PREVALENCE OF DEPRESSION AMONG PATIENTS WITH DIABETES MELLITUS AND ASSOCIATED FACTORS AT KIGALI UNIVERSITY TEACHING HOSPITAL IN RWANDA

RUTAGARAMA ALEXIS

MPH/0256/13

A Thesis Submitted in Partial Fulfilment for the award of a Master of Public health Degree in Epidemiology of Mount Kenya University

JANUARY 2015
DECLARATION

This research study is my original work and has not been presented to any other institution.

No part of this research should be reproduced without the authors’ consent or that of Mount Kenya University.

Student Name: RURAGARAMA ALEX

Sign___________________________________ Date________________________________

Declaration by the supervisor(s)

This research has been submitted with our approval as The Mount Kenya University Supervisor.

Name: Dr Jean Damascene Iyamuremye

Sign ____________________________ Date________________________
DEDICATION

This research is dedicated to the God Almighty and my family members
ACKNOWLEDGEMENT

I wish to gratefully acknowledge the support and kindness of the following individuals:

First, I extend my deep and sincere thanks to my supervisor, Dr Jean Damascene Iyamuremye for his guidance and invaluable support.

Special thanks to the entire academic staff, administrative staff and lecturers of Mt. Kenya University who worked so hard to enable the completion of this study.

I would as well like to thank all the CHUK healthcare professionals and Diabetic patients who participated in this study, without their commitment, the generous giving of their time and the careful completion of the questionnaires this study would not have been possible. It was a great pleasure to work with them. For this, I will always be grateful.

I would like to acknowledge the help, support and encouragement I received from my parents, brothers and sisters and friends.
ABSTRACT

Medical research indicates that people suffering from non-communicable diseases are also at high risk of getting depression. Depression is also responsible for the greatest proportion of disease burden associated with non-fatal health outcomes, accounting for over 10% of the total years lived with disability. Diabetes and depression have been associated with premature morbidity and mortality. When these conditions coexist, the risk for developing co-morbidities, complications, suffering of patients and associated costs escalates diabetes. Depression is more common among diabetic patients than the general population and can impact on treatment. Research shows there are strong links between depression and diabetes. The aim of this study is to assess the prevalence of depression, to identify the factors associated among diabetic patients consulting Kigali University Teaching Hospital (CHUK). The study population was all adults’ patients with diabetes followed at CHUK who visited internal Medicine department. 537 consulted in 2014 Data were collected through distribution of interview by trained professionals. A sample of 100 diabetic patients was selected using stratified random sampling technique. The Hamilton Depression Rating Scale was used to assess the prevalence of depression. Factors associated with depression were measured using social demographics questionnaires. Result indicated that 29% of the participants had depression, among them 14% had mild depression, 13% for moderated depression, 2% for severe depression. A statistically significant association between depression and age was found ($\chi^2=11.7$, df= 3, p=.009). A statistically significant association between depression and marital status was found ($\chi^2=12.6$, df=3, p=.006). A statistically significant association between depression and others chronic diseases was found ($\chi^2=13.1$, df =1, p=.000). No statistically significant association was found between depression and gender, duration of diabetes, education level, treatment modality, body weight, and religion. Concerning coping strategies 71% of participants used emotion focused disengagement, 64% used problem focused disengagement, and 75% of participants used problem focused engagement, 62% used emotion focused engagement. This work provides reasonable evidence that could be of significant benefit in the implementation of strategies oriented toward preventing depression among diabetic patients.
# TABLE OF CONTENTS

DECLARATION.......................................................................................................................... ii

DEDICATION............................................................................................................................. iii

ACKNOWLEDGEMENT.............................................................................................................. iv

ABSTRACT ....................................................................................................................................... v

TABLE OF CONTENTS ............................................................................................................ vi

LIST OF TABLES ......................................................................................................................... x

LIST OF FIGURES ....................................................................................................................... xi

LIST OF ABBREVIATIONS .......................................................................................................... xii

OPERATIONAL DEFINITION OF TERMS .................................................................................. xiii

CHAPTER ONE: INTRODUCTION ............................................................................................. 1

1.0. Introduction .......................................................................................................................... 1

1.1. Background to the study ...................................................................................................... 1

1.2. Problem statement .............................................................................................................. 3

1.3. Objective of study .............................................................................................................. 4

1.3.1. General objective ......................................................................................................... 4

1.3.2. Specific objectives ........................................................................................................ 4

1.4. Research questions .......................................................................................................... 5

1.5. Significance of the study ................................................................................................... 5
1.6 Limitation of study .......................................................... 5
1.7 Scope of the Study .............................................................. 5

CHAPTER TWO: LITERATURE ......................................................... 6

2.0 Introduction to literature ...................................................... 6
2.1 Theoretical literature ............................................................. 6
2.2 Types of diabetes ..................................................................... 6
  2.2.1 Type 1 ........................................................................... 6
  2.2.2 Type 2 ........................................................................... 7
2.3 Etiology and risk factors of diabetes ............................................ 7
2.4 Depression ............................................................................. 8
2.5 Etiology and risk factors of depression ......................................... 9
2.6 Depression and Diabetes .......................................................... 10
2.7 Coping strategies among diabetes patients .................................... 11
2.8 Empirical literature ................................................................. 12
2.9 Critical review ......................................................................... 16
2.10 Conceptual framework ........................................................... 16
2.11 Summary ............................................................................. 17

CHAPTER THREE: RESEARCH METHODOLOGY ................................. 18

3.0 Introduction ........................................................................... 18
3.1 Research design ...................................................................... 18
3.2. Target population ...................................................................................................................... 18
3.3. Sample design .......................................................................................................................... 18
3.3.1. Sample size Determination .................................................................................................. 18
3.3.2. Sampling Procedure ............................................................................................................ 20
3.4. Data collection procedure ...................................................................................................... 20
3.4.1. Research Instruments .......................................................................................................... 20
3.5. Data analysis procedure ......................................................................................................... 23
3.6. Ethical Considerations ............................................................................................................. 23

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION ......................................................... 24

4.0. Introduction ............................................................................................................................ 24
4.1. Demographic Characteristics of Respondents ........................................................................ 24
4.2. Presentation of Findings ......................................................................................................... 25
4.3. The prevalence of depression among patients with diabetes at CHUK ................................. 25
4.4. Depression and demographics ............................................................................................... 27
4.5. Coping strategies among patients with diabetics at CHUK march 2015 ............................. 34
4.5.1 Depression and coping strategies among patients with diabetics at CHUK march 2015 .... 34

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS ............................... 35

5.0. Introduction ........................................................................................................................... 35
5.1. Summary of Findings .............................................................................................................. 35
5.1.1 Objective 1 to determine the prevalence of depression among diabetic patients consulting at CHUK. ................................................................. 35

5.1.2. Objective 2 to identify the risk factors for depression among diabetic patients consulting at CHUK.......................................................... 35

5.1.3. Objective 3 to explore coping strategies among diabetic patients consulting at CHUK ........................................................................... 36

5.2. Conclusion .......................................................................................... 36

5.3. Recommendations .............................................................................. 37

5.4. Suggestions for further study ............................................................. 38

REFERENCES ......................................................................................... 39

APPENDICES .......................................................................................... 45

AUTHORIZATION LETTER ...................................................................... 46
LIST OF TABLES

Table 4.1: List of the main socio-demographic characteristics of the sample............................... 24
Table 4.2: Depression and sex of participants at CHUK March 2015 .......................................... 27
Table 4.3: Depression and age of participants at CHUK March 2015 ........................................ 28
Table 4.4: Depression and Marital status of participants at CHUK ............................................. 29
Table 4.5: Depression and education level of participants at CHUK ........................................... 30
Table 4.6: Depression and Religion of participants at CHUK March 2015 .................................. 30
Table 4.7: Depression and duration of diabetes mellitus to the participants ................................. 31
Table 4.8: Depression and Treatment modality to the participants at CHUK march 2015 .......... 32
Table 4.9: Depression and Others chronic diseases of participants.............................................. 32
Table 4.10: Depression and Body weight of participants at CHUK March 2015 .......................... 33
LIST OF FIGURES

Figure 2.1: Conceptual framework indicating the independent and dependent variables designed by the researcher ................................................................. 16

Figure 4.2: The prevalence of depression among diabetic patients consulting at CHUK ...... 26

Figure 4.3: The level of the depression mood of participants ................................................. 26
LIST OF ABBREVIATIONS

BMI : Body Mass Index

CHUK : Centre Hospitalier Universitaire de Kigali

DM : Diabetes Mellitus

DSM : Diagnostic and Statistical Manual of Mental Disorders

IDF : International Diabetes Federation

PTSD : Post-Traumatic Stress Disorders

WHO : World Health Organization

EFD : Emotion Focused Disengagement

PFD : Problem Focused Disengagement

EFE : Emotion Focused Engagement

PFE : Problem Focused Engagement

HAMD : Hamilton Depression
OPERATIONAL DEFINITION OF TERMS

**Depression:** a state of low mood and aversion to activity that can affect a person's thoughts, behavior, feelings and sense of well-being. Depressed people can feel sad, anxious, empty, hopeless, worried, helpless, worthless, guilty, irritable, hurt, or restless.

**Diabetes mellitus:** a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produce.

**Coping strategy:** Coping has been defined as a response aimed at diminishing the physical, emotional and psychological burden that is linked to stressful life events and daily hassles.

**Problem focused engagement:** involves cognitive and behavioral strategies to change the situation or to change the meaning of the situation for the individual. These coping efforts are focused on the stressful situation itself.

**Emotion focused engagement:** reflect open communication of feelings to others and increased social involvement, especially with family and friends. These coping efforts are focused on the individual’s emotional reaction to the stressful situation.

**Problem focused disengagement:** reflects denial, avoidance, and inability or reluctance to look at the situation differently. They reflect cognitive and behavioral strategies to avoid the situation.

**Emotion focused disengagement:** includes social withdraw and self-criticism. It involves shutting oneself and one’s feelings off from others, and criticizing or blaming oneself for what happened.
CHAPTER ONE: INTRODUCTION

1.0. Introduction

This chapter contains the background to the study, statement of the problem, specific objectives of the study, the research questions, significance of the study, limitations of the study and the scope of the study.

1.1. Background to the study

Diabetes causes 4.6 million deaths per year, accounting for 8.2% of global all-cause mortality, and it is estimated that 366 million adults have diabetes (IDF, 2011). The global mortality burden of diabetes is not evenly distributed, with low and middle income countries carrying a disproportionate burden. It is projected that by 2030 around 82.5% of people with diabetes will live in developing countries (IDF, 2011). It is associated with high mortality and morbidity including renal, retinal and vascular complications (WHO, Global burden of disease, 2008). Among the many additional complications which coincide with DM, depression, anxiety, tension and stress are most commonly under-detected (Pouwer, Beekman, Lubach, & Snoek, 2006). The literature reports that patients with diabetes are almost twice as likely to suffer from depression and anxiety as the general population (Trento, Raballo, Trevisan, & Sicuro, 2012). The number of diabetes sufferers in Africa remains uncertain, although and IDF estimate from 2000 put the figure at 7.5 million diabetic adults between 20 and 79 years of age (IDF, 2011).

The diabetes is very uncommon in Africa, a situation that seemed to have remained virtually static until the 1990s and more recently (Cook, 1901). Indeed, from 1959 to the mid-1980s,
medical statistics showed that the prevalence rate of diabetes in Africa was equal to or less than 1.4%, with the exception of South Africa, where the rate was estimated to be as high as 3.6% in 2001 (Motala, 2002). But, by 1994, the continent-wise prevalence of diabetes mellitus stood at 3 million and was then predicted to double or triple by the year 2010 (Sobngwi, Mauvais-Jarvis, Vexiau, Mbanya, & Gautier, 2001). Approximately, 7.1 million Africans were said to be suffering from diabetes at the end of 2000, a figure that was expected to rise to 18.6 million by 2030 (Wild, Roglic, Green, Sicree, & King, 2004).

Depression is responsible for the greatest proportion of disease burden associated with non-fatal health outcomes, accounting for approximately 12% of the total years lived with disability (WHO, 2008).

Depression is associated with a wide range of negative consequences, including significant worsening of co-morbid medical conditions, high mortality risk related to suicide, and socioeconomic burden resulting from functional impairment (Kim, et al., 2011). Recently, both diabetes and depression have been associated with premature morbidity and mortality, and when these conditions coexist, the risk for developing co-morbidities, complications, suffering of patients and associated costs escalates (Lin, Heckbert, Rutter, Katon, & Ciechano, 2009).

Three hundred sixty-eight adults were interviewed, of whom 15.5% met Criteria A, C, and E for current major depression. Depressive symptoms were strongly associated with functional impairment in most major roles for men and women (Bolton, Neugebauer, & Ndogoni, 2002).
Therefore, it is relevant to establish the diagnoses of depression in the diabetic patient. The presence of undiagnosed depression among persons with this condition is a cause of concern since these symptoms hinder the initiation of treatment and allows frustration to build up in patients, thereby contributing to poor clinical outcomes (Khuwaja, Lalani, Dhanani, Azam, & Rafique, 2010).

1.2. Problem statement

According to Karinganire of Rwanda Focus (October 10th 2012) medical experts note that the people suffering from non-communicable diseases might also be at high risk of getting depression. Researcher realized that depression is highly related with other chronic diseases. Incidence of diabetes, especially type 2, and is rapidly growing in the world. In 1985, an estimated 30 million people were suffered with this chronic disease, which, by the end of 2006, had increased to 230 million, representing 6% of the world population. Of this number, 80% is found in the developing countries (Khuwaja, Lalani, Dhanani, Azam, & Rafique, 2010). It is estimated that, during the next 35 years, diabetic world-wise prevalence will reach 25%, with India being the hardest hit. Diabetes is very uncommon in Africa, a situation that seemed to have remained virtually static until the 1990s and more recently (Vogelzangs, Suthers, Ferrucci, Simonsick & Ble, 2007). From 1959 to the mid-1980s, medical statistics showed that the prevalence rate of diabetes in Africa was equal to or less than 1.4%, with the exception of South Africa, where the rate was estimated to be as high as 3.6% in 2001 (Danese, Moffitt, Harrington, Milne, & Polanczyk, 2009). But, by 1994, the continent-wise prevalence of diabetes mellitus stood at 3 million and was then predicted to double or triple by the year 2010 (Lin, Heckbert, Rutter, Katon, & Ciechano, 2009). Approximately, 7.1 million Africans were said to be suffering from diabetes at the end of
2000, a figure that was expected to rise to 18.6 million by 2030 (Lin, Heckbert, Rutter, Katon, & Ciechanowski, 2009).

The study done by Nikibakht, Moyayedi et al. (2009) on depression among diabetic patients in Bandarabbas, Southern Iran showed the prevalence 43.5% participants had depression. Little is known about the prevalence of depression among diabetic patients consulting CHUK. It is assumed that diabetic patients consulting CHUK experience depression, but to date, concrete data are limited. There is no existing study exploring the prevalence of depression among diabetic patients consulting CHUK. The purpose of this study is to assess the prevalence of depression among diabetic patients consulting CHUK. It is therefore necessary to establish the frequency and factors associated with depression, since they can be responsible for premature morbidity, mortality, risk of developing co-morbidities, complications, suffering of patients, as well as escalation of costs.

1.3. Objective of study

1.3.1. General objective

To determine the prevalence of depression among diabetic patients consulting at CHUK and to identify associated factors.

1.3.2 Specific objectives

i. To determine the prevalence of depression among diabetic patients consulting at CHUK.

ii. To identify the risk factors for depression among diabetic patients consulting at CHUK.

iii. To assess coping strategies among diabetic patients consulting at CHUK.
1.4 Research questions

i. What is the prevalence of depression among diabetic patients consulting at CHUK?

ii. What are the risk factors for depression among diabetic patients consulting at CHUK?

iii. What are coping strategic used by diabetic patients consulting CHUK?

1.5 Significance of the study

The purpose of this study is to assess and determine the prevalence of depression among diabetic patients consulting at CHUK. Acknowledging that depression exists among diabetic patients consulting at CHUK, the results of this study will help CHUK healthcare providers develop and implement strategies and action to diagnose and to treat depression associated with diabetes.

1.6 Limitation of study

The population of this study was adult’s diabetic patients consulting at CHUK. It did not include children. There is lack of data about depression among patients with diabetes mellitus in Rwanda and sub-Saharan countries. The tools used were not designed for the children.

1.7 Scope of the Study

The study was carrying out over a period of two months of year 2014. It was exploring the prevalence of depression among patients with diabetic mellitus and associated factors. The study population included only CHUK diabetic patients. CHUK University teaching hospital of Kigali is located in the Centre of Kigali city in the District of Nyarugenge. The researcher was considering patients with diabetes mellitus who had been treated at CHUK for a period not less than six months.
CHAPTER TWO: LITERATURE

2.0. Introduction to literature

This chapter contains theoretical review, empirical review, critical review, conceptual framework and summary.

2.1. Theoretical literature

Depression is a common illness worldwide, with an estimated 350 million people affected; and depression is the leading cause of disability worldwide, and is a major contributor to the global burden of disease (WHO, 2012).

The Ministry of Health Dr Agnes Binagwaho, said that depression causes damage to family and the country economy. In Rwanda, a survey conducted in the year 2009 in general population, revealed 28.54% prevalence of Post-traumatic stress disorders (PTSD). Among people suffering from PTSD, depression was the first co-morbid disorder with a prevalence of 53.93%.

Diabetes mellitus is a chronic metabolic disease, characterized by a disorder in the metabolism of carbohydrates, lipids and amino acids, either as a result of decreased insulin secretion, or due to a reduction to insulin sensitivity of the cells of the body cells (Papazafiropoulou, Tamvakos, & Pappas, 2009)

2.2. Types of diabetes

2.2.1. Type 1

Diabetes mellitus is a group of metabolic diseases characterized by elevated blood glucose levels (hyperglycemia) resulting from defects in insulin secretion, insulin action or both.
Insulin is a hormone manufactured by the beta cells of the pancreas, which is required to utilize glucose from digested food as an energy source. Chronic hyperglycemia is associated with micro vascular and macro vascular complications that can lead to visual impairment, blindness, kidney disease, nerve damage, amputations, heart disease, and stroke (American Diabetes Association, 1998).

2.2.2. Type 2
Type 2 diabetes is the result of failure to produce sufficient insulin and insulin resistance. Elevated blood glucose levels are managed with reduced food intake, increased physical activity, and eventually oral medications or insulin. It is typically diagnosed during adulthood (Rosenbloom, Joe, Young, & Winter, 1999).

2.3. Etiology and risk factors of diabetes

Type 1 Diabetes
Caused by the immune destruction of the beta cells of the pancreas, Insulin secretion gradually diminishes; May present at any age, but most common in childhood and adolescence. Insulin by injection is necessary for survival. Contributing factors: – Genetic predisposition – Environmental triggers (infection or other stress)(Pinhas-Hamiel, et al., 1999).

Type 2 Diabetes
Caused by insulin resistance in the liver and skeletal muscle, increased glucose production in the liver, over production of free fatty acids by fat cells and relative insulin deficiency; Insulin secretion decreases with gradual beta cell failure; Reductions in blood glucose levels
often can be achieved with changes in food intake and physical activity patterns. Oral medication and/or insulin injections are eventually required.

**Contributing factors:** – Obesity – Age (onset of puberty is associated with increased insulin resistance) – Lack of physical activity – Genetic predisposition – Racial/ethnic background - Conditions associated with insulin resistance, (e.g., polycystic ovary syndrome)(Pinhas-Hamiel, et al., 1999).

### 2.4. Depression

Depression is a common mental disorder that presents with depressed mood, loss of interest or pleasure, decreased energy, feelings of guilt or low self-worth, disturbed sleep or appetite, and poor concentration. Moreover, depression often comes with symptoms of anxiety (Andrews, Cuijpers, Craske, & McEvoy, 2010). These problems can become chronic or recurrent and lead to substantial impairments in an individual’s ability to take care of his or her everyday responsibilities. At its worst, depression can lead to suicide. Almost 1 million lives are lost yearly due to suicide, which translates to 3000 suicide deaths every day. For every person who completes a suicide, 20 or more may attempt to end his or her life (WHO, World suicide prevention, 2012). There are multiple variations of depression that a person can suffer from, with the most general distinction being depression in people who have or do not have a history of manic episodes.

Depressive episode involves symptoms such as depressed mood, loss of interest and enjoyment, and increased fatigability. Depending on the number and severity of symptoms, a depressive episode can be categorized as mild, moderate, or severe (Andrews, Cuijpers, Craske, & McEvoy, 2010). An individual with a mild depressive episode will have some
difficulty in continuing with ordinary work and social activities, but will probably not cease to function completely (Andrews, Cuijpers, Craske, & McEvoy, 2010). During a severe depressive episode, on the other hand, it is very unlikely that the sufferer will be able to continue with social, work, or domestic activities, except to a very limited extent (Andrews, Cuijpers, Craske, & McEvoy, 2010).

Bipolar affective disorder typically consists of both manic and depressive episodes separated by periods of normal mood. While depression is the leading cause of disability for both males and females, the burden of depression is 50% higher for females than males (WHO, 2008). In fact, depression is the leading cause of disease burden for women in both high-income and low- and middle-income countries (WHO, 2012). Research in developing countries suggests that maternal depression may be a risk factor for poor growth in young children (Rahman, Patel, Maselko, & Kirkwood, 2008).

2.5. Etiology and risk factors of depression

There is no single cause of depression but here are some factors that may contribute to its development: Psychological, Biological and Environment Scientists have also found evidence which makes some people with a genetic predisposition to major depression vulnerable to the disorder. However not everyone with a family history develops depression. Some life event that may trigger episodes of depression: Death of a loved one, Major loss or change, Chronic stress, Alcohol and drug abuse, Heart disease and cancer, medications (Mental health atlas, 2005).
2.6. Depression and Diabetes

Research shows there are strong links between depression and diabetes. Up to half of those living with type 2 diabetes experience depression (Clarke & Currie, 2009). Among people with type 1 diabetes, depression and anxiety disorders are less common, although one in eight is also likely to experience depression. Women with diabetes are more likely than men to experience depression. The connections between depression and anxiety disorders and diabetes are complex (Clarke & Currie, 2009).

Being diagnosed with diabetes can be a shock, resulting in feelings such as denial, anger, guilt or grief. Anxiety and even sadness are all a normal part of adapting to changes in your lifestyle and the way you view yourself. However, for some people these feelings do not pass with time and can lead to persistent depression.

Depression may exist before the diagnosis of diabetes. In fact, depression may double the risk of developing type 2 diabetes. People with depression tend to be less physically active, eat more, and are more likely to smoke – all of which are risk factors for developing type 2 diabetes (Gebel, 2008). In addition, there are biological changes associated with depression that encourage the development of diabetes and if the person is experiencing depression before the diagnosis of diabetes, it can be difficult for them to take in the necessary information about diabetes management and follow management plans. Over time, managing diabetes (regular blood glucose testing, taking medication, following a healthy eating plan and undertaking regular physical activity) can take its toll and leave a person feeling frustrated, fed up, overwhelmed or ‘burnt out’. This may increase a person’s risk of depression.
2.7. Coping strategies among diabetes patients

Coping has been defined as a response aimed at diminishing the physical, emotional and psychological burden that is linked to stressful life events and daily hassles (CR, 1999). Coping is understood to be adaptation activity that involves effort. It is the element of effort which enables us to draw the distinction between coping and ready-made adaptation devices such as reflexes. Coping constitutes constantly changing cognitive, behavioral and emotional efforts to manage particular external and/or internal demands that are appraised as taxing or exceeding the resources of the individual (Lazarus & Folkman, 1984).

Essentially, coping strategies are separated into emotion-focused and problem-focused. An emotion-focused strategy emphasizes that patients try to process their emotions by acting and thinking. When patients use a problem-focused strategy, they believe that they can affect the situation that was caused by their disease or affect their resources to manage the situation, and this type of strategy is important to maintain quality of life. Emotion-focused and problem-focused coping strategies may be used simultaneously or alternately. It is therefore difficult to discriminate between them in the coping process (Carver, et al., 1993). The outcome of the coping process is adaptation or maladaptation. Adaptation is defined as the degree to which patients cope psychologically, socially and physiologically with their chronic illness (Canam, 1993).

Coping with the implications of one's diabetes related problems could be a difficult and often lifelong process. Patients may cope by adjusting their social role to fit the demands and challenges associated with the illness, or they may cope by trying to reframe their experiences viewing the situation in a more positive light. Accepting the reality of the
diagnosis and developing a positive attitude toward treatment is thought to be critical for successful coping and recovery (VA, 2005). Coping is considered one of the core concepts in health psychology and in the context of quality of life, and is strongly associated with the regulation of emotions throughout the stress period (Folkman & Moskowitz, 2004). But there is no consensus as to which coping strategies are most effective, and how well a coping strategy serves the purpose of solving problems, relieving emotional distress.

2.8. Empirical literature

Many studies on depression and diabetes have been done. Although the available literature covers a wide variety of such studies, in this review, focus has been put on the prevalence of depression in diabetes. Literature from studies that have been done internationally, regionally.

A study conducted on Depression among diabetic patients in Bandarabbas, Southern Iran; the objective was to screen a random selection of diabetic patients attending the diabetes clinic of Shahid Mohammadi hospital, Iran for anxiety and depression. The result shown that Prevalence of depression and anxiety was 50 and 67 percent respectively (Nikibakht, Moyayedi, zare, Mahboobi, & Banaei, 2009).

A research conducted on High levels of depression in Diabetic Patients with Charcot foot in South London (King’s College Hospital). Aim of the study was to access mental health in Diabetic patients with Charcot foot and to investigate the moderating effect of socio-demographic factors. The results Anxiety and depression level were high (Anxiety and depression score 6.4 ± 4 and 6.3± 3.6 respectively) (Sahra, Charles, Matthew, James, Shuttleworth, & Jorg, 2014).
A study conducted on depression among outpatients with type 2 diabetes: A multi-centre study of prevalence and associated factors in Karachi, the largest city and economic hub of Pakistan. The Results: Overall, 57.9% (95% CI = 54.7%, 61.2%) and 43.5% (95% CI = 40.3%, 46.8%) study participants had anxiety and depression respectively(Khuwaja, Saima Lalani, & Raheem, 2010).

A Research done on anxiety and depression in patients with type 2 diabetes mellitus, depending on sex and body mass index in diabetic medical centers of Attica basin Greece. 
Results: 56% of the participants were women (n=174), while men percentage was 44% (n=136). Percentages of anxiety symptoms in women were three times higher in comparison to men, 62% (n=136) of women were presented with HADS-A>8 in contrast to 21% (n=29) of men (p<0.001). Women had a twofold percentage of depression symptomatology than men, as 41.4% (n=72) of women were presented with a HADS-A>8 in comparison to men’s 17, 8 % (n=24). When the relation between sex, age and Body Mass Index (BMI) and depression symptoms was examined, it was shown that high BMI favors the occurrence of modest or severe symptomatology, as risk increases for any additional BMI unit.(Koulouri, Roupa, Sotiropoulou, & Makrini, 2009)

A study conducted in Nigeria, 211 patients satisfied the study’s inclusion criteria and were approached, and of whom 200 consented to participate in the study (94% participation rate). The 30% respondents in the index group met a SCAN diagnosis for a depressive disorder according to the ICD-10, which was significantly higher than the proportion of 9.5% who met a SCAN diagnosis of depression in the control group (χ²=26.51, df=1, p<0.001). Of those in the index group who had a depressive disorder, 31 (51.7%) met the SCAN criteria
for mild depression, 22 (36.7%) were moderately depressed, and the remainder had severe depression. (James, Omoaregba, Eze, & Morakinyo, 2010)

A study conducted on Prevalence of Depression among Type 2 Diabetic Outpatients in Black Lion General Specialized Hospital Addis Ababa, Ethiopia 2014 was a cross-sectional study design was used to assess the prevalence of comorbid depression among patients with type 2 diabetes mellitus. Result. Totally 264 type 2 diabetic outpatients were interviewed with a response rate of 95.6%. The prevalence of depression among type 2 diabetic outpatients was 13%. Based on PHQ9 score, 28.4% fulfilled the criteria for mild depression, 12.1% for moderate depression, 2.7% (7) for moderately severe depression, and 1.5% for severe depression (Tesfa Dejenie Habtewold, Yosef Tsige Radie, & Nigussie Tadesse Sharew, 2014).

A study done on factors associated with depression and suicide among patients with diabetes mellitus and essential hypertension in a Nigerian teaching hospital. The aim of the study was to assess the prevalence of depression and suicidal behaviour in subjects with diabetes mellitus and essential hypertension and also determine the socio-demographic correlates. Result of study, the prevalence of depression for the subjects with DM was 27.8% and 26.7% for essential hypertension. The subjects with DM had prevalence of 6.3% for suicidal behaviour while essential hypertension had 7.8% (Igwe, et al., 2013).

A study done on diabetes and depression comorbidity and socio-economic status in low and middle income countries (LMICs). The aim of this review was to systematically map the evidence for the association of socio-economic status with diabetes and depression comorbidity in low and middle income countries. The Studies show some evidence that the
occurrence of depression among people with diabetes is associated with lower socio-economic status. The small evidence base that considers diabetes and depression in low and middle income countries is out of step with the scale of the burden of disease (Leone, et al., 2012).

A study conducted on the association between depression, quality of life, and the health care expenditure of patients with diabetes mellitus in Uganda is a cross-sectional survey of 437 patients with DM at 3 DM clinics in Uganda. Participants were assessed for depression, blood sugar levels, diabetic neuropathy, quality of life, and health care expenditures. Result of study the prevalence of depression was 34.8%. Depressed participants were more likely to be suicidal (Akenaa, et al., 2015).

A study done by ZABLON NYABERI for the award of master of science in mental health nursing degree of the university of nairobi form kenya 2014 on the correlates of undiagnosed depression among patients attending the diabetes outpatient clinic at moi teaching and referral hospital. A cross-sectional study was conducted among 181 diabetes patients on follow-up at Moi Teaching and Referral Hospital (MTRH). The objectives of the study were to determine the prevalence and the factors associated with undiagnosed depression among diabetes patients. The symptoms of depression were assessed using Beck’s Depression Inventory II (BDI-II). Depression was observed in 19% of the study participants.

A study conducted on prevalence of anxiety and depression among diabetic Africans patients in Guinea. Aim of study- prevalence and risk factors associated with symptoms of anxiety and depression were determined in African people with diabetes. This cross-sectional study involving 491 out-patients with type 2 diabetes recruited from four diabetes clinics (Conakry,
Labé, Boké, Kankan) in Guinea was carried out. Results.- Anxiety and depression symptoms were present in 58.7% and 34.4% of the 491 people with Type 2 diabetes (Camara, et al., 2013)

2.9. Critical review

Although the concept of depression and diabetes mellitus is gaining attention worldwide, a review of the literature found that many researchers focused their studies on the prevalence of depression and anxiety among diabetic patients and they did not study moderating factors like coping strategies which can influence relationship and there is no current literature found on studies that assessed the prevalence of depression and associates factors among diabetic patients at CHUK.

2.10. Conceptual framework

**INDEPENDENT VARIABLE**

- **Diabetes mellitus:**
  - Age
  - BMI
  - Treatment modality
  - Duration of illness

**DEPENDENT VARIABLE**

- **Depression**
- **Somatic symptoms:** headache, muscle aches.
- **Loss of energy and fatigability**
- **Psychological symptoms:** (Sadness, hopeless, worthless.....)

**INTERVENING VARIABLES**

- Co morbidities illness
- Coping strategies
- Social support

*Figure 2.1: Conceptual framework indicating the independent and dependent variables designed by the researcher*
The model shows the independent variables, dependent variables and modifying variables. The researcher looked at how changes or alterations in the independent variables affected the dependent variables. Being diagnosed with diabetes can be a shock, resulting in feelings such as denial, anger, guilt or grief. Anxiety and even sadness are all a normal part of adapting and coping to changes in your lifestyle and the way you view yourself. However, for some people these feelings do not pass with time and can lead to persistent depression.

2.11. Summary

This chapter consists of literature review of the study. It gives in detail the two variables which were included in the study. First, the Diabetes mellitus has been reviewed with its definition, classification of diabetes, Etiology and risk factors of diabetes. Second, Depression has been defined, risk factors of depression and their classification. This chapter presents different existing studies done on depression among diabetic patients; these studies explore depression prevalence, the association between depression and diabetes. This chapter makes a critical review and towards the end, it states the theoretical framework. The purpose of this study will be to assess the prevalence of depression among diabetic patients consulting at CHUK, to identify the risk factors of depression and to examine the relationship between depression and diabetic.
CHAPTER THREE : RESEARCH METHODOLOGY

3.0. Introduction

This chapter covers all steps, strategies and procedures for gathering and analysing data of this study. It includes design of the study, target population, sample size and sampling procedure, data collection instruments together with its validity and reliability and procedures to be used during data collection. It also presents about data management which shows the ways that the results will be analysed and presented. Finally it covers ethical consideration.

3.1. Research design

A cross-sectional descriptive study was conducted immediately after research authorization was granted. Research was conducted among patients with diabetic confirmed diagnosis at least Six months prior to the start of the study of Type 1 or 2 diabetes at CHUK.

3.2. Target population

The study population was all adults’ patients with diabetes followed at CHUK who visited internal Medicine department. 537 consulted in 2014

3.3. Sample design

3.3.1. Sample size Determination

A sample is a segment of the population selected to represent the population as a whole. The eventual sample size is usually a compromise between what is desirable and what is feasible. The feasible sample size is determined by the availability of resources. It is also important to remember that resources are not only needed to collect the information but also to analyse it.
Lwanga and Lemeshow (1991) provided a formula to calculate sample size in one sample situation by estimating a population proportion (P) with specified relative precision (\( \varepsilon \)), with a 95% confidence level. The international prevalence of depression in individuals with diabetes will help the researcher to calculate the sample size. Globe perspective published 31% as internationally prevalence rates of major depression in people with diabetes on 25 January 2010 (Egede, E, & Ellis, 2010). The sample size was determined based on the formula as follows:

\[
 n = z^2 \left( 1 - \alpha/2 \right) \left( 1 - P \right) / \varepsilon^2 P
\]

With

N: sample size

Z: z-score that correspond to an alpha level

\( \alpha \): alpha level: a criterion for accepting or rejecting a null hypothesis

P: anticipated population proportion

\( \varepsilon \): relative precision

Confidence level: level at which the researcher is confident that he/she has made the right decision in rejecting the null hypothesis

In this study;

P = 31% = .31

\( \varepsilon = .31 \)

\( \alpha = 0.05 \)

Confidence level = 95%

\( z_{(1 - \alpha/2)} = \pm 1.96 \)

\[
 n = z^2 \left( 1 - \alpha/2 \right) \left( 1 - P \right) / \varepsilon^2 P
\]
Thus, \( n = (\pm 1.96)^2 (1-0.31)/ (0.31)^2 0.30 = (3.8416)0.7/ (0.09)0.31=2.68/0.027=99.25 \approx 100 \)

Therefore, a minimum sample size of 100 patients was used.

### 3.3.2. Sampling Procedure

The researcher was used purposive (judgmental) sampling technique. The researcher was working in close collaboration with doctors who treat diabetic patients. After patient consultation, doctors were informing the diabetic patients about the study and they were inviting the patients to participate in the study. Patients who accepted to participate in the study were sent to the researcher, and then the research was explaining the consent form to the patients. After explaining the consent form and answering all patients’ questions and concerns, the participants signed the consent form and the researcher proceeded to participants’ interview.

### 3.4. Data collection procedure

#### 3.4.1. Research Instruments

The Hamilton Depression Rating Scale has been the gold standard for the assessment of depression for more than 40 years. The Hamilton Depression Rating Scale is a 21-item scale that evaluates depressed mood, vegetative and cognitive symptoms of depression. It provides ratings on current DSM-IV symptoms of depression, with the exceptions of hypersonic, increased appetite, and concentration/indecision. The HAMD was originally designed to be administered by a trained clinician using a semi-structured clinical interview (Williams, 1988). The Hamilton Depression Scale was not designed to be self-administered because of the difficulty of interpretation of some of the clinical terms. The researcher used the Kinyarwanda version of Hamilton test. The Kinyarwanda version of this instrument was
adapted to Rwandan patients by health care professionals at Hospital Neuro-Psychiatrique Ndera.

The internal consistency reliabilities of the HAMD sub-scales were calculated using Cronbach’s alpha coefficient. Alpha coefficients for depression were 0.86 and 0.78 respectively, indicating good reliability. (Zigmond & Snaith, 1983).

(HAMDS data was initially analyzed using standard classifications: The scale consists of 21 items and measures constructs, depression with cut-off points for severity (scores: 0–7 normal; 8–10 mild; 11–14 moderate; and 15–21 severe (Snaith, 2003).

Diabetes related information and demographics were provided by patients on a self-designed recording sheet: patient age at time of treatment, gender, type of treatment, marital status (married/cohabiting, separated/divorced, single, other), occupational status.

Coping strategies of participants was measured by the CSI-SF, which is a 16-item checklist comprised of emotional, behavioral and cognitive abilities (Addison, Campbell, & Sarpong, 2007). All the coping subscales had marginal to acceptable levels of internal consistency (0.58-0.72). The items are measured on a 5-point Likert scale where 1= never to 5= almost always. The inventory is comprised of four subscales: problem-focused engagement (PFE) (4 items), emotion-focused engagement (EFE) (4 items), problem-focused disengagement (PFD) (4 items), and emotion-focused disengagement (EFD) (4-items). The potential scores for each of the four subscales range from 4-20. The items for each of these are presented in Appendix I. The EFE scale measures dealing with a stressor through seeking involvement of family and social support, and the PFD scale measures avoidance of the stressor (e.g., trying not to think about the problem and hoping the problem would take care of itself). High scores on the PFE scale indicate that coping by optimism and active problem solving. High scores on
the EFD scale mean that coping by using withdrawal and negative self-evaluation (e.g., self-blame and self-criticism).

Validity and Reliability of the Research Instruments

Validity

Validity refers to the degree to which an instrument measures what is supposed to be measuring (Polit & Hungler). The research instruments which were used to measure the prevalence of depression among diabetic patients at CHUK was properly calibrated by defining each concept and were assessed for content validity by rating the items for readability, clarity and comprehensiveness and come to some level of agreement as to which items should we included in the final instrument. To insure content validity, the instrument items were partly adapted from the questionnaire of the Rwanda Demographic and Hospital Neuro-Psychiatrique Ndera (Rwanda) that are used to diagnosis depression. To assess whether the instrument was cover all dimensions of the construct, literature and experts in the field were consulted. Also, were evaluated by my supervisor at the Mount Kenya University and during the pre-testing of the instrument.

Reliability

Reliability is the consistency of an instrument or a measure. In this study test-retest method were used to determine the reliability of the study instruments. Test-retest was a measure of the stability of response over time in the same group of respondents. The researcher was administering the research instrument to the same individual at two different points in time.
3.5. Data analysis procedure

Data was entered into a computer using Microsoft Excel 2007 and Data was analysed using SPSS. Descriptive statistics (frequencies, means and standard deviations) were used to tabulate and describe the data. For analytical statistics, \( X^2 \) and fisher’s exact tests used to test the association in order to answer the objective. The quantitative findings were presented in tables, figures and chats.

3.6. Ethical Considerations

Ethical clearance and approval was obtained from Mount Kenya University School of Public Health Institutional Review Board (IRB). The study received the authorization from the CHUK. At an individual level, written consent (1 Appendix) was received from each participant before data collection. Respondents received detailed information and description of the research and the fact that their participation was voluntary and they can withdraw at any point if they so deemed. The respondents’ anonymity and confidentiality was assured by using codes instead of their names; hence no information could be linked to specific respondents. Furthermore, confidentiality was guaranteed through storage of the completed data collection tools in a safe, locked place, and only researcher and researcher assistant were had access to the data collected.
CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.0. Introduction

This chapter presents the research findings objective by objective, it presents in details demographic characteristics of respondents and it concludes with the discussion of these research findings.

4.1. Demographic Characteristics of Respondents

Table 4.1: List of the main socio-demographic characteristics of the sample

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>43</td>
<td>43</td>
</tr>
<tr>
<td>Female</td>
<td>57</td>
<td>57</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 20 years</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>20-30 years</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>30-50 years</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>More than 50 year</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/ never married</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>Married</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Widowed</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catholic</td>
<td>46</td>
<td>46</td>
</tr>
<tr>
<td>Muslim</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Protestant</td>
<td>31</td>
<td>31</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Education level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Primary</td>
<td>53</td>
<td>53</td>
</tr>
<tr>
<td>Secondary</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>University</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Body weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 50 kg</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>50 kg- 80 kg</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>More than 80 kg</td>
<td>51</td>
<td>51.0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>
In view of the table 4.1 the sample consisted of 100 participants. The majority of participants were females (57%) and the minorities were males (43%). The age of the participants was distributed as follow; 1% of the participants were less than 20 years old, 24% of the participants were between 20 and 30 years old, 30% of the participants were between 30 and 50 years old and 45% of the participants were above 50 years old.

Fourteen of participants (14%) reported that they were single, 39% were married, 13% were divorced or separated and 34% were widowed. 46% of the respondents were catholic Christian and 31% were protestant Christian, 5% of the respondents were Muslim, 18% of respondents were Others.

Education level of the participants varied between illiterate, Primary, Secondary and University. 22% of the participants were illiterate, 53% of the participants were primary level, 21% of the participants were secondary level and 4% of participants were university level. The body weight of participants: 1% was less than 50kg, 48% of participants the body weight was varied 50kg-80kg, 52% of participants the body weight was more than 80kg.

4.2. Presentation of Findings

This presents the results obtained according to the objectives of this study

4.3. The prevalence of depression among patients with diabetes at CHUK

This presents the results related to objective one which is to determine the prevalence of depression among diabetic patients consulting at CHUK
Figure 4.2: The prevalence of depression among diabetic patients consulting at CHUK

As shown in the figure 4.2 the prevalence of depression among diabetic patients tested 29% of the participants had depression and 71% of participants were not depressed.

Figure 4.3: The level of the depression mood of participants

According figure 4.3 the level of the depression mood among them 48% had mild depression, 45% had moderate depression and 7% had severe depression.

The prevalence of depression among participants was 29%. The depression scores were significantly higher and more frequent in diabetic case. This prevalence is high if compared with that found by Chaoyang, Ford, Strine and Mokdad (2006) among US adults with
diabetes, the prevalence was 8.3%. It is also low if it is compared to that found by Nikibakht, Moyayedi, et al (2009) on depression among diabetic patients in Bandarabbas, Southern Iran. They found the prevalence of 43.5%. A possible explanation for the differences in prevalence could be attributed to the different measurement scales used to determine the presence of depression and the lifestyle of the population. These study findings confirm that there is an association between depression symptoms and DM. While our findings do not determine the direction of whether diabetes causes the onset of depression or vice versa, other studies have noted a direction.

4.4. Depression and demographics

The researcher examined the relationship between demographics and depression.

Table 4.2: Depression and sex of participants at CHUK March 2015

<table>
<thead>
<tr>
<th>Gender</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>71</td>
</tr>
</tbody>
</table>

As shown in the table 4.2 among 43 male participants 9 males had depression and 57 females 20 females had depression. Using Pearson chi square association tests, no statistically significant association between sex and depression was found.

The chi square test was run to test the association between sex and depression. There was no statistically significant association between sex and depression. These results are similar to those of Amit, Ethiraj, Anil (2009). Prevalence and determinants of depression in type 2 diabetes patients in a tertiary care centre. However, Roupa, Koulouris, al (2009) in their
study depression in patients with type 2 diabetes mellitus, depending on sex and body weight found statistically significant association between sex and depression.

Table 4.3: Depression and age of participants at CHUK March 2015

<table>
<thead>
<tr>
<th>Age</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Less than 20 years</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>20-30 years</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>30-50 years</td>
<td>8</td>
<td>22</td>
</tr>
<tr>
<td>More than 50 year</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>71</td>
</tr>
</tbody>
</table>

As shown in the table 4.3 depression and age, the participants aged less than 20 years none had depression, 24 participants aged 20-30 years 2 of them had depression, 30 aged 30-50 years 8 of them had depression and the 45 participants aged more than 50 years 19 had depression. Using Pearson chi square association tests, a statistically significant association between depression and age was observed ($\chi^2=11.7$, df= 3, p=.009). The association between age and depression was found. The most of participants were found to the study were age more than 50 years old and were widowed which is one of which must be “depressed mood” they are more risk likely experienced symptoms of depression and other explanation. It is well that older patients face many challenges including isolation, more diseases and disabilities; hence making them more prone to developing psychological conditions. This is in line with previous research describing age and depression. A study conducted in Bosnia Herzegovina in 2007 among patient with diabetes the prevalence of depression was 36% (32% in male and 39% in female) and it showed that the higher prevalence was in the age group 51-80 years which was a consistent finding to our study (Leonard & Charles, 2010). Advancing age is usually associated with depression as has been shown in earlier studies and
more so in patients with DM, as was also observed in our study (Katon, Simon, & Russo, 2004).

Table 4.4: Depression and Marital status of participants at CHUK

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Single/ never married</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Married</td>
<td>7</td>
<td>32</td>
</tr>
<tr>
<td>Married</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Widowed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>29</td>
<td>71</td>
</tr>
</tbody>
</table>

The table 4.4 shows that 14 single/ never married 1 of them had depression, 39 married participants 7 of them had depression, 13 divorced/separated 6 of them had depression, and 34 widowed 15 of them were depressed. Using person Chi square association test, a statistically significant association between depression and marital status was observed ($\chi^2=12.6$, df=3, p=.006). In the present study, depression symptoms were significantly associated with the marital status of the subjects studied with single, married, divorced or separated and widowed. This finding is in line with the other studies who reported depression to be significantly associated with marital status done by (Jose, Tellez, Mario, & Cardiel, 2004). However, Bin Chen, Xiyao Zhang, Xiuping Xu et al 2013 In the study Diabetes education improves depressive state in newly diagnosed patients with Type 2 diabetes; depending on marital status found none statistically significant association between marital status and depression.
According 4.5 depression and education level, 22 illiterate participants 10 of them had depression, 53 had primary level 15 of them had depression, 21 had secondary school level 4 of them were depressed , 4 had university level none of them had depression. Using Pearson chi square association tests, No statistically significant association between education level and depression was found. The patients with higher education levels (above high school) could understand the scale contents quickly and easily, but their compliance was not good for they would like to compare the methods and make some trials, which might be the reason for their sensitivity to depression. However, the trend needs further evidence to exclude that whether it was only a bias.

Table 4.5: Depression and education level of participants at CHUK

<table>
<thead>
<tr>
<th>Education level</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Illiterate</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Primary</td>
<td>15</td>
<td>38</td>
</tr>
<tr>
<td>Secondary</td>
<td>4</td>
<td>17</td>
</tr>
<tr>
<td>University</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>

Table 4.6: Depression and Religion of participants at CHUK March 2015

<table>
<thead>
<tr>
<th>Religion</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Catholic</td>
<td>14</td>
<td>32</td>
</tr>
<tr>
<td>Muslim</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Protesta nt</td>
<td>11</td>
<td>20</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>
As table 4.6 shown 46 Catholic Christians 14 of them had depression, 5 muslin none of them were depressed, 31 protestants Christians participants in the study 11 of them had depression and 18 others religion 5 of them had depression. Using Pearson chi square association tests, No statistically significant association between religion and depression was found. However the association between religion and depression was found in the study done by (B, Cummings, & Levine, 2009) the prayer, religious reading, religious attendance, and religious belief proved protective against depressive symptoms.

Table 4.7: Depression and duration of diabetes mellitus to the participants

<table>
<thead>
<tr>
<th>Duration of DM</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Less than 1 years</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>2-5 years</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>5-10 years</td>
<td>13</td>
<td>19</td>
</tr>
<tr>
<td>More than 10 years</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>29</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>

In view of the table 4.7 the participants had diabetes mellitus less than 1 years none of them had depression, 39 of participants had diabetes mellitus 2-5 years 9 of them had depression 32 had diabetes mellitus 5-10 years 13 of them were depressed and 19 had diabetes mellitus more than 10 years 7 of them had depression. Using Pearson chi square association tests, No statistically significant association between duration and depression was found. The depression was not significant associated with duration of diabetes. However the study done by (Dejene, Negash, Tesfay, Jobst, & Abera, 2014). Showed that among respondents with II DM, (46.9%) of the participants were found significantly association between treatment modality and duration of diabetes.
As shown in Table 4.8, 50 participants using oral medication, 10 of them had depression, 28 using any insulin 12 of them had depression and 22 using others treatment modality 7 of them were depressed. Using Pearson chi square association tests, no statistically significant association between treatment modality and depression was found. The depression was not significant associated with modality of treatment and religion. However, the study done by (Dejene, Negash, Tesfay, Jobst, & Abera, 2014). In their study among respondents with II DM, (46.9%) of the participants were found significantly association between treatment modality.

According to Table 4.9, 54 participants had diabetes mellitus none other chronic diseases, 8 and of them had depression, 46 participants had diabetes with others chronic diseases, 21 of them had depression. Using Pearson chi square association tests, a statistically significant
association between others Chronic diseases and depression was observed ($\chi^2=13.1$, df =1, p=.000). The researcher reported a significant association of other chronic diseases with depression. This is consistent with the previous research in Pakistan (Khan, Saima, Lalani, & Raheem, 2010). Also found similar results, they stated that the other chronic diseases is among the most influential variables related to depressed mood and it could prove to be strong predictors of depression. It is well documented that development of others chronic diseases and depression in people with diabetes not only leads to increased disease severity, complications, work disability, poor quality of life but is also associated with increased use of medical services and substantially higher health care costs.

### Table 4.10: Depression and Body weight of participants at CHUK March 2015

<table>
<thead>
<tr>
<th>Body weight</th>
<th>Depression</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Less than 50 kg</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>50 kg- 80 kg</td>
<td>12</td>
<td>35</td>
</tr>
<tr>
<td>More than 80 kg</td>
<td>17</td>
<td>34</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>29</td>
<td>71</td>
</tr>
</tbody>
</table>

As shown in Table 4.10 that 2 participants had less than 50kg none of them had depression, 47 had 50kg-80kg 12 of them had depression and 51 participants had more than 80kg 17 of them had depression. Using Pearson chi square association tests, no statistically significant association between body weight and depression was found. These results are similar to those of Amit, Ethiraj, Anil (2009) Prevalence & determinants of depression in type 2 diabetes patients in a tertiary care centre. There was no statistically significant association between body weight and depression. However, Roupa, Koulouris, al (2009) in their study
depression in patients with type 2 diabetes mellitus, depending on body weight found statistically significant association with depression.

4.5. Coping strategies among patients with diabetics at CHUK march 20015

Coping strategies among participants, 71% used emotion focused disengagement as coping strategy, whereas, 29% of participants did not. 64% used problem focused disengagement 36% of participants didn’t use coping strategy. 62% used emotion focused engagement whereas 38% of participants no practice for emotion focused engagement and 75% using Problem focused engagement, 25% no practice of participants found on problem focused engagement.

4.5.1 Depression and coping strategies among patients with diabetics at CHUK march 20015

Depression and emotion focused disengagement statistically significant association between practice of coping strategy on emotion focused disengagement and depression was observed ($\chi^2=8.3$, df=1, p=.004) and a statistically significant association between practice of coping strategy on problem focused disengagement and depression was observed ($\chi^2=7.5$, df=1, p=.006).

No statistically significant association between practice of coping strategies on emotion focused engagement and problem focused engagement and depression was found.
5.0. Introduction

This chapter contains a summary of the research findings objective by objective. It draws a conclusion and it makes recommendations. Finally it gives suggestions for further study.

5.1. Summary of Findings

The result of the study was obtained from data collected using an interview addressed to the patients with diabetes mellitus consulting at CHUK.

5.1.1 Objective 1 to determine the prevalence of depression among diabetic patients consulting at CHUK.

The prevalence of depression among patients with diabetes mellitus 29% of the participants had depression, among them 14% had mild depression, 13% had moderate depression and 2% had severe depression.

5.1.2. Objective 2 to identify the risk factors for depression among diabetic patients consulting at CHUK.

To identify the risk factors for depression among diabetic patients consulting at CHUK. The Pearson chi-square test was used to characterize the relationship between variables and to identify factors associated with depression. The risk factors associated for depression were age, marital status, and other chronic diseases and sex, duration of diabetes, body weight, modality treatment, and religion were not significantly associated with depression.
5.1.3. Objective 3 to explore coping strategies among diabetic patients consulting at CHUK

The coping strategies among diabetic patients 71% used emotion focused disengagement as coping strategy, whereas, 29% of participants didn’t. 64% used problem focused disengagement 36% of participants didn’t use coping strategy. 62% used emotion focused engagement whereas 38% of participants no practice for emotion focused engagement and 75% showing practice on Problem focused engagement, 25% no practice of participants found on problem.

5.2. Conclusion
The purpose of this cross sectional study was to assess the prevalence of depression, to identify the factors associated with the depression, to assess coping strategies among diabetic patients. The primary problem identified was the worryingly prevalence of depression among participants. The second problem was the identification of factors associated with depression of the participants; the third one was the exploration of coping strategies among participants.

Depression is still a worldwide serious and growing problem that affects a significant proportion of diabetic patients. Depression is dangerous to diabetic patients and expensive for organizations.

This work provides reasonable evidence that could be of significant benefit in the implementation of human resource policies: CHUK responsible managers could reduce the prevalence of depression among diabetic patients followed at CHUK by to implement strategies oriented toward reducing prevalence of depression. This study showed high
prevalence of depression in patients with diabetes. The risk factors for depression were age, marital status, others chronic diseases and gender, education level, religion, treatment modality duration of diabetes and body weight was not significantly associated with depression.

5.3. Recommendations
Based on the worryingly prevalence of depression among diabetic patients at CHUK, the researcher formulated the following recommendations:

Depression should be managed like any other diseases are once identified; the degree of risk should be assessed and controlled.

As results showing that depression exists among diabetic patients at CHUK, medical unit must develop and implement plans and strategies to treat, prevent and control the depression to the diabetic patients.

In view of the data and findings noted above, it is recommended that:
CHUK should help in the elaboration of special strategies for prevention depression among diabetic patients, the hospital should support in the establishment of diabetic patients associations, and it also should establish a program of sensitization to the population on measure of limitation and preventive for depression. Finally, it should provide health education to the diabetic patients about depression and their impact.
Once established, the ongoing review and evaluation of the specific strategies and plans that have been implemented to prevent and control depression must be put in place. The evaluation and review process should ensure that the strategies implemented are effective in preventing and treatment with diabetic patients on depression problem.
5.4. Suggestions for further study

This study is not exhaustive. The researcher would like to formulate some suggestions to future researchers to further build on this work and explore other related themes. Future research is needed to address the following topics: The impact of depression on diabetic patients, the assessment of depression among patients with others chronic disease, Management of depression with diabetic patients.
REFERENCES


APPENDICES
AUTHORIZATION LETTER

Appendix 1: Letter of Introduction from Mount Kenya University

Mount Kenya University

SCHOOL OF POST GRADUATE STUDIES
RESEARCH AUTHORIZATION

11th February, 2015

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

MR. RUTAGARAMA ALEX - MPH/0256/13

This is to confirm that the above named person is a bona fide student of Mount Kenya University (Kigali Campus). He is currently carrying out research work to enable him complete his Master of Public Health (Epidemiology Concentration) degree program. The title of his research is:

PREVALENCE OF DEPRESSION AMONG PATIENTS WITH DIABETES MELLITUS AND ASSOCIATED FACTORS AT KIGALI UNIVERSITY TEACHING HOSPITAL IN RWANDA

The information received will be confidential and for academic purpose only. Any assistance accorded him to complete this study will be highly appreciated.

Thank you.

[Signature]

Tom Mulegi PhD
COORDINATOR, SCHOOL OF POST GRADUATE STUDIES
Appendix 2: Authorization letter from CHUK

CENTRE HOSPITALIER UNIVERSITAIRE
UNIVERSITY TEACHING HOSPITAL

Ethics Committee / Comité d'éthique

March 23, 2015

Review Approval Notice

Dear Rutagarama Alex,

Your research project: “Prevalence of Depression among patients with Diabetes mellitus and associated factors at Kigali University Teaching Hospital.”

During the meeting of the Ethics Committee of Kigali University Teaching Hospital (KUTH) that was held on 23/03/2015 to evaluate your protocol of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your protocol.

You are required to present the results of your study to KUTH Ethics Committee before publication.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

[Signature]

Dr. Stephen Rulisa
The President of the Committee.
Kigali University Teaching Hospital.

<<University teaching hospital of Kigali Ethics committee operates according to standard operating procedures (SOPs) which are updated on an annual basis and in compliance with GCP and Ethics guidelines and regulations>>
BLANK QUESTIONNAIRE

Appendix 3: Informed consent

I am RUTAGRAMA ALEX, A student at Mount Kenya University in public health-Epidemiology; I am conducting this study in Partial Fulfilment of the Requirements for the Masters ‘degree in Public Health-Epidemiology. I need to assess the prevalence of depression among patients with diabetes mellitus and associated factors. You are among the selected people to participate in this research if you are willingly to. The feedback from you and other participants will provide the information that could help us to make an emphasis on the possible interventions depending on the results. This questionnaire is about 20 minutes. If you don’t want to participate it doesn’t matter. If you want to participate you are allowed to omit any question that you fill don’t want to answer. You can withdraw any time from the study. You can ask questions any time from the researcher.

Do you want/wish to participate? Yes No

☐ ☐

If you have questions about this study, you can ask the researcher or to the following addresses:

RUTAGARAMA Alex

Phone number: 0788402399

Date........../............/2015

Interviewers’ Name and Signature _______________________
Appendix 4: Questionnaire Socio-demographic of the respondents

I. Gender
- Male
- Female

II. Age
- Less than 20 years
- 20 - 30 years
- 30 - 50 years
- More than 50 years

III. Marital Status:
- Single / (never married)
- Married
- Divorced/Separated
- Widowed

IV. Religion
- Catholic
- Muslim
- Protestant
- Others

V. What is the highest education you have received?
- Illiterate
- Primary
- Secondary
- university

VI. Duration of diagnosis of DM?
- 1- Less than 1 year
- 2- 2-5 years
- 3- 5 – 10 years
- More than 10 years

VII. Do you have others chronic Diseases?
XI. Treatment modality

- oral
- Any insulin
- All others

VII. Body weight?

- less than 50kg
- 50kg-80kg
- More than 80kg

- No
- yes
Appendix 5: Hamilton Rating scale for Depression

Date of Assessment

1. **DEPRESSED MOOD** (Sadness, hopeless, helpless, worthless)
   0=Absent
   1=These feeling states indicated only on questioning
   2=These feeling states spontaneously reported verbally
   3=Communicates feeling states non-verbally—i.e., through facial expression, posture, voice, and tendency to weep
   4=Patient reports VIRTUALLY ONLY these feeling states in his spontaneous verbal and non-verbal communication

2. **FEELINGS OF GUILT**
   0=Absent
   1=Self-reproach, feels he has let people down
   2=Ideas of guilt or rumination over past errors or sinful deeds
   3=Present illness is a punishment. Delusions of guilt
   4=Hears accusatory or denunciatory voices and/or experiences threatening visual Hallucinations

3. **SUICIDE**
   0=Absent
   1=Feels life is not worth living
   2=Wishes he were dead or any thoughts of possible death to self
   3=Suicidal ideas or gesture
4=Attempts at suicide (any serious attempt rates 4)

4. INSOMNIA EARLY

0=No difficulty falling asleep

1=Complains of occasional difficulty falling asleep—i.e., more than 1/2 hour

2=Complains of nightly difficulty falling asleep

5. INSOMNIA MIDDLE

0=No difficulty

1=Patient complains of being restless and disturbed during the night

2=Waking during the night—any getting out of bed rates 2 (except for purposes of voiding)

6. INSOMNIA LATE

0=No difficulty

1=Waking in early hours of the morning but goes back to sleep

2=Unable to fall asleep again if he gets out of bed

7. WORK AND ACTIVITIES

0=No difficulty

1=Thoughts and feelings of incapacity, fatigue or weakness related to activities; work or hobbies

2=Loss of interest in activity; hobbies or work—either directly reported by patient, or indirect in listlessness, indecision and vacillation (feels he has to push self to work or activities)

3=Decrease in actual time spent in activities or decrease in productivity

4=Stopped working because of present illness
8. RETARDATION: PSYCHOMOTOR (Slowness of thought and speech; impaired ability to concentrate; decreased motor activity)

0 = Normal speech and thought
1 = Slight retardation at interview
2 = Obvious retardation at interview
3 = Interview difficult
4 = Complete stupor

9. AGITATION
0 = None
1 = Fidgetiness
2 = Playing with hands, hair, etc.
3 = Moving about, can’t sit still
4 = Hand wringing, nail biting, hair-pulling, biting of lips

10. ANXIETY (PSYCHOLOGICAL)
0 = No difficulty
1 = Subjective tension and irritability
2 = Worrying about minor matters
3 = Apprehensive attitude apparent in face or speech
4 = Fears expressed without questioning

11. ANXIETY SOMATIC: Physiological concomitants of anxiety (i.e., effects of autonomic over activity, “butterflies,” indigestion, stomach cramps, belching, diarrhea, palpitations, hyperventilation, parenthesis, sweating, flushing, tremor, headache, urinary frequency).

Avoid asking about possible medication side effects (i.e., dry mouth, constipation)

0 = Absent
1 = Mild
2=Moderate
3=Severe
4=Incapacitating

12. SOMATIC SYMPTOMS (GASTROINTESTINAL)

0=None
1=Loss of appetite but eating without encouragement from others. Food intake about normal
2=Difficulty eating without urging from others. Marked reduction of appetite and food intake

13. SOMATIC SYMPTOMS GENERAL

0=None
1=Heaviness in limbs, back or head. Backaches, headache, muscle aches. Loss of energy and fatigue
2=any clear-cut symptom rates 2

14. GENITAL SYMPTOMS

(Symptoms such as: loss of libido; impaired sexual performance; menstrual disturbances)

0=Absent
1=Mild
2=Severe

15. HYPOCHONDRIASIS

0=Not present
1=Self-absorption (bodily)
2=Preoccupation with health
3=Frequent complaints, requests for help, etc.
4= Hypochondria cal delusions
16. LOSS OF WEIGHT

A. When rating by history:

0 = No weight loss
1 = probably weight loss associated with present illness
2 = Definite (according to patient) weight loss
3 = Not assessed

17. INSIGHT

0 = Acknowledges being depressed and ill
1 = Acknowledges illness but attributes cause to bad food, climate, overwork, virus, need for rest, etc.
2 = Denies being ill at all

18. DIURNAL VARIATION

A. Note whether symptoms are worse in morning or evening. If NO diurnal variation, mark none

0 = No variation
1 = Worse in A.M.
2 = Worse in P.M.

B. When present, mark the severity of the variation. Mark “None” if NO variation

0 = None
1 = Mild
2 = Severe

19. DEPERSONALIZATION AND DEREALIZATION (Such as: Feelings of unreality; Nihilistic ideas)

0 = Absent
1 = Mild
2 = Moderate
3=Severe
4=Incapacitating

20. PARANOID SYMPTOMS

0=None
1=Suspicious
2=Ideas of reference
3=Delusions of reference and persecution

21. OBSESSIONAL AND COMPULSIVE SYMPTOMS

0=Absent
1=Mild
2=Sever
Appendix: 6 Hamilton Rating scale for Depression version Kinyarwanda
### Appendix: 7Coping Strategies Short Form (CSI-SF)

<table>
<thead>
<tr>
<th></th>
<th>NEVER</th>
<th>SELDOM</th>
<th>SOMETIMES</th>
<th>OFTEN</th>
<th>ALMOST ALWAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I make a plan of action and follow it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2. I look for the silver lining or try to look on the bright side of things.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3. I try to spend time alone.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. I hope the problem will take care of itself.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. I try to let my emotions out.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6. I try to talk about it with a friend or family.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. I try to put the problem out of my mind.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. I tackle the problem head on.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. I step back from the situation and try to put things into Perspective.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10. I tend to blame myself.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>11. I let my feelings out to reduce the stress.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12. I hope for a miracle.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>13. I ask a close friend or relative that I respect for help or advice.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14. I try not to think about the Problem.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>15. I tend to criticize myself.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>16. I keep my thoughts and feelings to myself</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Emotion-focused disengagement= 3, 10, 15, 16
Problem-focused disengagement= 4, 7, 12, 14
Emotion-focused engagement= 5, 6, 11, 13
Problem-focused engagement= 1, 2, 8, 9