district hospital.

CHAPTER THREE

METHODS

Study Area

This study was done in Mkuranga District from August 2012 to October 2012.

Study Population

All diabetic patients attended the Mkuranga District Hospital from August 2012 to October 2012 were recruited after signing an informed consent for participating in the study

Study design

This was prospective cross sectional descriptive and analytical study of all diabetic patients attended the diabetic clinic at Mkuranga district hospital.

This study focused on quantifying the prevalence, severity, risk indicators of visual impairment and its impacts among diabetic patients attending diabetic clinic in Mkuranga district hospital. In addition, it explored the socio-economic challenges facing diabetics who had visual impairment and its consequences on activities of daily living. This was analysed and compared to those who had no visual impairment.

Inclusion criteria

All diabetic patients attending Mkuranga district hospital.

Exclusion Criteria:

All diabetic patients who had any form of visual impairment, this includes those who were blind prior to the diagnosis of DM, but the cause is not related to diabetes.

Sampling technique:

All diabetic patients attending the Mkuranga District Hospital were recruited.

For the determination of severity of visual impairment all diabetic patients found to have visual impairment were graded according to the WHO criteria for visual acuity and visual impairment.

Sample size:

The sample size was estimated at 196, which was calculated using the following formula:

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

$$n = \frac{(1.96)^2 \times 0.5\ (1-0.5)}{0.07^2}$$

$$n = 196$$

Where:

d = absolute precision = 0.07

p = expected proportion in the population = 0.50

$z_{(1-a/2)}$ = 1.96 = value of the standard distribution corresponding to a significance level of a (1.96 for a 2-sided test at the 0.05 level)

Data collection:

Interviewer-administered questionnaire was used as the tool for data collection for all diabetic patients. Physical examination yielded information related to the level of visual acuity as a determinant and grading tool for visual impairment. Information regarding risk indicators was obtained through clinical, socio-demographic and interview data, where factors associated with visual impairment in diabetics were checked.

Data to assess the impact of the visual impairment was obtained through information which was compared between visual acuity in relation to ability to work, psycho-social factors, cognitive functions and coping with management of the diabetic condition

Data collection procedures:

All data were collected after informed consent was signed by study participants. Both demographic characteristics of all study participants and their results of fasting blood sugar level tested on the same day of interview were recorded. Visual acuity was tested by research assistants in a well illuminated area outside the examination office by using the Snellen's E-chart which was kept at 6 meters away from the study subjects. The examination of anterior segment of the eye was done by ophthalmologist to all study participants. All the findings were recorded in the questionnaire and later coded.

Diabetic patients with visual impairment but no obvious anterior segment ocular pathology were refracted by trained ophthalmologist to rule out other confounding factors as the potential cause of visual impairment.

Posterior segments of the eye were examined after fully dilating the pupil using tropicamide eye drops pre-mixed with epinephrine. Finally, interview was conducted by use of interviewer-administered questionnaire.

Rigour:

To ensure validity and reliability of data collected, training on the procedures of data collection was done to the study team prior to the commencement of the study. The study team comprised of the ophthalmic assistant officers, data entry operator, ophthalmic nurses and Ophthalmologists who had special training in refraction and retina (Retina specialist). A pilot study was done in a non-project health unit and all potential ambiguous questions were modified and data collection tool adjustments were made.

All equipments that were used for this study were checked and tested before initiation of the fieldwork.

Data obtained were coded on the same day by using numerical values, and then stored in a computer and memory data device to ensure data security. Missing data were traced back as soon as they were discovered to be missing and when the missed data was recovered, they were coded and recorded in the appropriate column of the study participant. Every Saturday, the data entered were cross checked to ensure consistency and to ensure that they were free of errors. All raw data were converted into electronic form by entering the codes on MS Excel spreadsheet in a computer at appropriate rows

and columns. To ensure reliability, a range of data checks were done, random check was done on 15% of raw data, and re-entry was done to check for accuracy. The final check was done and confirmed using the software which ensured that there were no inconsistencies or invalid data. Manual data was checked for consistency to ensure that proper instruction was given to the computer.

Back-up copies of data entered on daily basis were kept by data operator and principal investigator.

Data Analysis:

Data were entered, coded and analysed using Epi Info 2000 software.

Study Limitation

Recall bias was minimised especially when eliciting information regarding the duration of DM from the time of diagnosis, by which this information was useful on determining risk indicators. Categorisation for duration from the time when diagnosis of DM was simplified (see Appendix I for details) and reference with important event within the community or country were referred to capture the duration.

Due to variation in geographical factors, economical power of different communities and availability of facilities for diabetic care, the results obtained from this study might not be possible to generalise in different settings within Tanzania.

Ethical issues Before commencement of this study, the proposal was submitted to the UWC Research Ethics and Senate committees, Tanzania's National Institute for Medical

Research (NIMR) and the Mkuranga district Hospital ethical committee and permission to conduct this study was given by all these authorities. Prospective participants were provided with information of the study (see Appendix II) which included a clear description of the aim of the study and that its primary intention for fulfilling the requirements for my Masters in Public Health degree. Furthermore, it was explained to them their rights to leave the study at any time or not participate in the study at all without necessarily explaining the reason for cessation from the study participation. An informed consent form (see Appendix III) was signed by the patients when they agreed to participate in the study.

For the purpose of clarity, the data collection tool, participant information sheet and consent form were translated into Swahili language which is the native language spoken at the study area and Tanzania in general, and these has been attached as appendix IV, V and VI respectively.

During the course of data handling, cleaning and analysis, only codes were used instead of names. All data were kept in lockable cabinets and computer which were accessible by the researchers only.

For study participants who were detected to have any form of visual impairment or condition that needed further review or management, they were given referral letters to attend a tertiary unit for further management or were sent to local physician with an internal transfer note at the district hospital for appropriate management.

Appropriate counseling was given to such patients before they were given their referral letters.

CHAPTER FOUR

RESULTS

4.1. Description of Study Sample:

A total number of 165 diabetic patients were recruited during the study period from August 2012 to October 2012. Among them, 2 had to be removed from the study as the primary cause of visual impairment was not related to DM, therefore the final sample size taken was 163 giving a response rate of 83.2%. This was attributed to some extent by coincidental Ramadan fasting where the larger population of Mkuranga district are Moslems, therefore activities involving gatherings or long waiting time are not attended sufficiently.

Male to female ratio was almost equal, male having an edge above female by a ratio of 1.2:1 (Table 1). The age of study participants ranged from 23 to 70 years. The mean age of respondents was 52.2147 years (Standard deviation of 8.2923 years). Among the age groups, those between 41 to 60 years had a larger proportion of all diabetic cases recruited in the study accounting for 77.3% of the total study sample (Table 1).

Table 1: Frequency of Age groups and Gender (n=163)

Age groups in years	Number of Males (%)	Number of Females (%)	Total (%)
20 – 40	8 (9.0)	5 (6.8)	13 (10.0)
41 - 60	64 (71.9)	62 (83.8)	126 (77.3)
61 - 80	17 (19.1)	7 (9.5)	24 (14.7)
Total	89 (100.0)	74 (100.0)	163 (100.0)

Impaired blood sugar was observed in 74.2% of the study participants, in overall, 20.2% had very high blood sugar which needed prompt treatment (Table 2). This situation has in impact as far as diabetic eye complications are concerned.

Table 2: Frequency of Fasting Blood Glucose level (n=163)

Range in mg/dl	Male	Female	Total (%)
Below normal (Less than 80)	1	0	1 (0.6)
Normal (80 – 140)	23	18	41 (25.2)
Impaired (141 - 180)	48	40	88 (54.0)
High (Above 180)	17	16	33 (20.2)
Total	89	74	163 (100.0)

4.2. Prevalence of visual impairment:

The prevalence of visual impairment among diabetic patients surveyed was found to be 23.3%. However, for males, the prevalence of visual impairment was 27.0% and 19.9% for females as shown on Figure 4 below. Severity of visual impairment was graded according to WHO classification, those found to have moderate visual impairment, had a prevalence of 9.2% which was obtained from 15 diabetic patients. For severe visual impairment, the prevalence was 8.0% (13 study subjects) and for those who had very severe visual impairment (blind), had a prevalence of 6.1% which was obtained from 10 study subjects. The remaining 125 study subjects (76.7%) were classified as a group of individuals with normal vision. Details are shown in Table 3 below.

Table 3: Classification of Visual Acuity (n=163)

Classification of Visual acuity	Male	Female	Total	Percentage
Normal (6/18 and above)	65	60	125	76.7
Moderate Visual impairment (6/24 – 6/60)	9	6	15	9.2
Severe Visual Impairment (5/60 – 3/60)	6	7	13	8.0
Very severe Visual Impairment (Blind) (Less than 3/60)	9	1	10	6.1
Total	89	74	163	100.0

Table 4: Visual Acuity Grouping (n=163)

Range	Male	Female	Total (%)
Normal Vision (6/18 and above)	65 (73.0)	60 (81.1)	125 (76.7)
Impaired vision (≤6/24)	24 (27.0)	14 (19.9)	38 (23.3)
Total	89 (100.0)	74 (100.0)	163 (100.0)

4.3. Risk indicators for Visual impairment:

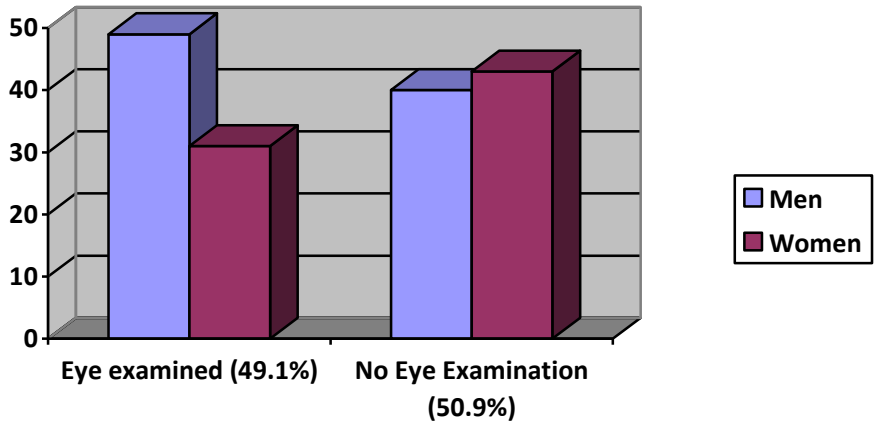
The association between blood sugar levels and visual impairment was not uniform in the categories of blood sugar levels, where a larger proportion of visual impairment was observed in the group of study subjects who presented with a high blood sugar level where it accounted for 30.3% (Table 5). However, this group, when compared to that which had diabetic cases presented with normal blood sugar, it was found that there was no statistically significant association between presented blood sugar level and degree of visual impairment (Odds ratio 0.92; 95% CI: 0.30 – 2.81).

Table 5: Association between the Levels of sugar and Level of Vision (n=163)

Range of Fasting Blood Sugar	Impaired vision	Normal Vision	Total	Odds ratio (95% CI)	p-value
Normal	12 (28.6)	30 (71.4)	42	1	
Impaired	16 (18.2)	72 (81.8)	88	1.80 (0.70 - 4.63)	0.1777
High	10 (30.3)	23 (69.7)	33	0.92 (0.30 – 2.81)	0.8701
Total	38	125	163		

Annual eye examination which is mandatory for all diabetic patients was achieved by only 49.1%, and there was no significant gender preponderance (Figure 1).

Figure 1: Frequency of Eye examination for the past one year (n=163)



There was no statistically significant association between level of education and per annual eye examination (chi-square less than 5.0), however, a larger proportion (56.44%) of patients who attained a university/college qualification had reported having an eye check in the past year as compared to those attended 32.0% of uneducated group as shown in Table 6 below.

Table 6: Association Between Level of Education and Eye Examination for the past one year (n = 163).

Education Level	Eye check		Total	Odds Ratio	p-value	Chi-square
	Yes	No				
University/College	31 (56.4)	24 (43.6)	55	0.36 (0.12 – 1.08)	0.0433	4.08
Secondary School	12 (46.2)	14 (53.8)	26	0.55 (0.15 – 1.98)	0.3006	1.07
Primary school	21 (52.5)	19 (47.5)	40	0.43 (0.13 – 1.36)	0.1057	2.62
Non formal/ Other	8 (47.1)	9 (52.9)	17	0.53 (0.12 – 2.25)	0.3239	0.97
Un-educated	8 (32.0)	17 (68.0)	25	1		
Total	88	83	163			

Among the study participants who never went to the eye unit for eye examination, Table 7 shows that 45 (54.2%) of them, had no prior information that eye examination was necessary, among them, women appears to carry a larger proportion for not being informed as compared to their male counterpart despite that male to female ratio was almost the same. Similarly, they had a higher dependency for someone to accompany them to the health unit, as it was observed that 3 (75.0%) of them did not go to the health unit for eye examination as they could not get somebody to accompany them as compared to only 1 male patient with the same reason.

Table 7: Reasons Presented by Diabetic Patients for Failure to go for Eye Examination: (n = 83)

Reasons for Failure of eye examination	Male	Female	Total	Percentage
No need felt	16	11	27	32.5
Not informed for eye check necessities	19	26	45	54.2
No one to escort	1	3	4	4.8
Other reason(s)	4	3	7	8.5
Total	40	43	83	100.0

Analysis was done to find if there is any association between regular eye examination and individual's level of satisfaction with services provided at study participants' respective health unit. It was found that there is a relationship between failure to attend at the health unit for a regular annual eye examination and dissatisfaction with diabetic services provided at a local health unit. The results were statistically significant (Odds Ratio: 0.34; 95% CI: 0.15 – 0.77) and p-value of 0.044 as shown in Table 8 below.

Table 8: Association between eye examination and satisfaction with diabetic care services in the health unit (n=163)

Eye examination	DM care Service satisfaction		Total	
	No	Yes		
No	13	70	83	OR: 0.34(0.15 – 0.77)
Yes	28	52	80	p-value: 0.044
Total	41	122	163	Chi-square: 8.09

Among the reasons given by the study participants for dissatisfaction of diabetic management services as shown in Table 9 below, lack of diabetic medicine was the main reason which accounted for 16 (39.0%) individuals. Long waiting time to be seen by the doctor and cost of diabetic management were other important factors reported. In male, unavailability of diabetic medicine was the most striking reason for dissatisfaction, while

in women, the main reasons for not satisfied with diabetic care was long waiting time to be seen by a doctor and cost of diabetic treatment.

Table 9: Frequency: Reasons for not being satisfied with Diabetic Service at Eye health unit (n = 41).

Responses	Male	Female	Total (%)
High Cost of Diabetic management	2	6	8 (19.5)
Long waiting time	4	6	10 (24.4)
Medicine not available	11	5	16 (39.0)
Discouraged by health unit staff	2	0	2 (4.9)
Short consultation time	0	1	1 (2.4)
Other reasons	1	3	4 (9.8)
Total	20	21	41 (100.0)

Diabetic complications related to the eyes were found in 70 cases (42.9%) of all eligible diabetic cases. Analysis to determine the cause of visual impairment as related to diabetes mellitus as shown in Table 10 revealed that, retinopathy in both male and females accounted for a larger proportion among all eye complications discovered, the retinopathy weighed 50.0% for all pathologies noted followed by cataract (17.1%).

Table 10: Frequency of Diabetic Eye Complications (n = 70).

Eye Complications	Male	Female	Total (%)
Cataract	7	5	12 (17.1)
Retinopathy	20	15	35 (50.0)
Corneal related	1	0	1 (1.4)
Optic nerve	1	3	4 (5.7)
Other	8	10	18 (25.8)
Total	37	33	70 (100.0)

Residential area, as one of the risk indicators was analysed based on urban and rural set up of the study subjects in relationship to the presence of any eye complication as a result of diabetes mellitus. There was no statistical significant relationship observed (0.78 (95% CI: 0.36 – 1.70), p-value 0.78) as shown on Table 11.

Table 11: Association between Presence of Diabetic Eye Complications and Residential area

Residence	Eye complications		Total (%)	95% CI
	Yes	No		
Mkuranga Urban	51	72	123 (75.5)	0.78 (0.36 – 1.70)
Mkuranga Rural	19	21	40 (24.5)	p-value 0.50
Total	70	93	163 (100.0)	

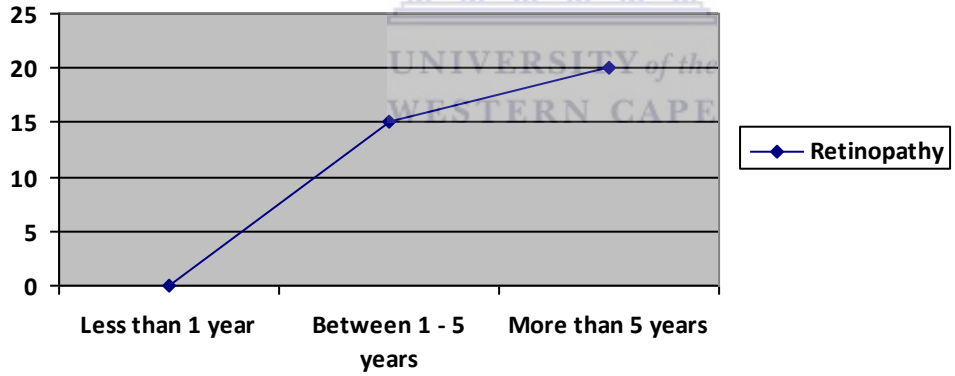
Analysis to find association between the duration of diabetes mellitus from the time of diagnosis and visual impairment has been presented in Table 12, where it is noted that there is a strong relationship between the two comparable factors (Odds Ratio 0.02 (95% CI:0.00 – 0.13), it has been observed for those DM patients who were diagnosed within one year before commencement of this study, none of them was had any form of visual impairment, and those diagnosed between 1 and 5 years prior to this study, 15 (19.2%) had visual impairment, and those who had more than 5 years since diagnosis for diabetes mellitus was made, 57.5% of them had visual impairment.

Table 12: Association between the Duration of Diabetes Mellitus from time of diagnosis and level of Visual acuity. (n = 163)

Duration of DM	Impaired vision	Normal Vision	Total	Odds Ratio	p-value	Chi-square
Under 1 year	0 (0.0)	45(100.0)	45	1		
1 – 5 years	15 (19.2)	63 (80.8)	78	0.09 (0.00 – 0.66)	0.00429	8.16
Over 5 years	23 (57.5)	17 (42.5)	40	0.02 (0.00 – 0.13)	0.00000	27.32
Total	38	125	163			

Prevalence of diabetic retinopathy in the study population was found to be 21.5% (Table 10). When duration of diabetes mellitus from the time of diagnosis was compared with presence of retinopathy, it was observed that those who had been diagnosed with DM for less than one year, there was no one who was found to have retinopathy, in the group diagnosed between 1 year to 5 years, 19.2% of cases had diabetic retinopathy and the last group of those diagnosed with diabetes mellitus for more than 5 years, 20 (50.0%) of them were discovered to have diabetic retinopathy. The association between the duration of diabetes and retinopathy was significant as in Figure 2 below.

Figure 2: Relationship between Duration of diabetes mellitus from the time of diagnosis and Presence of Diabetic retinopathy



Statistical relationship between duration of DM of groups between the duration of 1 -5 years and that of less than a year: 0.09 (CI: 0.00 – 0.66) odds 0.00429

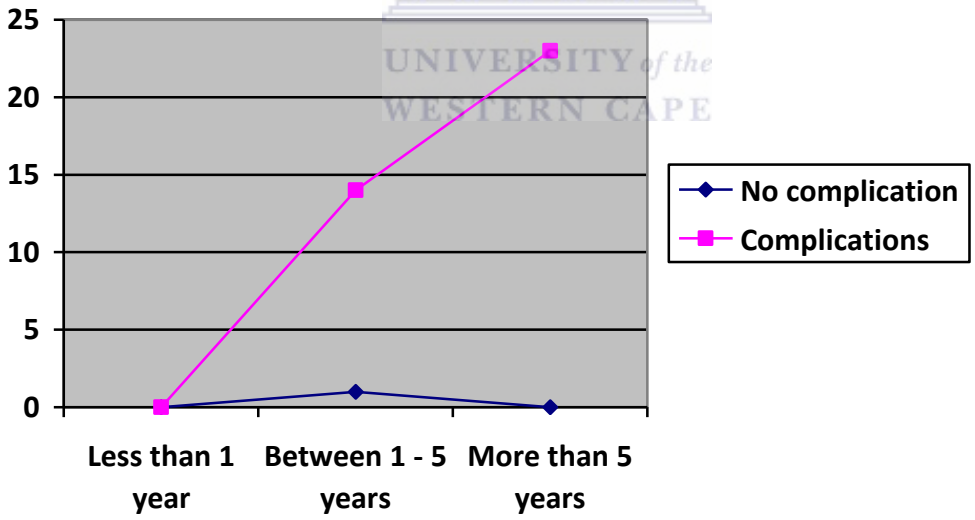
Relationship between duration of DM between duration of over 5 years and that of less than 1 year: 0.02 (0.00 – 0.17) odds 0.00000

Adjusted odds 0.09 (95% CI: 0.01 – 0.39), p-value; 0.00012, Chi-square 14.6

Prevalence of diabetic retinopathy 21.5%

When the duration of diabetes mellitus from the time of diagnosis among visual impaired diabetic patients was analysed in trying to find its association with development of diabetic eye complications, no statistical significant association was found when the duration categories were compared as shown in Figure 3 despite the fact that, eye complications were found in 37 patients (97.4%) of all diabetic patients with visual impairment, and there is strong association between presence of eye complications and visual impairment (p-value of 0.00000) . as shown on table 13 below.

Figure 3: Association Between Duration of Diabetes Mellitus and Presence of Eye Complications among Visually Impaired Patients (n = 38).



The statistical relationship between duration of DM between 1 – 5 years and that of less than 1 year. 0.13 (0.00 – 7.51): odds ratio; 0.1607

The statistical relationship between the duration of DM over 5 years and that of less than 1 year0.04 (0.00 – 3.00). odds 0.0168

Table 13: Association Between Visual Impairment and Presence of Eye Complications

	Complication	No Complication	Total	Odds Ratio	p-value
Impaired Vision	37	1	38		
Normal Vision	33	92	125	103.15 (14.20 – 2101.36)	0.0000
Total	70	93	163		

Chi-square: 59.90 RR: 3.69 (95% TS: 2.74 – 4.97)

In the same group of visually impaired diabetic patients, when analysis was done among them to find the association between their level of presented blood sugar and presence of diabetic eye complications, no statistical significant results were obtained (Table 14).

Table 14: Association Between the Level of Blood Sugar and Diabetic Eye Complications among Visually Impaired Cases

Range	Complication	No Complication	Total	Odds Ratio	p-value
Normal	12	0	12	1	
Impaired	15	1	16	1.63 (0.10 – 51.23)	0.7024
High	10	0	10	1.18 (0.00 – 50.21)	0.9095
Total	37	1	38		

Similarly longevity was found to carry no statistically significant association with visual impairment in this group of visually impaired diabetic patients (Table 15). However, it has been observed, that the diabetic patients with visual impairment under the age of 40 years, carry no increased risk for developing eye complication.

Table 15: Association between Age groups and presence of Diabetic Eye Complications among Visual Impaired cases

Age groups in years	Complication	No Complication	Total	Odds	p-value
20 – 40	0	0	0	1	
41 - 60	22	1	23	0.09 (0.00 – 4.79)	0.06896
61 - 80	15	0	15	0.06 (0.00 – 4.59)	0.05447
Total	37	1	38		

4.4. Impact of visual impairment among diabetic patients:

For comparison and trying to elicit association of level of visual acuity and various factors related to psycho-social activities of daily living, cognitive functions, behavioural changes and socio-economic impact of having diabetes with or without visual impairment, several factors were analysed and comparison was made between diabetic patients with visual impairment and those with normal vision. Level of visual acuity was

determined according to the WHO grading scale for visual impairment. The categories for visual level was adjusted to fit into groups of normal vision and impaired vision as seen in table 4 above. It is observed that there is considerable proportion of diabetic patients with visual impairment (45.6%) who reported that their visual impairment impedes various physical activities of daily living among the group of diabetic patients with visual impairment. This is far high when compared to the group of diabetic patients with normal vision, where in the later group, 11.3% reported some form of impaired activities of daily living. The association between visual impairment and impaired physical activities of daily living is statistically significant (OR: 6.57 (95% CI: 2.78 - 15.78) as shown in Table 16.

Table 16: Association between Performance of Activities of Daily Living and Level of Vision (n = 163)

AODL	Impaired vision	Normal Vision	Total (%)	
Impaired	26 (45.6)	12 (11.3)	38 (23.3)	
Normal	31 (54.4)	94 (88.7)	125 (76.7)	OR: 6.57 (2.78 - 15.78)
Total	57 (100.0)	106 (100.0)	163 (100.0)	p-value: 0.00000

Cognitive function was assessed and compared between study participants with both normal and visual impairment to determine if there is any association between alteration of cognitive function and presence of visual impairment. The results shows that 34.2% of subject with visual impairment has some form of cognitive impairment as compared to the same participants with normal vision who had lower proportion (8.8%) for cognitive function impairment. The association is statistically significant as shown in Table 17.

Table 17: Association between an integrity of Memory Capacity and Visual Level (n = 163).

Visual Level	Impaired Memory	Normal Memory	Total	
Impaired Vision	13 (34.2)	25 (65.8)	38	
Normal Vision	11 (8.8)	114 (91.2)	125	OR: 5.39 (1.98-14.81)
Total	24	139	163	p-value: 0.0001

Psychological changes among diabetic patients in Mkuranga district with normal and impaired vision was compared as summarised in Table 18. It was noted that there is statistically significant relationship between visual impairment and psychological instability. The data have shown that 52.6% of people with visual impairment reported to have a form of mental lag as compared to 10.4% of those in the same category, but with

normal vision. Similarly, the activities which need higher concentration were assessed and compared between diabetic patients with normal and impaired vision. In this assessment, it was noted that there is significant association between visual impairment and altering in attention for task oriented activities, as 27 cases (71.1%) in visual impairment group had altered attention as compared to only 9 (7.2%) in subject with normal vision. The results are shown in Table 19 and are statistically significant with a p-value of less than 0.05.

Table 18: Association between Level of Alertness and Visual Level (n = 163).

Vision	Impaired Alertness	Normal Alertness	Total (%)	
Impaired	20 (52.6)	18 (47.4)	38	OR:9.57(3.75-24.82)
Normal	13 (10.4)	112 (89.6)	125	p-value 0.0000000
Total	33	130	163	Chi-square 32.19

Table 19: Association between Activities which need mental concentration and level of Vision

Activities	Impaired vision	Normal Vision	Total (%)	
Impaired	27 (71.1)	9 (7.2)	36 (22.1)	OR:31.64 (10.87 – 96.02)
Normal	11 (28.9)	116 (92.8)	127 (77.9)	P-value: 0.00000
Total	38 (100.0)	125(100.0)	163	

Activities related to social interactions were assessed in the two groups of normal vision and those with impaired vision. It was found that among those who had some sort of alteration in the social interaction activities, in the group of normal vision had an upper edge in terms of number. But overall proportion of those with vision impairment, 26 (74.2%) of them, expressed difficulties to cope with the normal social interactions they had before as compared to 54 (45.8%) of those who has normal vision. Table 20 shows that there is strong association between visual impairment and altered social activity participation where the results are statistically significant with odds ratio of 3.42 (95% CI: 1.38 – 8.67).

Table 20: Association between Interactions in Social activities and the Level of Vision

Social interactions	Vision		Total (%)	
	Impaired	Normal		
Difficult in coping	26 (74.2)	54 (45.8)	80 (52.3)	OR: 3.42(1.38 – 8.67)
Coping	9 (25.8)	64 (54.2)	73 (47.7)	p-value: 0.0030
Total	35 (100.0)	118 (100.0)	153 (100.0)	

Tables 21, 22 and 23 represents the results related to the social economical impact among the diabetic patients with impaired vision as compared to those with normal vision.

Ability for diabetic patients to support their family economically among diabetic patients with visual impairment, it was observed that 26 (68.4%) of the patients with visual impairment expressed a degree of inability to support their families, while in the category of diabetic patients with normal vision, 16 (33.1%) expressed similar difficulties. In overall assessment, it has been shown that there is statistical significant relationship on impaired vision and difficulties to support the family financially (Odds ratio: 0.36 (95% CI: 0.17 – 0.76).

Table 21: Association between Ability to Support Family and the Level of Vision

Family support	Impaired vision	Normal Vision	Total (%)	
Difficult	26 (68.4)	16 (33.1)	42 (25.8)	OR: 0.36 (0.17 – 0.76)
No problem	12 (31.6)	109 (66.9)	121 (74.2)	p-value: 0.00337
Total	38 (100.0)	125 (100.0)	163 (100.0)	Chi-square: 8.59

Cost for management of diabetic mellitus among the diabetic patients in Mkuranga district was assessed and the perception reported from diabetic patients with impaired vision was compared to the perception reported by diabetic patients with normal vision to find if there is any association on how diabetic patients perceive the cost of diabetic management and visual impairment. It was found that diabetic patients with visual impairment perceive the cost as hindrance factor for management of diabetes mellitus as compared to those diabetic patients with normal vision as shown on table 23 (Odds ratio: 15.34 (95% CI: 5.67 – 43.18).

Figure 22: Association between the Perception on the Cost of DM Management and the Level of Vision (n = 163).

DM management cost	Impaired vision	Normal Vision	Total (%)	
Difficult	31 (81.6)	28 (22.4)	59 (36.2)	Chi square: 44.19
Affordable	7 (18.4)	97 (77.6)	104 (63.8)	OR: 15.34 (5.67 – 43.18)
Total	38 (100.0)	125 (100.0)	163 (100.0)	p-value 0.0000000

Prediction on impact for the future life while living with diabetes mellitus for diabetic patients living in Mkuranga district was assessed. There was a strong relationship between visual impairment and negative impact predictions from diabetic patients with visual impairment which accounted for 71.1% of all diabetic patients with visual impairment as compared to 18.4% to the diabetic patients with normal vision. This relationship is statistically significant as shown on Table 27 (Odds ratio: 13.34 (95% CI: 5.42 – 33.51).

Table 23: Association between The Impact on Future Life while living with diabetes mellitus and the Level of Vision (n = 163)

Level of Impact	Impaired vision	Normal Vision	Total (%)	
Negative Impact	27 (71.1)	23 (18.4)	50 (30.7)	Chi-square: 47.41
Positive Impact	11 (28.9)	102 (81.6)	113 (69.3)	OR: 13.34(5.42– 33.51)
Total	38 (100.0)	125 (100.0)	163 (100.0)	p-value: 0.00000

CHAPTER FIVE

DISCUSSION

General overview and prevalence of visual impairment:

This study was primarily aimed at determining the prevalence of visual impairment among diabetic patients attending Mkuranga District Hospital. The study was also aimed at assessing the severity of visual impairment cases among diabetic patients with visual impairment in addition to determining the socio-economic impact.

The data analysed were collected from 163 diabetic patients attending Mkuranga District Hospital. There was no gender preponderance among the participants as the ratio between male and female was almost the same at 1.2:1. This is not quite different from other prior studies conducted, especially in developed countries, where male usually have a slightly higher proportion of DM patients (Danaei *et al*, 2009).

The prevalence for visual impairment among diabetic patients attending Mkuranga District Hospital was found to be 23.3%. There is no previous similar study, which has been conducted in Mkuranga district. In consequence, there is no data for comparative purposes to help determine whether the prevalence in the area has increased or fallen. From a gender perspective, male diabetic patients were noted to have a higher prevalence rate of visual impairment than their female counterparts as they accounted for 27.0% for the cases as compared to 19.9% for the female patients. This observation is similar to one

made in another study which was conducted among the Yemeni diabetic population (Al-Akily, Bamashmus and Gunaid, 2011).

Using the WHO classification of visual impairment severity, the study observed that in Mkuranga district 9.2% were classified as having moderate visual impairment, 8.0% as having severe visual impairment and 6.1% as very severe visual impairment (blind).

Nevertheless, studies on the prevalence of visual impairment in diabetics in Africa are scarce. Using the findings drawn from the few studies, which have been conducted on the continent, we were able to compare with those obtained locally from the diabetic study in Mkuranga. This comparative analysis helped to establish that Mkuranga's visual impairment prevalence is actually lower than those found in Ethiopia and South Africa (Teshome *et al*, 2004, Mash *et al*, 2008).

5.2. Risk indicators for visual impairment

Visual impairment is a common presentation in diabetic patients. It arises when diabetic patients develop diabetic eye disease which is usually characterised by the presence of one or more diabetic eye complications.

The duration of the DM disease, as indirect measure, was found to be associated with visual impairment among diabetic patients attending Mkuranga District Hospital. It was more obvious when the duration of DM was longer. Those with a diabetic diagnosis of more than five years were found to have a stronger visual impairment (p-value 0.00000) than those with a diagnosis of between 1 and 5 years (p-value 0.00429). A similar observation was made in the systematic review and meta-analysis study by Wong and colleagues (2009). In the Mkuranga study, it was also established that diabetic patients,

who were diagnosed to have DM for more than 5 years before the commencement of the study, accounted for almost two-thirds of all study population with visual impairment. The remaining one-third was made up of patients with a 1-5 year diagnosis prior to this study. Among those diagnosed with DM of less than one year, none of them suffered from any form of visual impairment.

Furthermore, an analysis was done to determine the association between the duration of diabetes and the presence of eye-complications. The results confirm that there is a strong correlation between the two factors. The pre-determined diabetic eye complications were observed in 70 diabetic patients. These patients accounted for 42.9% of all the study participants. Similar eye-complications reported in other studies include diabetic retinopathy, cataract and others (Klein et al, 1984). The participants with visual impairment in the Mkuranga study were assessed to determine whether these complication increase their risk of developing visual impairment. The outcome shows that the study participants with complications had a 103 times likelihood of developing visual impairment than those who did not have any diabetic eye complication.

In this study, the commonest complication noted was diabetic retinopathy. This accounted for 50.0% of all diabetic eye-complications as observed from the study participants. Other eye-complications observed include cataract (17.1%), optic neuropathy (5.7%) and other sub-groups, which accounted for 27.2% of the cases. The prevalence of diabetic retinopathy found was 21.5%, a figure which lies within the wide

range of diabetic retinopathy prevalence established in other studies which vary from 9.2% to 55.4% (Levitt *et al*., 2004; Teshome *et al.*, 2004; Mengesha, 2006; Gill *et al.*, 2008; Majaliwa *et al.*, 2008). The presence of retinopathy was strongly associated with the duration of diabetic mellitus. Indeed, the longer the duration of diabetes mellitus, the more likely the patient was to get diabetic retinopathy. It was also observed that patients with longer duration of DM faced a risk of 0.09 times (0.01 – 0.39) of the likelihood of developing retinopathy. This association was also observed in other studies conducted elsewhere in the world (Klein *et al*, 1984, Rotimi *et al*, 2003, Wong *et al*, 2009, Klein *et al*, 2010).

Poor glycemic control is another known risk indicator for visual impairment in patients with diabetic mellitus. In the Mkuranga study, 121 of study participants (74.2%) were found with impaired blood glucose level. Subsequent analysis found that diabetic patients with impaired glycemic level had a visual impairment which was twofold higher than that of those with normal vision. This finding, however, was not statistically significant in the Mkuranga study, as compared to another study which was done in Nigeria (Rotimi *et al*, 2003), where the association between poor glycemic control and visual impairment was evident as a risk indicator for developing diabetic eye-complications. Poor control of blood sugar carries an increased risk of development of eye-complications among Mkuranga diabetic population. Having three quarters of the study participants being found with impaired blood sugar signifies a big gap between attitude, knowledge and perception of diabetes mellitus among patients and healthcare providers. Certainly, this is an issue that needs to be looked upon.

5.3. Factors behind visual impairment in patients with diabetes mellitus

Mkuranga District diabetic patients are vulnerable to similar risk factors of developing visual impairment like other studies have reported in different countries (Rotimi *et al*, 2003, Wong *et al*, 2009, Klein *et al*, 2010). However, there are some specific factors observed which potentially pose a risk of developing diabetic eye-complications among the diabetic population of Mkuranga district.

Lack of knowledge was observed as one of the contributory factors to poor attendance of mandatory annual eye-examination. Only 49.1% of the study population had had an eye-examination within a year prior to the commencement of this study. An initial assumption was made to the effect that the level of one's education among the study population had an influence on one's willingness to attend the annual eye-examination on regular basis. This assumption was based on the belief that higher education raises the prospect of exposure to the knowledge about diabetes mellitus and necessity of mandatory annual eye-examinations. However, it was observed in this study that the level of one's education had no bearing on the diabetic patients' going for annual eye-examinations. Alarmingly, it was established that more than half of the study population (54.2%) had not been informed about the importance of eye-examinations despite paying regular visits to the same health unit. Of the 45 study participants who were not informed about the necessity of an eye-examination by healthcare providers, 26 of them (57.8%) were women. The overall ratio of male to female was almost at par (1.2:1 in favour of male participants). In real terms, it emerged that a larger proportion of women than men was

not informed. This lack of knowledge tends to undermine their accessing of eye-care services for diabetes mellitus disease. Another reason which prevents female diabetic patients in Mkuranga from to attending eye-examination included having no one to escort them to the health facility. In this category, three quarters of the respondents cited lack of somebody to escort them to the health unit for diabetic management and eye assessment as a reason.

Also, 27 of the study participants (32.5%) acknowledged that at one time they had received advice to go for an eye-examination. However, they did not feel the urge to do so as they were able to see well, therefore, did not believe an eye-examination was necessary. And yet, during the study we realised that even the healthcare providers did not have full knowledge at their disposal on how to assess the eyes properly before making a prompt referral to an eye unit whenever a need arose.

On the whole, the study established that lack of knowledge on diabetic eye disease, or failure to adhere to the principles of diabetes mellitus management can increase the risk of developing eye complications among the Mkuranga diabetic population. A similar knowledge discrepancy was described by Zgibor and Songer (2001) during the assessment of the external barriers to diabetic care. A similar outcome was established in the analysis done during a study in India (Venkataraman, Kannan and Mohan, 2009), which found insufficient knowledge in understanding diabetes mellitus among the diabetic patients.

The rural-to-urban drift has often been associated with an increased risk of acquiring non-insulin dependent diabetes mellitus (Mennen *et al.*, 2000). This state tends to raise the potential risks of developing visual impairment in subsequent years. In this research, 72.9% of the study participants reside in urban area. However, there was no statistical evidence to validate the association between urban residential area and the development of diabetic eye-complications. In fact, the trend of acquiring Type 2 diabetes mellitus appears to have become more prevalent than in the past even in the rural setting of Mkuranga District.

5.4. Impact of visual impairment on diabetic patients

Important factors related to daily living activities for diabetic patients with impaired vision and those with normal vision were compared in a bid to understand whether there is an impact on only those with visual impairment or in both sub-groups. The study outcome shows that in the sub-group of those with an impaired vision were 6.57 times (95% CI: 2.78 – 15.78) more likely to have daily living activities that were undermined by their state than the diabetic patients with a normal vision (p-value 0.00000). This finding has implications for the socio-economic well-being of diabetic patients in Mkuranga district as poverty is widespread among the Mkuranga population, and yet the management of diabetes mellitus is an expensive exercise.

The cognitive function of participants with normal vision and those with an impaired vision was assessed. The findings show that the diabetic patients with visual impairment

were 5.39 times more likely to have an impaired cognitive function than those with a normal vision. Similar results were obtained when the psychological wellbeing of the study participants was assessed. This assessment was done by comparing these two groups of impaired and normal vision respondents. The results revealed that the diabetic patients with an impaired vision were 9.57 times more likely to have psychological instability than those with a normal vision.

Furthermore, an assessment was made to compare the after-effect of social interactions between diabetic patients with visual impairment and those with normal vision. The majority of diabetic patients with visual impairment indicated that they had to change their habitual social interactions after they were diagnosed with diabetes mellitus. The study also established that the study subjects with visual impairment were 3.42 times more likely to report an alteration in their social interactions than those with normal vision.

The study also examined the socio-economic impact from different perspectives, before gauging how this impact affected the two study groups: those with normal and those with an impaired vision. Diabetic patients with a visual impairment expressed a varied degree of inability to meet all their financial family needs, and were 0.36 times (0.17 – 0.76) more likely to have financial difficulties than those with normal vision. On the same aspect of socio-economic impact, a cost analysis for the treatment of diabetes mellitus was done. This analysis was based on an individual's ability and perception of affording

diabetic treatment. The group with visual impairment was 15.34 times more likely to perceive financial difficulties to meet the cost of managing diabetes mellitus than the group with normal vision.

5.5. Impact on Public health

In this study, it was observed that the age group that was more affected by visual impairment belonged to individuals aged between 41 and 60. These accounted for 77.3% of the study population. From a gender perspective, females had a larger proportion when they were analysed separate from males within this same group. These females accounted for 83.8% of all female study participants as compared to male who represented 71.9% of subjects in their sub-group. This age group also happens to be the most experienced and most productive. Therefore, the loss of vision for such a group of people has a negative impact on economic growth and family support. For Mkuranga District, this development has much more impact, especially the issue of gender is factored in, since in this community, women are the ones who run and monitor day-to-day activities related to the wellbeing of their family. In fact, most of the household activities and fieldwork in the district are carried out by women.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

The prevalence of visual impairments among diabetic patients attending Mkuranga District Hospital was found to stand at 23.3%. Male diabetic patients were noted to have a slightly higher prevalence of visual impairment as they accounted for 27.0% of the cases than female diabetic patient who were found to have a prevalence of 19.9%. When severity of visual impairment was assessed and graded according to the WHO criteria, it was observed that 9.2% of the study participants had moderate visual impairment, 8.0% had severe visual impairment and 6.1% had very severe visual impairment or could simply be classified as visually blind.

It has been observed that people with visual impairment face greater negative effects in almost all aspects, which in turn erode the quality of their lives. The effects include psychosocial difficulties, cognitive function changes and increased socio-economic burden, thus making their lives more difficult and sometimes even unbearable. Generally, however, living with diabetes appears to be the greatest challenge that diabetic patients with visual impairment were found to face in Mkuranga. Indeed, when it came to future life projections, many of them expressed a numbing feeling of hopelessness, which in turn creates life stress, a sign of frustrations or giving up. Stress in life has a direct or indirect effect on increasing mortality rates. Arguably, it might also be a contributory

factor to an increase in the mortality rate among patients suffering from NCDs, with diabetes mellitus being one of then, as observed by WHO (2011)..

In this study, the level of the participants' education did not seem to have any influence on their getting proper diabetic eye-care. Even when information about eye-examination necessity was given, still response was not adequate in diabetic patients at all levels of education. This finding signifies that there is a gap on the dissemination of ample education on diabetic eye health, or the information given to diabetic patient is too inadequate for them to understand the proper management of diabetic-related eye diseases and the importance of having regular eye-examinations. It is also possible that diabetic care in the area under study is supervised by people who have inadequate knowledge on eye-health for diabetic patients.

Dealing with management of eye-complications due to diabetes mellitus alone is not the best option in developing countries due to a horde of factors such as unavailability of ample financial resources, lack of medicines, inadequate eye healthcare providers, unknown actual burden of diabetes mellitus, lack of diabetic knowledge and many others. The best way of dealing with such problems in these countries is early identification of diabetic eye-complications by screening especially using trained village or local health workers. After all, in most developing countries, this group of health workers outnumbers trained eye healthcare providers by far. This approach of using village health workers has

been successful in several countries where prevalence of diabetes mellitus has been known to be high (Beckham *et al*, 2008).

Nevertheless, the best solution remains the public health approach geared towards preventing or eliminating risk factors behind the spread of diabetes mellitus. Since the risk indicators for developing diabetes mellitus and risk indicators for acquiring visual impairment are now known in Mkuranga district, it is advisable to conduct intense research to measure the true burden of diabetes in the community using a population-based study. Such a study can help establish the true burden of diabetes mellitus and the anthropological determinants behind the failure among patients to attend the hospital diabetic eye care. Moreover, this research undertaking can help establish a cost-effective programme for reducing the burden of emerging non-communicable diseases. Strategies that Abanobi (2012) suggests for Nigeria to control Type 2 DM include the identification of high risk cases and launch interventions in high risk groups through community health education using the local government diabetic control programme. This approach can be of high value in Mkuranga District as well.

Also, the current trend of scaling up investment and health system development adopted by many countries for the control of non-communicable diseases as sub-units is encouraging as it is aimed at equal systematic financial fuelling in various NCD control initiatives. It also strives to ensure the availability of resources for programme sustainability as suggested by various authors (Karim and Dac, 2012, Venkataraman et al, 2009, Mayige et al, 2012). This approach can be adopted by Mkuranga District where

now there is now an availability of information on eye-complications among diabetic patients and some of their risk indicators.

In addition, I suggest that Mkuranga District Hospital establish a scientific observation and assessment project on what is happening before the patient decide to go to the hospital for diabetic treatment (pre-contact); and what is going on during the course of assessment and treatment within the hands of diabetic health officers (Intra-contact); and finally what happens when the patient goes home after the intervention had taken place at the hospital (Post-contact). Such concerted efforts can highlight some of the anthropological challenges encountered by Mkuranga District diabetic patients. Once all the challenges are established during the pre-contact, intra-contact and post contact stages, then appropriate and effective interventions can be established. These measures can involve the public in general, as most of diabetic patients acquire this disease because of their newly-adopted lifestyles. The new incidences of DM can also be reduced by various means mostly through public education campaigns on diabetes mellitus. Furthermore, it is possible to reduce the burden of DM-related visual impairment by incorporating community eye-care programmes within the Ministry of Health and Social Work budget. Women can also be empowered through the provision of education on DM. Subsequently, appropriate measures instituted within the district can help reduce the risk of acquiring diabetes mellitus in addition to reducing the burden of visual impairment and its associated effects among diabetics in Mkuranga District and beyond.

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APPENDICES

APPENDIX I

Data collection tool

I.	**General information**	
	Questionnaire number	
	Health unit:	
	Date of interview	
	Name of Interviewer	

II. **Demographic Data**			
	Residential area	…….	
	Date of birth		
	Sex	Male ……0 Female …….1	☐
	Marital status	Unmarried …….. 0 Married……1 Cohabiting ……...2 Widowed …….3 Divorced/separated ..4	☐
	Employment status	Unemployed ……0 Employed ……1	

		Student …….2 Retired ……..3 Peasant ……..4 For employed ¯↓ Other categories ▼Edu	
		Self employment …..1 Government …….2 NGO ……3 Religious ……..4 Other …….99	

	Highest level of education completed	None ……..0 University/College..1 Secondary school....2 Primary school…....3 Other/ non-formal...4 Specify ……..	
III.	**Clinical Data**		
a.	Blood sugar level		
b.	Visual acuity for the best eye	6/18 and above …..1 6/24 – 6/60 ……2	

		5/60 – 3/60 ……3 Less than 3/60 …...4	
c.	visual acuity of second eye	6/18 and above …..1 6/24 – 6/60 ……2 5/60 – 3/60 ……3 Less than 3/60 …...4	☐
d.	Is there any pathology noted	No ……0 Yes ……...1 For Yes ¯↓ For "No" ▼ Section IV question number 1.	☐
e.	Pathology noted	Cataract ……1 Retinopathy ……..2 Cornea related …..3 Optic discs ……4 Other – Specify…99 …….	☐

IV. Questions and Filters:

Q. Nº	Questions	Responses	
1.	When were you diagnosed to have diabetes mellitus?	Less than 1 year ……1 1 – 5 years ……2	☐

		More than 5 years……..3	
2 a.	Have you had an eye check in the past one year?	No ……..……0 Yes ……..…..1 If No ¯↓, if Yes ▼Q. No 3.	☐
2 b.	Why?	I felt that there was no need ..1 I was not informed that I need to be checked for my eyes …….2 The cost is high …….3 Discouraged by health care providers ……..4 Frustrated by the disease …..5 No one to help me to see an eye doctor ……6 Other reasons (Specify) …...99 ……	☐
3.	Where do you attend regularly for diabetic treatment?	Mkuranga Hospital ……1 Nearby health center ……..2 Hospital outside Mkuranga …3 Traditional herbalist ……4 Other (Specify) ……99 ……	☐
4 a.	Are you satisfied with the care you	No …….....0	

	are receiving from the location in question 3 above?	Yes ……..1 If "No" ¯↓, if Yes ▼Q. No 5	☐
4 b.	Why are you not satisfied?	Long wait ……..1 Did not see the doctor ……2 Short consultation ……3 Staff unkind/rude ……...4 Prescribed drugs not available.5 Too expensive …… 6 Other (Specify) ……99 …….	☐
5.	Who is assisting you financially to get treatment for diabetes mellitus?	Government – free/subsidised.1 Myself ……2 Children ……3 Parents ……4 Village /community ……5 Charity/religious organisation.6 Other (Specify) ……99 …….	☐
6 a.	From the time you were diagnosed to have diabetes mellitus, do you think it has affected your physical activities?	No ……..0 Yes ……1 For Yes, ¯↓, for No ▼Q. No.7	
6 b.	Which activities have been affected?	No …… 0, Yes ……. 1	

	(Tick as many as responded)	To read Repair broken materials Clean the house Fetching water Operate machine/driving Field work Taking care of children/grandchildren Walking during the day Walking at night Cooking Other (Specify) …….99 ……	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
7 a.	Do you think diabetes mellitus by any extent has affected you in terms of: Memorising events? If yes → If No ¯↓	Lost memory …….2 Hardly recall ……....1 Recall but sometimes not complete……1	Score ☐
7 b.	Level of alertness? If yes → If No ¯↓	Sometimes impaired ……1 Feel dull ……2 I want to sleep all the time ….3	Score ☐

7 c.	Task oriented concentration? If yes → If No ¯↓	Impaired but cope ……1 Impaired but cope with difficult.2 Disrupted ……3	Score ☐
7 d.	Ability to communicate? If yes → If No ¯↓	Impaired ……1 Feel not able to ……...2 Miserable ……...3	☐
8 a.	Does your friends and family know that you are diabetic?	No ¯↓8b ……..…..0 Yes ▼8c ……..…1	☐
8 b.	Why?	I think, they are not supposed to know ……1 They don't ask me …….2 Afraid of stigma ……...3 Other reason (specify) …….99 ……. Go to ▼Q. 9	☐
8 c.	How do they treat you now?	Give me big support ……1 No change before and after …..2 They appear confused ……..3 They run away from me ……4 Other (Specify) ……99	☐

		……	
9 a.	Do you still attend social gatherings? If yes → If answer is no ⁻↓	Increased ……..……1 As before ……..2 As before but with addition care.3 Reduced ……4 Go to ▼ Q. 10	Score ☐
9 b.	Why	I need companion ……1 I fear for injuries ……..2 It is unsafe to go out ……3 I am frustrated ……4 Depressed ……5 Other (Specify) ……..99 ……..……..	Score ☐
10.	Do you think you are able to support your family and dependants	I do without any problem …….1 I do, but I need additional support ……..2 I need support more than what I can give ……3 I have delegated other to take over ……..4 I am completely dependent …..5	Score ☐
11.	What do you think regarding the	Cheap and affordable ……1	

	cost of diabetic treatment?	Expensive but I am able to afford ……2 I afford with difficulty ……..…..3 I cannot afford ……4	☐
12.	What do you think about your future health with diabetes mellitus?	Bright future ……1 Probably nothing will change ...2 Uncertainty ……..3 Difficult life ……4 Miserable life ……5 Death ……6	☐
13.	Do you have any suggestions regarding management of diabetes mellitus within your community? (If any).	……... …… …… …… ……	

Thank you very much!

APPENDIX II.

PARTICIPANT'S INFORMATION SHEET

Dear Participant.

Thank you for willing to hear about my research. The following is an explanation of my research which I am going to do and which you are my potential participant.

This research is done as part of my study for the Masters in Public Health degree at the University of the Western Cape in Cape Town, South Africa. After reading the purpose of my research which includes your eligibility and willing to participate, anonymity and your rights to exit, please feel free to ask any questions regarding this research, before, during or after the study. My contact details and that of my supervisors are outlined at the end of this information sheet. We will be ready to answer or clarify anything which you may wish to know further.

Research Title:

Prevalence, severity, risk indicators, and impact of visual impairment among diabetic patients in Mkuranga District, Tanzania.

Purpose of this research:

To determine the prevalence, severity, risk indicators of visual impairment among diabetic patients and to evaluate its impacts on their activities of daily living and socio-

economical consequences encountered by diabetic population with visual impairment attending Mkuranga district Hospital.

At the end, this will provide baseline information, which will be useful to suggest appropriate measures to help diabetic patients who are attending the diabetic clinic at Mkuranga district hospital, whereby in a long run, its effectiveness will be used by other districts in Tanzania.

Interview Process:

The interview will consist of questions related to your experience and difficulties you are encountering on activities of daily living after being diagnosed to have diabetes mellitus. They will also try to elicit factors related to severity of visual impairment as a consequence of diabetes mellitus.

Benefits of this study:

There will be no any cost you will have to incur by participating in this study. The outcome of this research might not have direct benefit to you, but through the information you give us, will be very useful to suggest appropriate measure for the problem you are facing which will be presented to the public health committee in your district where they will be able to take necessary measures for the management of your condition.

Confidentiality:

At all times, I will keep the source of the information confidential and refer to you or your words by pseudonym or anonymous if you have no objections. I shall keep the

contents of the above research interview confidential in the sense that the anonymity or pseudonym noted above will be used in all documents which refer to the interview. The contents will be used for the purposes referred to above, but may be used for published or unpublished research at a later stage without further consent. Any change from this agreement will be renegotiated with you.

Voluntary Participation and withdrawal:

Participation is voluntary, no body has the right to influence or force you against your will to participate in this research. When you agree to be interviewed, some of the questions may touch on issues which you may feel critical and difficult to discuss or giving out information. If there is anything that you prefer not to discuss please feel free to say so. I will not be offended and there will be no negative consequences if you would prefer not to answer a question. I would appreciate your guidance should I ask anything which you find intrusive. In case if you are feeling uncomfortable about continuing to participate in this research, you are free to withdraw at anytime, and there will be no negative consequences to you.

Information about the interviewer

Dr. E. B. Chibuga,

P. O. Box 12114,

Dar es Salaam.

Tel: Mobile: 0754434950

Email: ebchib@yahoo.co.uk

Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact Dr. Ehimario Igumbor who is my supervisor at UWC.

His contact address is:

School of Public Health,

University of the Western Cape,

Private Bag X17,

Bellville 7530,

South Africa.

Tel: +27 82 920 0613 (mobile); +27 21 959 3520 (office)

Fax:+27 21 959 2872

Email: eigumbor@uwc.ac.za

In case he is out of reach, you can contact:

Head of Department:

Dean of the Faculty of Community and Health Sciences:

University of the Western Cape

Private Bag X17

Bellville 7535

This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.

APPENDIX III

CONSENT FORM

Title of Research Project: Prevalence, severity, risk indicators, and impact of visual impairment among diabetic patients in Mkuranga District, Tanzania.

The study has been described to me in language that I understand and I freely and voluntarily agree to participate. My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.

Participant's name…….....

Participant's signature…….

Witness…….

Date……

Should you have any questions regarding this study or wish to report any problems you have experienced related to the study, please contact this study coordinator:

Study Supervisor's Name: Dr. Ehimario Igumbor

University of the Western Cape

Private Bag X17, Belville 7530

South Africa

Telephone: +27 21 959 3520 (office)

Cell: +27 82 920 0613

Fax: +27 21 959 2872

Email: eigumbor@uwc.ac.za

In case if you need further clarification, you can contact me directly through these contacts:

Dr. E. B. Chibuga,

P. O. Box 12114,

Dar es Salaam.

Tel: Mobile: 0754434950

Email: ebchib@yahoo.co.uk

APPENDIX IV

Data collection tool translated in Swahili language

DODOSO

I.	**Maelezo ya awali**	
	Namba ya dodoso	
	Jina la kituo:	
	Tarehe ya mahojiano	
	Jina la anayehoji	

II. **Taarifa za muhojiwa**			
	Mahali anapoishi anayehojiwa	…….	
	Tarehe ya kuzaliwa		
	Jinsia	Mwanaume ……0 Mwanamke …….1	☐
	Hali ya ndoa	Hajaoa/hajaolewa…. 0 Ameoa/ameolewa….1 Kuishi bila ndoa rasmi.2 Kafiwa na mwenzi.….3 Wameachana 4	☐
	Hali ya kazi	Hajaajiriwa ……0	

		Ameajiliwa ……1 Mwanafunzi …..….2 Mstaafu ……..3 Mkulima ……..…..4 Ajira nyinginezo Kwa aliyeajiriwa ¯↓ ▼	☐
		Amejiajiri ….....1 Serikali ……...….2 Taasisi isiyo ya kiserikali ……3 Taasisi ya kidini …..4 Nyingine …….99	☐

	Kiwango cha juu cha elimu	Hajasoma ……..0 Chuo kikuu/taasisi..1 Elimu ya sekondari.2 Shule ya msingi…...3 Nyingine .....4 Eleza ……..	☐
III.	**Taarifa za afya (Clinical data)**		

a.	Kiasi cha sukari kwenye damu		
b.	Uwezo wa kuona kwa jicho lililo bora	6/18 au zaidi ….....1 6/24 – 6/60 ……2 5/60 – 3/60 ……3 Chini ya 3/60 …...4	☐
c.	Uwezo wa kuona kwa jicho lingine	6/18 au zaidi ….....1 6/24 – 6/60 ……2 5/60 – 3/60 ……3 Chini ya 3/60 …...4	☐
d.	Kuna tatizo lolote limeonekana?	Hapana ……0 Ndiyo …..……...1 Kama jibu ni ndiyo ¯↓ Kama ni hapana ▼ Nenda sehemu ya IV swali namba 1.	☐
e.	Tatizo lililo onekana	Mtoto wa jicho……1 Retina .....……..2 Konea ….....3 Mshipa wa neva …4 Lingine, ...…99 Eleza …….	☐

IV. Maswali na viambata:

Na.	Maswali	Majibu	
1.	Ni lini ukigundulika una ugonjwa wa kisukari?	Chini ya mwaka mmoja ……1 Kati ya mwaka 1 – 5 …….2 Zaidi ya miaka 5……..…..3	☐
2 a.	Uliwahi kupimwa macho kwa kipindi cha mwaka mmoja uliopita?	Hapana ……..…0 Ndiyo……..…..1 Kama jibu ni hapana ¯↓, na iwapo ni ndiyo ▼Swali Namba 3.	☐
2 b.	Kwa nini?	Sikuona sababu yoyote .....1 Sikufahamishwa ya kuwa nilitakiwa kupimwa macho ..….2 Gharama ziko juu …….….3 Nilikatishwa tama na watendaji wa afya ……..4 Ugonjwa umenichanganaya …..5 Sina mtu wa kunisaidia kwenda hospitali…….……6 Sababu nyinginezo….....99 Eleza ……	☐
3.	Kwa kawaida, ni wapi huwa unaenda kupata matibabu ya ugonjwa wa kisukari?	Hospitali ya wilaya ……..…1 Kituo cha afya kilico karibu…..2 Hospitali nje ya Mkuranga …..3 Kwa mganga wa jadi ……4	☐

		Sehemu nyingine ..... ……99 Eleza……	
4 a.	Je, unaridhika na huduma unayoipata katika kituo hicho cha afya?	Hapana…….....0 Ndiyo ……..1 Hapana" ¯↓, kama ndiyo ▼Sw. 5	☐
4 b.	Kwa nini hauridhiki?	Tunasubiri huduma kwa muda mrefu..... 1 Sipati fursa ya kumuona daktari.2 Muda wa kumuona mganga ni mfupi sana …….....…….3 Watumishi wana lugha chafu…..4 Dawa hazipatikani.....5 Gharama ziko juu sana…… 6 Nyingine …….....……99 Eleza …….	☐
5.	Ni nani anayekulipia gharama za matibabu ya ugonjwa wa kisukari?	Serikali.....1 Mimi binafsi …….....……2 Watoto wangu……...….3 Wazazi wangu ……4 Kijiji/Jamii yangu ……5 Taasisi ya msaada/dini.....6 Nyingine …….....…99 Eleza…….	☐

6 a.	Tangu umebainika kuwa una kisukari, unafiki ugonjwa huu umekuathiri kwa namna yoyote katika shughuli zako za kila siku?	Hapana……..0 Ndiyo…….1 Ndiyo, ¯↓, Hapana ▼Sw. Namba 7	
6 b.	Shughuli zipi zimeathiriwa? (Jaza mengi kadiri mgonjwa atakavyoeleza)	Hapana …… 0, Ndiyo ……. 1 Kusoma Kutengeza vitu vilivyoharibika Kusafisha nyumba Kuchota maji Kuendesha chombo cha moto Kazi za shamba Kutunza watoto/wajukuu Kutembea wakati wa mchana Kutembea wakati wa usiku Kupika Nyingine ……..99 Eleza…….	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
7 a.	Unafikiri ugonjwa wa kisukari umekupunguzia uwezo wa kuwa na kumbukumbu? Kama jibu ni ndiyo → Kama hapana ¯↓	Umepoteza kabisa …….2 Ni vigumu kukumbuka ….....1 Nina kumbukumbu, lakini nyakati nyingine inaniwia vigumu……1	☐
7 b.	Uwezo wa kuwa makini?	Kuna nyakati unapungua ……...1	

	Kama ndiyo → Kama hapana ¯↓	Najisikia uchovu muda mwingi .2 Nahisi kutaka kulala muda wote.3	
7 c.	Uwezo wa kutimiza na kufuatilia majukumu ya kikazi? Kama ndiyo → Kama hapana ¯↓	Umepungua lakini ninamudu …1 Umepungua lakini ninamudu kwa shida .....2 Umepungua……..…3	
7 d.	Uwezo wa kuzungumza na kuwasiliana na watu? Kama ndiyo→ Kama hapana ¯↓	Umepungua ..……..……1 Naona sijiwezi ……...2 Sijiwezi kabisa ……...3	
8 a.	Je, marafiki na ndugu zako wanajua kuwa una ugonjwa wa kisukari?	Hapana ¯↓8b ……..…..0 Ndiyo ▼8c ……..…1	
8 b.	Kwa nini?	Ninadhani hawaitajiki kujua ….1 Hawajawahi kuniuliza …….2 Naogopa kujulikana na kutengwa …….....…...3 Sababu nyingine (Eleza)..…99 ……. Nenda ▼Sw. namba 9	
8 c.	Unaona wanakujali namna gani?	Napata msaada mkubwa ……1 Hakuna mabadiliko yoyote…..2 Wamechanganyikiwa ……..3	

		Wamenikimbia ….....……4 Nyingine (Eleza) ……99 ……	
9 a.	Bado unajumuika kwenye mikusanyiko ya kijamii? Kama ndiyo → Kama hapana ¯↓	Nimeongeza ……....…….1 Kama hapo awali ……..2 Kama hapo awali lakini ninachukua tahadhari zaidi...3 Nimepunguza ……..4 Nenda ▼ Swali namba 10	☐
9 b.	Kwa nini?	Ninahitaji mtu wa kunisindikiza.1 Ninaogopa kuumia……..2 Si salama kwenda huko ..……..3 Nimekata tamaa…….……4 Nina mzongo mkubwa wa mawazo .....5 Sababu nyingine (Eleza) ……..99 ……..	☐
10.	Je, unafikiri unaweza kumudu kuitunza familia yako na wanaokutegemea?	Ninaweza bila tatizo lolote …….1 Ninaweza, lakini ninahitaji msaada .....……..2 Ninahitaji msaada zaidi kuliko ninavyoweza …….3 Nimewakabidhi watu wengine	☐

		wanisaidie……..4 Sijiwezi kabisa .....…..5	
11.	Unasemaje kuhusu gharama za matibabu ya ugonjwa wa kisukari hapa nchini?	Rahisi …….....….1 Ni ghali lakini ninamudu..……2 Ninamudu kwa shida ……..…..3 Ni ghali na sizimudu ……4	☐
12.	Nini matarajio ya maisha yako ukiwa na ugonjwa wa kisukari?	Maisha mazuri…….…….1 Sidhani kama kuna kitu kitabadilika .....2 Sina hakika ……..3 Maisha magumu …….…….4 Maisha ya kukata tamaa……5 Kifo ……6	☐
13.	Je, una maoni gani kuhusu matibabu ya ugonjwa wa kisukari hapa wilayani kwako? (Kama unayo).	……... ……. ……. ……. …….	

Ninakushukuru sana!

APPENDIX V.

Participant's information sheet translated in Swahili language

Ndugu mpendwa.

Nakushukuru kwa kukubali kwako kusikiliza kuhusiana na utafiti huu. Kifuatacho ni maelezo yanayohusiana na utafiti wangu ambao nimepanga kuufanya ikizingatiwa ya kuwa wewe ni mmoja wa watu muhimu wanaoweza kushiriki.

Utafiti huu unafanywa kwanza ukiwa sehemu ya masomo yangu ya uzamili wa fani ya afya ya jamii katika chuo kikuu cha Western Cape kilichopo jiji la Cape Town nchini Afrika Kusini. Ukishasoma na kuelewa nia na madhumuni ya utafiti wangu, na kukubali kushiriki ukitambua ya kuwa taarifa zako hazitatolewa kwa mtu yeyote. Pia, na haki zako kujitoa kwenye utafiti huu bila kuathirika kwa namna yoyote. Jisikie huru kuniuliza swali lolote kuhusiana na utafiti huu. Njia na anuani za mawasiliano yangu na wasimamizi wangu zimeorodheshwa ndani ya taarifa hii. Tutakuwa tayari kukujibu au kufafanua jambo lolote ambalo hutakuwa umelielewa.

Jina la utafiti huu:

Ukubwa wa tatizo, dalili za hatari na athari za matatizo ya macho kwa wagonjwa wa kisukari katika wilaya ya Mkuranga, Tanzania.

Madhumuni ya utafiti huu:

Ukubwa wa tatizo, dalili za hatari na athari za matatizo ya macho kwa wagonjwa wa kisukari katika wilaya ya Mkuranga ambazo zinahusiana na suala la mahusiano na kipato katika shughuli za kila siku kwa wagonjwa wa kisukari ambao wamepungukiwa na uwezo wa kuona kutokana na ugonjwa wa kisukari.

Mwisho wa utafiti huu, taarifa tutakazozikusanya, zitaweza kutusaidia kupata taarifa za awali kwa wagonjwa wa kisukari wanaohudhuria hospitali ya Wilaya ya Mkuranga, na hapo baadaye tunaweza kutoa mapendekezo ambayo yanaweza kutoa faida kwenye sehemu nyingine kuhusiana na matibabu ya ugonjwa wa kisukari.

Mchakato wa mahojiano:

Mahojiano yatahusu kuulizwa maswali ambayo yatalenga wewe kueleza uzoefu wako na matatizo ambayo unakutana nayo katika shughuli zako za kawaida katika maisha yako ya kila siku tangu ulipogundulika ya kuwa una ugonjwa wa kisukari. Pia maswali yatalenga kupata taarifa sababu ambazo zinaweza kuashiria tatizo kubwa la kuona kutokana na ugonjwa wa kisukari.

Faida za utafiti huu:

Hakutakuwa na gharama yoyote itakayokukuta kwa kushiriki katika utafiti huu. Matokeo ya utafiti huu yanaweza yasiwe na faida ya moja kwa moja kwako, bali kutokana na taarifa utakazotupa, zitatuwezesha kutoa mapendekezo kwenye ngazi husika katika kamati ya Afya ya wilaya ambao watachukua majukumu ya kutekekeleza utatuzi wa matatizo mnayoyapata na hivyo kuweza kukusaidia kwa siku za usoni.

Utunzaji wa siri:

Kwa muda wote, taarifa zitakazokuhusu zitahifadhiwa na kama zitahitajika, basi zitapewa jina au neon ambalo halitakuwa na utambulisho wako.

Matumizi ya taarifa zako hayataenda kinyume na makubaliano tuliyoyaweka kati yangu na wewe. Japo, kama kutakuwa na ulazima wa kuchapisha taarifa zitakazotokana na matokeo ya taarifa tulizozipata kutoka kwako na washiriki wengine tunaweza kuyatoa bila taarifa zaidi kutoka kwako.

Kama kuna mabadiliko yoyote tunataka kuyafanya, basi tutajadiliana nawe kwanza.

Ushiriki wa Hiyari

Kushiriki katika utafiti huu ni hiyari, na wala haulazimishwi na mtu yeyote. Kama utakubali kushiriki katika utafiti huu, kuna baadhi ya maswali utakayoulizwa, yanaweza kuwa na mguso au hisia ambazo zinaweza kukufanya kushindwa kuyajibu. Iwapo utakuwa na hali hiyo, usisite kusema au kukataa kuyajibu kwani hakutakuwa na athari yoyote kwenye utafiti na hata kwako pia.

Iwapo utaona kwa namna yoyote utafiti huu unakukwaza au kukupa shida, unawezakujitoa muda wowote bila sharti lolote.

Maelezo ya kwangu:

Dr. E. B. Chibuga,

S. L. P. 12114,

Dar es Salaam.

Tel: Mobile: 0754434950

Email: ebchib@yahoo.co.uk

Ikitokea una swali la ziada au tatizo lolote unalotaka kuliwasilisha kuhusiana na utafiti huu, Usisite kuwasiliana na msimamizi wa utafiti huu ambaye mawasiliano yake yameaninishwa hapo chini:

Msimamizi wa Utafiti: Dk. Ehimario Igumbor

University of the Western Cape

Private Bag X17, Belville 7530, South Africa

Simu ya ofisini: +27 21 959 3520

Simu ya Kiganjani: +27 82 920 0613

Nukushi: +27 21 959 2872

Barua pepe: eigumbor@uwc.ac.za

Iwapo msimamizi wa utafiti hataweza kupatikana kwa njia za mawasiliano zilizo onyeshwa hapo juu, unaweza kuwasiliana na mkuu wa idara wa chuo kama iliyoainishwa hapo chini.

Mkuu wa idara:

Kitivo cha Afya ya jamii na Sayansi:

Chuo Kikuu cha Western Cape

Private Bag X17

Bellville 7535

Utafiti huu umeidhinishwa na Chuo Kikuu cha Western Cape kutoka kwenye kamati ya idhini ya utafiti

APPENDIX VI

Consent form translated in Swahili language

FOMU YA IDHINI YA USHIRIKI

Jina la shughuli ya utafiti: Ukubwa wa tatizo, dalili za hatari na athari za matatizo ya macho kwa wagonjwa wa kisukari katika wilaya ya Mkuranga, Tanzania.

Nimeelezwa kwa kina na kwa lugha ambayo ninaifahamu vyema madhumuni ya utafiti huu. Nimekubali kwa hiyari yangu kuwa mshiriki katika utafiti huu. Maswali yangu niliyokuwa nayo kuhusu utafiti huu yamefafanuliwa na kujibiwa vyema

Ninatambua ya kuwa taarifa zangu hazitatolewa kwa mtu yeyote. Pia ninaweza kujitoa katika utafiti huu wakati wowote kutokana na sababu yoyote ambayo si lazima kuieleza. Kutokana na hili ninatambua ya kuwa ushiriki wangu utakapokoma kwa sababu yoyote ile, sitaathirika kwa namna yoyote ile.

Jina la mshiriki…….....

Sahihi ya Mshiriki…….

Shahidi…….

Tarehe……

Ikitokea una swali la ziada au tatizo lolote unalotaka kuliwasilisha kuhusiana na utafiti huu, Usisite kuwasiliana na msimamizi wa utafiti huu ambaye mawasiliano yake yameaninishwa hapo chini:

Msimamizi wa Utafiti: Dk. Ehimario Igumbor

University of the Western Cape

Private Bag X17, Belville 7530

South Africa

Simu ya ofisini: +27 21 959 3520

Simu ya Kiganjani: +27 82 920 0613

Nukushi: +27 21 959 2872

Barua pepe: eigumbor@uwc.ac.za

Iwapo utahitaji maelezo zaidi, Tafadhali wasiliana nami kupitia anuani iliyoainishwa hapo chini.

Dk. E. B. Chibuga,

S. L. P. 12114,

Dar es Salaam.

Simu ya Kiganjani: 0754434950

Email: ebchib@yahoo.co.uk