PREVALENCE AND FACTORS ASSOCIATED WITH DIABETES TYPE 2 AMONG PERSONS AGED 30 TO 65 YEARS OLD ATTENDING DIABETIC CLINIC AT TORORO DISTRICT HOSPITAL

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DECLARATION

I Nyakuri Emma hereby declare that this research is my own work and original piece. It has never been presented to any other university or institution of higher learning for academic award of any kind. All sources have been clearly sited.

Sign ……

Date ……

APPROVAL

I hereby confirm that this research report has been written under my supervision and is ready for submission to the International Health Sciences University as a partial fulfillment of the award of a bachelors of nursing science.

Signature ……....
Dr. John Odda

Date…..…….……..

DEDICATION

To the memory of my dear father; Mr. Okoth John. Father, I only wish you were here to see me graduate.

To my lovely mother Nangonzi Margaret and brother, Mr. Ochieng Richard for their support throughout my academic struggle. In the same way, I dedicate this piece of work to my lovely wife Nayiga Leticia and the rest of the family members. May the Almighty God and His mercy be upon them, for which their memories gave me the energy to keep working.

I also dedicate my study to all my friends, without your prayers, encouragement and solidarity, this research could not have been a success. May the Almighty Lord bless you All.

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Foremost, I would like to express my sincere gratitude to my supervisor Dr. Odda John for his continuous support during my research study, his patience, commitment and immerse knowledge that helped me write this research and thesis. Thank you so much without my equitable measure for the full support you gave me.

On the other hand, I thank my brother Mr. Ochieng Richard for the great support both financially and socially during my course period. I do not have much to give you but to wish you well in whatever you lay your hands on.

Finally to my lovely daughter Miss. Aboth Marie Eleanor, your smiles gave me courage the time this work seemed challenging.

GOD BLESS YOU.

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OPERATIONAL DEFINITIONS

Glycosylated hemoglobin test: Is a test carried out that reflects your average blood sugar level for the past two to three months. The test measures the percentage of one's hemoglobin in the red blood cells that carries oxygen, is coated with sugar.

Prediabetes: This is situation in which an individual has a high blood glucose or glycosylated hemoglobin levels but not sufficient high to be classified as diabetes rather it's a risk factor to diabetes. This is also referred to as impaired glucose tolerance.

Diabetes: For purposes of this study, Diabetes is a metabolic syndrome marked by raised blood glucose concentration with a fasting plasma concentration more than 7 millmol/liter, random or postprandial concentration more than 11.1 millmol/liter, resulting from problems in how insulin is produced, how insulin works, or both (www.diabetes.co.uk).

Diabetic patients: These are people who are suffering from diabetes.

Body Mass Index: Is the ratio of the bodyweight in kilograms (Kg) and height in square meters (m2).

Prevalence: is the occurrence of present cases in a distinct population at a specified point in time.

Incidence: The rate of occurrence of new cases of diabetes arising in a given period in specified population.

LIST OF ACRONYMS

CDC:	Center for Disease Control
DM:	Diabetes Mellitus
DSMET:	Diabetic Self-Management Education and Training
HbA1c :	Glycosylated Hemoglobin Test
HBP:	High Blood Pressure
IDDM:	Insulin Dependent Diabetes Mellitus
IDF:	International Diabetes Foundation
IGT:	Impaired Glucose Tolerance
SMBG:	Self-Monitoring Of Blood Glucose
WHO:	World Health Organization.
OR:	Odds ratio.
RR:	Relative Risk
CI:	Confidence Interval.
NCD:	Non-Communicable Disease.

ABSTRACT

Background. Type 2 diabetes mellitus (DM II) prevalence is increasing rapidly around the world with both high morbidity and mortality and a high health cost. It has emerged as global pandemic due to a fast upsurge in Lifestyle, socio-demographic and health systems related factors. There was, therefore a need for this study to assess the prevalence and factors associated with type 2 diabetes mellitus in Tororo district hospital during the month of May to June, 2017.

The main objective of this study was to determine the prevalence of type 2 diabetes mellitus among clients aged 30 to 60 years attending the diabetic clinic at Tororo hospital. The factors assessed include socio-demographic, life style and healthy system factors.

Method. This descriptive cross-sectional study was conducted to assess the prevalence and factors associated with of type 2 diabetes mellitus among persons aged 30 to 65 attending diabetic clinic at Tororo hospital. Convenience non probability random sampling technique was used to obtain respondents. Data was collected using structured questionnaire and was analyzed in SPSS version 16.00 and presented in form of frequency tables. In addition, random blood glucose testing was employed to identify with diabetes at the clinic. Subjects with random blood sugar ≥11.1mmol/l on the following day were subjected to fasting blood glucose testing and they were confirmed to have DM II if they had blood glucose level of ≥7 mmol/l. In each subject, height, weight was measured and Body mass index calculated using standard procedures.

Results. A total of 110 participants were included in this study, 74 (69.1%) were females and 36(30.9%) were males. Most (59.1%) respondents in the age group 41 to 65 years. Overall prevalence of DM II was 54.5%, (n=60). Prevalence was high in females (64.9%; n= 74) than in males (33.3%; n=36). The age group 41 to 65 years had the highest prevalence of DM II (96.9%, n=65) followed by 30-40 years age group (37%, n=45). Socio-demographic factors such gender, age, relation to member of family with diabetes mellitus type 2, and average monthly income were significantly associated with prevalence of DM II. Lifestyle factors such as food consumed, weight, BMI, quantity of smoking in a day, exercising, interval of exercise per week, duration of exercise, alcohol consumption and intervals of alcohol consumption per week were significantly associated with DM II ($P<0.05$). Furthermore, health system factors such having availability of healthy facility in respondents home area, estimated distance to the health center and adequate staffing at facility were significantly associated with DM II ($P<0.05$).

Conclusion and Recommendation. Higher proportion of persons with DM II attend diabetic clinic at Tororo district hospital. The most predominant age group is 40 to 65 years, with obesity or overweight. It is therefore recommended that all those over 40 years, are obese or overweight should be routinely be screened for DM II and appropriate public health education given to all diabetic patient in all hospitals nationwide.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter presents the background to the study, the statement of the problem, the objectives of the study, research questions, significance of the study and the conceptual framework of the study.

1.1Background of the study

According to International Diabetic Federation (IDF, 2015), diabetes is the most common serious chronic metabolic disease causing morbidity and mortality among the affected individuals with an estimated 5 million deaths globally in 2015 (IDF, 2015). In fact, diabetes is one of the fastest rising non-communicable disease (NCD) globally, although the preventable diabetes type 2 is the most common form of diabetes reported accounting for 90 % of all cases (Bagonza et al., 2015). Owing to numerous blockades of accessing diagnosis and treatment, diabetic patients are often naïve and undiagnosed whereas individuals on diabetic treatment were mismanaged (Bagonza et al, 2015). The mismanagement would arise because of non-adherence to non-pharmacological measures such as physical exercise, and healthy life style such as weight control, regular medical check-ups, routine monitoring of blood sugar, and enough rest. (www.everydayhealth.com/solutions/course/type-2-diabeteshealthy-habits-guide). The numbers of people affected by the disease has continued to rise and this has been attributed to lifestyle factors of which 75% are from low income countries (IDF, 2015).

Diabetes is among the most prevalent chronic illness on the rise, universally affecting 415 million people and more (IDF, 2015). It has emerged as global epidemic due to a fast upsurge in overweight, obesity, in addition to physical inactivity.

The world health organization (WHO) established that, the number people are living with diabetes mellitus is on the increase and its prevalence are growing in all regions of the world (WHO, 2016). In 2014, four hundred twenty two adults people (or 8.5% of the population) were diabetic, equated to 108 (4.7%) in 1980 (WHO, 2016). WHO predicted diabetes to be the seventh primary cause of death universally by 2030 but then again approximately 50% - 80% of all type 2 diabetic patient die of cardiovascular disorders and stroke, and furthermore end up with renal failure (Einstein, 2014).

The combined impact of poor awareness, insufficient access, and limited services on diabetic information is closely accompanying the occurrence of type 2 diabetes mellitus. These, together with inadequate resources makes diabetic patients end up in heart attack, stroke, blindness, kidney failure and leg amputation (WHO, 2016). Furthermore the frequency of leg amputation in diabetes mellitus is 15 times greater than for non-diabetic individuals (WHO, 2016).

In terms of costs, it is estimated that global health care expenditure is 673 billion dollars, 12% of the global expenditure on diabetes (IDF, 2015).

In Sub Saharan Africa, the actual number of diabetic patients remains uncertain, although the International Diabetes Foundation (IDF) estimated 14.2 million in 2015 and the figure is projected to double to about 28 million by the year 2040 (IDF, 2015). More than two thirds (66.7%) of people living with diabetes are undiagnosed in Africa (IDF, 2015). According to IDF (2015), most populous African countries have the highest number of people with diabetes, these include South Africa (2.3 million), Democratic Republic Of Congo (1.8million), Nigeria (1.6 million) and Ethiopia (1.3 million) (IDF, 2015).

Never the less Impaired Glucose Tolerance (IGT) is also becoming problematic, and exceeds 30 per cent in many African countries (Diabetes.co.uk, 2014).

In addition, low and middle-income countries account for more than 80% of all deaths related to type 2 diabetes mellitus (Einstein, 2014).

In Uganda, the prevalence of diabetes in 2015 was 400,600 cases and it is estimated that the number will double by the year 2040 while the number of death due to diabetes was 11,341 deaths (IDF, 2015).

Whereas there is an increase in frequency of diabetes mellitus in Uganda, only a few areas in Uganda have had studies and these include Kampala, Iganga, Wakiso and Kayunga (Arlena, 2012). Unfortunately, Tororo was not included in this study yet preliminary observation by the Principal investigator showed that 10 out of every 35 patients attending diabetes clinic in Tororo government (January 2017) were newly diagnosed with diabetes mellitus. Of which a further 7 out of 10 were diabetes mellitus type 2 aged from 30 years to 65 years old. This is about 28.6% which is very high compared to the national prevalence of 2.8 % (WHO, 2016). This raises questions as to what factors could be contributing to Diabetes mellitus type 2 in Tororo district in Eastern Uganda.

There is, therefore an urgent need to assess current prevalence and factors associated with type 2 diabetes mellitus in Tororo district hospital which a gap this research is trying to address. Therefore, this study seeks to determine the prevalence and factors associated with type 2 diabetes mellitus among persons aged 30 to 65 years old in Tororo district hospital in May to June, 2017.

1.2 Statement of the problem

As a volunteer at diabetic mellitus clinic in Tororo hospital, it was observed that 10 out of every 35 patients attending diabetes clinic in Tororo district hospital (January 2017) were newly diagnosed with diabetes. This is about 28.6% which is very high compared to the national prevalence. Furthermore 7 out of 10 were type 2 diabetes mellitus patients aged 30 to 65 years old. This raises questions as to what the factors could be contributing to this condition.

Hence there is an urgent need to assess current prevalence and factors associated with type 2 diabetes mellitus in Tororo hospital which is a gap this research is trying to address.

1.3 Objectives of the study

1.3.1 General objective

The purpose of this research is to determine the prevalence and factors associated with type 2 diabetes mellitus in Tororo district hospital during the month of May to June, 2017.

1.3.2 Specific objectives of the study

i. To determine the prevalence of type 2 diabetes mellitus in Tororo district hospital May to June 2017.
ii. To establish the socio-demographic factors associated with diabetes mellitus type 2 among persons aged 30 to 65 years old in Tororo district hospital May to June 2017.
iii. To identify the life-style factors associated with type 2 diabetes mellitus among persons aged 30 to 65 years old in Tororo district hospital May to June 2017.
iv. To establish the health system factors associated with type 2 diabetes mellitus in Tororo district hospital May to June 2017.

1.4 Research questions

i) What is the prevalence of type 2 diabetes mellitus in Tororo district hospital May to June 2017? ii. What are the socio-demographic factors associated diabetes type 2 in Tororo district hospital, May to June 2017? iii. What are the life-style factors associated with type 2 diabetes mellitus in Tororo district hospital, May to June 2017?

ii) What are the health system factors associated with type 2 diabetes mellitus in Tororo district hospital, May to June 2017?

1.5 Significance of the study

This study will profit the community members especially the families that were involved in providing care for diabetic patients and generate information on the cause and prevention of diabetics.

The study will generate information that were a basis in guiding policy formulation that will institute policies aimed at mitigating diabetics among the population.

This study will generate information that will significantly contribute to academic knowledge for students regarding the diabetes type 2.

The research study was an advocacy tool for diabetic patients to access medical support from the communities and health facilities.

1.6 Conceptual framework of the study

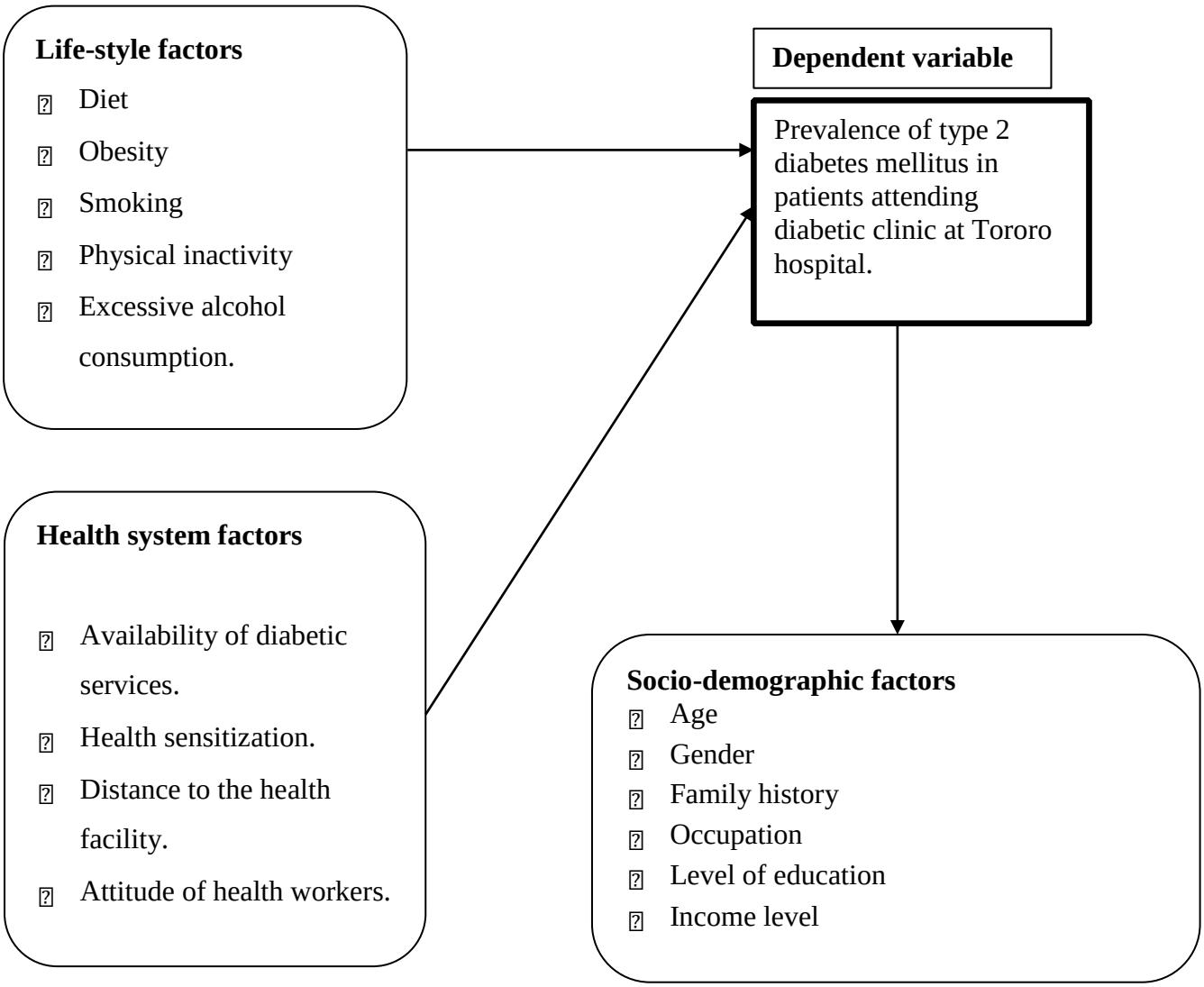


Figure 1: A conceptual frame work showing the prevalence and factors associated with type 2 diabetes mellitus at Tororo district hospital May-June 2017.

1.6.1 Explanation of the conceptual framework.

From the figure above, the prevalence of diabetes mellitus type 2 is associated with lifestyle factors, socio-demographic factors and health system factors, thus making it a dependent variable.

Life style factors associated with prevalence of diabetes mellitus.

Unhealthy diet, obesity, smoking, physical inactivity, and excessive alcohol consumption are lifestyle factors. The above factors contribute to persistently raised blood glucose levels and progress of Type 2 diabetes mellitus hence life style factors are the independent variable.

Socio-demographic factors associated with prevalence of diabetes mellitus.

These tender to correlate positively with risks of developing diabetes mellitus. These factors include age, gender, family history, occupation, level of education and income level. Thus socio-demographic factors is an independent variable.

Health system factors

These factors can be prevented through provision of focused diabetic care, massive sensitization by the ministry of health, and accessibility to service provision in all health centers in the country. Thus health system factors is an independent variable.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter presents the review of literature from different authors who have written about diabetes as well as prior studies done on similar topics. The literature review is presented in accordance with the objectives of the study.

Diabetes mellitus is a metabolic syndrome of impaired carbohydrate, fat and protein metabolism caused by either lack of insulin secretion or decreased sensitivity of tissues to insulin (www.diabetes.co.uk/diabetes-care/blood-sugar-levels-rangeshtml.). Diabetes mellitus is characterized by high fasting plasma glucose concentration of greater than 7 mmol/l or a random blood sugar and postprandial glucose levels of greater than 11.1 mmol/l (www.daibetes.co.uk).

2.1 Hormones involved in glucose regulation.

Insulin is the chief hormone produced in the pancreatic beta (β) cells of islets of Langerhans, whereas others hormones involved in glucose regulation are; glucagon produced by alpha cells of islets of Langerhans and Somatostation produced by delta cells of islets of Langerhans (Guyton, 1991). Insulin is the key in regulation of body's blood glucose levels by stimulating glucose cells in the skeletal muscles and fats tissue to uptake glucose from blood stream. Glucagon increases blood glucose concentration when glucose e concentration fall and for this reason it's also called hyperglycemic hormone (Guyton, 1991).

Somastatin plays a principal role to prolong time over which the food nutrients are assimilated in blood, at the same time it depresses glucagon and insulin secretion, and reservation of absorbed nutrients by tissues thus inhibiting the depletion of the food to ensure availability of energy sources whenever needed by the body cells (Guyton, 1991).

In presence of insulin resistance, this uptake of glucose is prevented and blood sugar levels increase (www.news-medical.net/health/Gestational-Diabetes-Pathophysiology.aspx.).

2.2 Pathophysiology of Diabetes mellitus.

Diabetes mellitus is of four major categorizes; 1). Insulin dependent diabetes mellitus (IDDM) or type 1, 2. Non-insulin dependent diabetes mellitus (NIDDM) or type 2; 3). Gestational Diabetes mellitus (GDM) or type 3 and; 4). Monogenic diabetes or type 4 (Baynest, 2015).

Insulin-dependent diabetes mellitus is categorized by destruction of beta (β) cells by autoimmune process that typically lead to hypoinsulinemia (Kumar and Clark, 2002). The presence of an enzyme called anti-glutamic acid decarboxylase in the pancreatic islet β-cells or insulin antibodies result into initiation of autoimmune process; which is followed by CD4+, CD8+ cells and macrophages infiltration in the islets, destroying the β-cells (Hussain and Vincent, 2007). Autoimmune is due to genetic immunologies and possible environmental factors such as viral infections that triggers the process (Brunner and Suddarth, 2010). According to Guyton (1991), hereditary upsurges the vulnerability of the beta cells to invasion by viruses and favors the progress of autoimmune antibodies contrary to beta cells, thus leading to their damage and possible onset of juvenile diabetes. Classic feature of type 1 diabetes include weight reduction, production of abnormally large volume of dilute urine (polyuria), excessive hunger or appetite (polyphagia) , constipation, unexplained fatigue, cramps and blurred vision (Mayfield, 1998). People with type one diabetes produce no insulin and must use exogenous insulin by subcutaneous injection to control their blood sugar level. According to Brunner and Suddarth (2010), type one diabetes accounts for about 5 to 10% of all diabetic patients.

Type one diabetes mellitus or juvenile onset diabetes starts at 20 years old but may occur at any age (http://www.webmd.com/diabetes/guide/diabetes-basics#1).

Type 2 diabetes formerly known as Non-insulin dependent diabetes mellitus (NIDDM) or senile diabetes mellitus, is the most dominant form of diabetes with 90 - 95% cases (Brunner and Suddarth, 2010). Type 2 patients produce insulin, however it is either not enough or the body cells are resistant to insulin, making it hard to control normal blood sugar levels. Holt (2004), stated that impaired insulin secretion due to dysfunction of the pancreatic β-cells, dysfunctional insulin and increased insulin resistance are the focal pathological defects in type 2 diabetes.

During metabolism to overcome insulin resistance and to prevent the buildup of glucose in blood, increased amounts of insulin must be secreted to maintain the glucose level at acceptable values. On the other hand, failure of beta cells to compile with increased tissue demand for insulin result into elevated blood glucose levels, and eventually an impaired glucose intolerance (American Diabetes Association, 2010). Type 2 is universally linked with high blood pressure, high lipid levels in blood and obesity (Saely et al., 2004). Guyton

(1991), in an obese person there is insensitive to stimulation of beta cells of islets of Langerhans by increased blood glucose levels, for that reason the blood insulin levels do not increase when needed. Furthermore obesity is associated with down regulation of insulin receptors in insulin target cells found in skeletal muscles and adipose tissues throughout the body, thus the little available insulin is unsuccessful in achieving the usual metabolic effects on carbohydrates, fats and proteins (Guyton, 1991).

Type 2 diabetes is treated by regulating diet, and physical activity in combination with oral hypoglycemic agents as needed (Brunner and Suddarth, 2010). Type 2 usually occurs in people over 40 years but its prevalence has increased in individuals aged 30 years due to increases in obesity (http://www.webmd.com/diabetes/guide/diabetes-basics#1).

Summary of pathophysiology of type 2 diabetes.

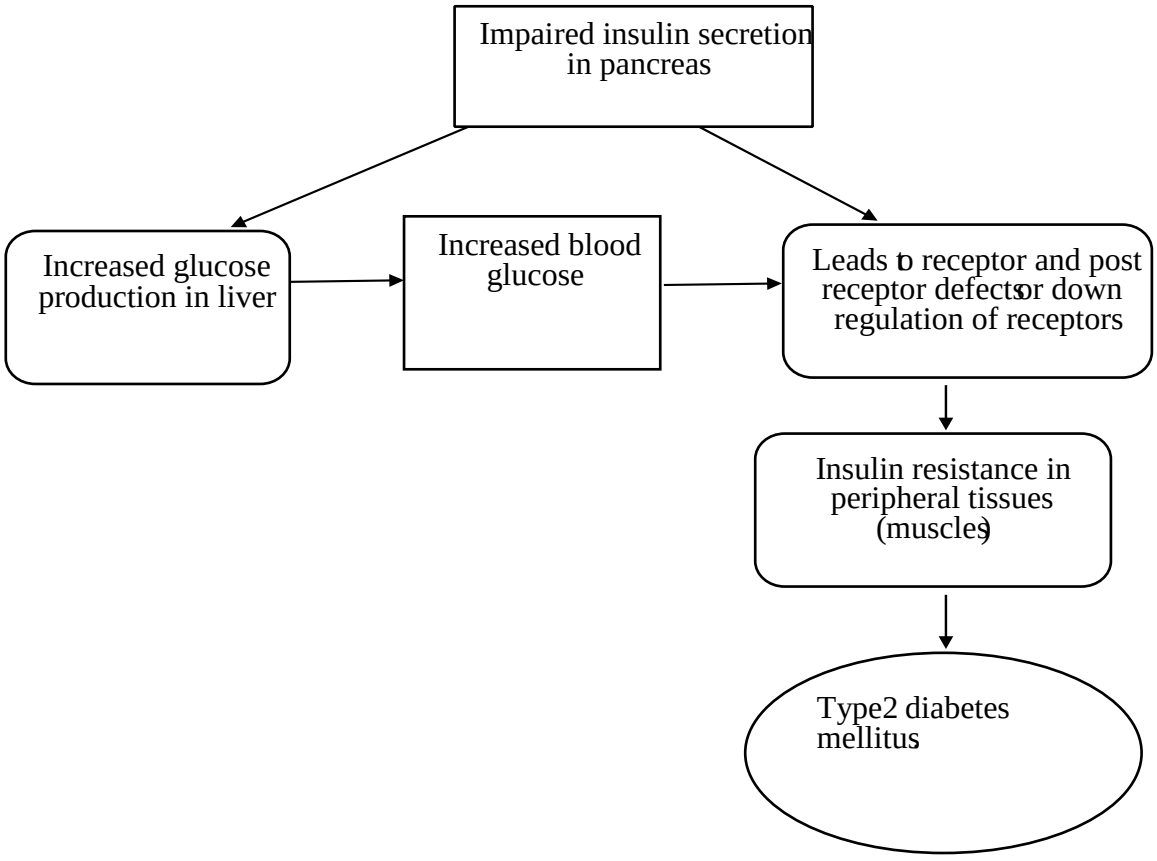


Figure 2:Pathophysiology of diabetes mellitus type 2 (Ozougwu et al., 2013)

Pregnancy induced diabetes or Gestational diabetes mellitus is characterized by increased glucose intolerance with onset during pregnancy most especially in second or third trimester (Brunner and Suddarth, 2010). Risk for gestational diabetes include marked obesity, history of

gestational diabetes, increased amounts of glucose in urine (glycosuria) , and strong family history of diabetes. According to Mandal (2014), the exact pathophysiology of gestational diabetes is unknown however insulin resistance is thought to be the main underlying pathology.

According to American Diabetes Association (2010), in the United States approximately seven percent of all pregnancies are worsened by gestational diabetes, yielding more than 200,000 cases yearly. Although gestational diabetes may resolves after deliver, it predisposes the mother to diabetes type 2 in future (http://care.diabetesjournals.org/content/26/suppl_1/s103).

Type 4 or other specific type called monogenic diabetes mellitus. This type of diabetes involves a collection of etiologies clustered together to form classification called monogenic diabetes mellitus. Monogenic diabetes include; 1) Maturity Onset Diabetes Mellitus in Youth (MODY) associated with faults of insulin action: MODY is elevated blood glucose levels detected before 25 years of age and treatable for 5 years minus insulin and negative test of islet cell antibodies (Saely et al., 2004). MODY is caused by inherited autosomal dominant trait resulting from mutations in glucokinase gene on chromosome 7p; glucokinase is a vital enzyme of glucose metabolism in beta cells and liver (Froguel et al., 1993), 2) Additionally individuals with disease of exocrine pancreas such as pancreatitis or cystic fibrosis, 3) People with dysfunction from other endocrine disorders caused by drugs, chemical or infection and type 4 diabetes comprise less than 10% of diabetes mellitus cases (Saely et al., 2004).

2.3 Epidemiology of diabetes mellitus type 2

According to International Diabetic Federation (IDF, 2015) , type 2 diabetes is a single most serious chronic metabolic disease causing cardiovascular diseases and mortality among the affected individuals with an estimated 5 million deaths globally in 2015 directly attributable to type 2 diabetes (IDF, 2015).

In fact, type 2 diabetes is one of the fastest growing non-communicable disease (NCD) globally, although modifiable type 2 is the most dominant form of diabetes reportedly accounting for 90 % of all cases (Bagonza et al., 2015).

Diabetes mellitus type 2 is among the most prevalent and fastest growing chronic illness, globally affecting more than 415 million people worldwide and pausing more health burden than HIV/AIDS, Tuberculosis and malaria combined (IDF, 2015). It is emerging as global pandemic due to an increase in overweight, obesity, and physical inactivity.

According to world health organization (WHO), there is an increase in total number of people living with type 2 diabetes and its frequency is rising in all regions of the world (WHO, 2016). The World Health Organization predicts that type 2 diabetes were the seventh leading cause of mortality worldwide by 2030. Type 2 diabetes is predicted to be one the leading causes of acquired blindness and kidney failure worldwide (Einstein, 2014). The combined impact of poor awareness, insufficient access, and limited services to diabetic information is closely associated with prevalence of type 2 diabetes mellitus. These, together with inadequate resources makes type 2 diabetes the leading cause of heart attack, stroke, blindness, kidney failure and lower limb amputation. Furthermore the rate of leg amputation is ten to twenty times greater in diabetes type 2 than in non-diabetic people (WHO, 2016).

In terms of costs, it is estimated that global health care expenditure is 673 billion US dollars, which is about 12% of the global expenditure on diabetes (IDF, 2015).
In Sub Saharan Africa, the actual number of diabetic patients remains uncertain, although the International Diabetes Foundation (IDF) estimated 14 million in 2015 and this figure is estimated to double to 28 million by the year 2040 (IDF,2015). More than 2/3 (66.7%) of people living with type 2 diabetes are undiagnosed in Africa (IDF, 2015). According to IDF (2015), highly populated African countries have the greatest number of diabetic patients, and these include South Africa (2.3 million), Democratic Republic Of Congo (1.8 million), Nigeria (1.6 million) and Ethiopia (1.3 million) (IDF,2015) .

In Uganda, the prevalence of diabetes in 2015 was 400,600 cases and it is estimated that the number will double by 2040 while the mortality due to diabetes was 11,341 deaths (IDF, 2015). Whereas there is a high occurrence of diabetes mellitus in Uganda, only few areas in Uganda have had studies these include Kampala, Iganga, Wakiso and Kayunga (Arlena, 2012). Unfortunately, Tororo was not included in this study yet preliminary observation by the principal investigator showed that 10 out of every 35 patients attending diabetes clinic in Tororo government hospital (January 2017) were newly diagnosed with diabetes mellitus. This is about 28.6% which is very high compared to the national prevalence of 2.8 % (WHO, 2016). Furthermore seven out of ten were diabetes mellitus type 2 aged 30 to 65 years old. This raises questions as to what the factors could be contributing to Diabetes mellitus type 2 in Tororo district in Eastern Uganda.

On the other hand, the risk of type 2 diabetes is to a large extent modifiable in the population through lifestyle changes and therefore there is a huge potential to slow down and eventually reverse this pandemic
(http://www.diapedia.org/type-2-diabetes -mellitus/3104287123/epidemiology-of-type-2diabetes).

2.4 Life-style factors associated with type 2 diabetes mellitus

Diet is considered a modifiable risk factor for type 2 diabetes mellitus. Dietary practice refers to patients' choices in food consumption based on diabetes nutrition education that emphasizes on intake of; lower fat, higher fibre, lower sodium and food that have health promoting properties such as omega-3 fatty acid rich fish, soy products, fresh or frozen fruits and vegetable (Shamsi et al., 2011). In a study by Hu and colleagues (2002) in Boston USA, the intake of total fat (RR 1.27, Cl 1.64-1.55) and saturated fats (1.34, 1.09-1.66) were associated with a high risk of type 2 diabetes. Furthermore linoleic acid was associated with a lower risk of type 2 diabetes mellitus in men less than 65 years of age (RR.0.74, Cl 0.600.92) (Hu et al., 2002). In the same study, repeated consumption of processed meats was closely associated with a higher risk for type 2 diabetes mellitus (RR.1.46, Cl 14-1.86 FOR > or = 5/weeks <1/month, p=0.0001) (Hu et al., 2002). *Matovu and colleagues (2017)* conducted a cross sectional study in Kampala Uganda, among 200 newly diagnosed type 2 diabetes patients, during the study, a positive association between frequently high carbohydrate diet and body mass index. A high intake of carbohydrates was linked to increase in body mass index above 28 kg/m2 (Matovu et al., 2017).

Higher consumption of sugar-sweetened beverages is also associated with a greater magnitude of weight gain because of excessive calories content and largely absorbable sugars and an increased risk for development of type 2 diabetes mellitus more especially in females (Schulze et al., 2004).

Obesity is the accumulation of excess body fats, and results when energy intake exceeds energy expenditure by the body cells (Lippincott's, 2005). Obesity is frequently associated with type 2 diabetes mellitus and in many studies, it has been shown to be a powerful predictor of development of type 2 diabetes mellitus (Lippincott's, 2005).

An increase in obesity in the recent population is attributed to interaction between genetic and lifestyle factors which include metabolic anomalies, sedentary life style, habitual energy intake in relation to expenditure and availability of fast foods (Lippincott's, 2005). Nearly two thirds of American people especially adults are overweight (BMI>25 kg/m2) and more than a third percent are obese (BMI >30kg/m2) (Lippincott's, 2005). Adipose tissue, particularly

visceral fats secrete various proinflammatory adipokines which contain cytokines (Kershaw et al., 1995). These cytokines are changed with an increase in the adipose tissue mass causing a metabolic disturbance that contribute to type 2 diabetes mellitus (Cornier et al., 2005). According to WHO (2011), close to 90% of patients who develop type 2 diabetes mellitus are commonly associated with excess body weight. Furthermore, *Sushmita and colleagues (2010)* in USA, revealed that obstructive sleep apnea (OSA), a treatable sleep disorder that is universally amid individual who are overweight and obese, has become a unique, modifiable risk factor applicable to insulin resistance and glucose intolerance, and may stimulate the progress to prediabetes (20%-67%) and type 2 diabetes mellitus (15%- 30%), and its independent of shared risk factors (Sushmita et al., 2010).

Ministry of Health national study in Cameroon reported that, risks of developing diabetes can be reduced by 15% in males and 13% in females by controlling obesity and overweight.
According to surgeon's general report 2014, smokers have 35% high risk of diabetes than non-smokers. Cigarrete contains nicotine, a substance that injure the cells, causing them to swell and interfere with their normal function, a process known as inflammation (CDC, 2014). On the other hand, smoking as well causes oxidative stress, a metabolic condition that occurs when nicotine reacts with oxygen in the body, and the resultant effect is damage to cells, including the insulin producing cells, thereby exposing an individual to risk of diabetes (CDC, 2014).

Evidence strongly relate smoking to high risk of abdominal obesity or belly fat, yet this is a known risk factor for diabetes, because it enhances the production of cortisol a hormone that raises blood glucose levels (CDC, 2014).
In addition to increase in insulin resistance, a cross sectional analysis between cigarrete smoking and glycosylated hemoglobin where 12 % men and 11% women smokers were studied, outcomes revealed a lowest mean glycosylated hemoglobin in non-smokers, intermediates in former smokers and highest in current smokers (Sargeant et al.,2014). Thus cigarrete smoking is positively related to risk of diabetes type 2 (Sargeant et al., 2014).
The risk of developing diabetes increases with the number of cigarrete smoking per day according to Surgeon's report 2014 (CDC, 2014).
Limited physical activity has been reported to have causal effects for diabetes while regular physical activity improves life for diabetic patients (Shipigel, 2012). Regular exercise has a number of benefits, among which is the ease to control your blood glucose levels.

In a prospective cohort and cross-sectional studies by *Hu and colleagues (2002),* a relationship between physical activity and risk of type 2 diabetes mellitus was assessed and the study showed that high physical activity level is related to reduced risk to type 2 diabetes mellitus regardless of method of activity (Hu et al., 2002). Furthermore, this study showed that moderate walking and vigorous activity have been associated with a decreased risk of type 2 diabetes mellitus. On conclusion, regular exercise can also help people with type 2 diabetes avoid long-term complications, especially heart disorders (Hu et al., 2002). In subSahara Africa, particularly Uganda, a study by Mayega and colleagues (2014), showed that sufficient physical activity and diverse diet were linked to lower likelihood of abnormal glucose regulation, and therefore lowered risk for diabetes type 2.

Excessive consumption of alcohol and smoking cigarettes are also reported to be life style risk factors for the occurrence of diabetes among the population (WHO, 2016). In a prospective study by Hodge and colleagues (2006), diabetes status was ascertained for 31422 (80%) participants, 362 cases of identified former drinkers had higher risk than lifetime abstainer.

Furthermore, men who drank more than or equal to 210grammes alcohol over 1 to 3 days had an increased risk of type 2 diabetes mellitus (OR 5.21,1.79-15.19), whereas the same amount for more days did not increase risk of type 2 diabetes mellitus in women (Hodge et al.,2006). Therefore, it was concluded that high daily intake of alcohol, even if for only 1 to 3 days a weak increases the risk of type 2 diabetes mellitus especially in men (Hodge et al., 2006). Additionally, a prospective cohort study by Cullmann and colleagues in Sweden, was done to determine the relation between alcohol intake and diabetes, 2070 men and 3058 women with normal baseline glucose levels, 70 men and women with pre-diabetes all aged 35-56 years were included.

During the 8 years of follow up, it was found that, total alcohol consumption drinking increased the risk of pre-diabetes and type 2 diabetes mellitus in men (Odds Ratio 1.42, 95% CI 1.00-2.03 and OR 1.67, 95% CI 1.11-2.50, respectively), whereas low consumption was concomitant with a decreased diabetes risk in women (OR 0.41, 95% CI 0.22-0.79) (Cullmann et al., 2012).

On the other hand, men exhibited higher risk of pre-diabetes with high beer consumption (OR 1.84, 95% CI 1.13-3.01) and of type 2 diabetes with high consumption of spirits (OR 2.03, 95% CI 1.27-3.24). It was concluded that in women the association was more compound with

a decreased risk on low or medium alcohol intake and an increased risk of pre-diabetes with high consumption of spirits (Cullmann et al., 2012).

In a population based survey carried out in two districts in Eastern Uganda namely Iganga and Mayuge by Mayega and colleagues, they concluded that obesity, insufficient physical activity, and unhealthy diets are possible factors to identify people at risk of type 2 diabetes mellitus. However, this study did not include Tororo. There is, therefore the need to assess the life style factors that are linked to occurrence of type 2 diabetes among individuals aged 30 to 65 years old in Tororo hospital of which the study is going to address.

2.5 Socio-demographic factors associated with diabetes mellitus type 2

Age is also a risk factor for diabetes in that people above 45 years are more likely to suffer from diabetes than those below this age group (Kibirige et al., 2014). Adults aged 45 to 65 years old are still at the highest risk for developing type 2 diabetes mellitus (http://www.healthline.com/health/type-2-diabetes-age-of-onset#overview1).

According to Choi and Shi (2001), they stated that the occurrence of type 2 diabetes mellitus amplified with age and body mass index and this as well increased inversely with energy expenditure in both males and females.

Prevalence of and incidence of type 2 diabetes mellitus vary to a certain extent with sex from one population to another. A study done by Baumann and colleagues (2010) in Uganda found that; Men experienced more regular physical self-care activity than women and on the other hand women were more adherent to recommended diet and as well experienced high concern about diabetes complications. Chio and colleagues (2009), similarly established that men are statistically significant adherent to self-care management than women. These differences are relatively small and appear to be accounted for by differences in other risk factors such as obesity and physical inactivity. Additionally, World Health Organization Diabetic Profile (2016), established that the relative risk for obesity was 1.3% and 6.5% for men and women respectively in Uganda as a whole. Furthermore, the relative risk for overweight was 11.3% and 25.9% for men and women respectively (WHO, 2016). This suggested an increased risk factor for developing type 2 diabetes mellitus in females than males (WHO, 2016).

A positive family history of type 2 diabetes mellitus is sturdily related to risk of diabetes, however the factors interceding this excess risk is poorly understood (InterAct Consortium, 2013). Furthermore, it was found out that, only the genetic score explained two percent of the

family history associated risk of type 2 diabetes mellitus, whereas biparental history of type 2 diabetes mellitus was much associated with a greatest risk of type 2 diabetes mellitus (HR 5.14, 95% CI 3.74-7.07) (InterAct Consortium,2013).

Additionally, parents diagnosed with diabetes at a young age (less than 50 years: HR 4.69, 95% CI 3.335-6.58) was largely confined to maternal family history (InterAct Consortium, 2013). Kajoba (2014), conducted a cross sectional study on adult patients attending Kitagata hospital in sheema district Uganda, and found out 60% of diabetic patients had a positive family history of diabetes mellitus type 2.

In a case-control study by Zhao and colleagues (2013) in Ninguxia Hui Autonomous Region of China, individuals with moderate and severe occupational stress (OD.2.538 and 3.075) respectively were associated with risk of diabetes mellitus. Furthermore, the higher the degree of stress, the greater the risk of developing type 2 diabetes mellitus (Zhao et al., 2013). In a study by Agardh and colleagues (2011) in Swedish population, to ascertain the relationship between low educational levels and risk for type 2 diabetes mellitus, they computed the population attributable factor (PAF) considering dispersed age group (30-44, 45-59, 60-69, 70-79 and 80 years above).

It was found out that 17.2% of diabetes burden in men and 20.1% of the diabetes burden in women was attributed to lower educational levels in all aged groups as a combination (Agardh et al., 2011).

A study by Jongnam and Changwoo (2012) in Korean population to determine the relationship between socioeconomic status and risk for type 2 diabetes mellitus, they adjustments for covariates such as gender, marital status, region, body mass index, physical activity, smoking and alcohol consumption .the was establish that individuals with lowest income were more likely to have type 2 diabetes mellitus than people of highest income (OR 1.35.95% CI 1.08 to 1.72) (Jongnam and Changwoo, 2012). Furthermore, prevalence of diabetes increased inversely with income especially among women (Choi and Shi, 2001).

In Uganda a national crossectional study by Bahendeka and colleagues (2014), on the prevalence and correlates of diabetes, the occurrence of diabetes mellitus type 2 increased with age from 0.2 % (0.0-0.5) to 2.1% (1.1-3.1) and 2.3% (0.9-3.8) in the 18-29, 30-49 and 50-69 years age groups. Additionally, abdominal obesity was positively associated with risks for diabetes type 2 4.3% (95%CI 1.6-9) (Bahendeka et al., 2014). In the same study, female

were less likely to have diabetes (CI 0.13-0.58) than men. Whereas in Tororo, Sociodemographic factors associated with prevalence of type 2 diabetes are not definite thus the need to carry out this research.

2.6 Health system factors associated with type 2 diabetes mellitus.

Obirikorang and colleagues (2016) conducted a crossectional study at Sampa Government hospital in Ghana. Out of 630 participants with type 2 were assessed and 378 (60%) did not have knowledge on diabetes complication, 169 (26.9%) had inadequate knowledge on diabetes while 82 (13.1%) had adequate knowledge. Therefore it was statistically noted that participants lacked an in-depth information on diabetes and its complications (Obirikorang et al., 2016). According to the Uganda diabetic country profile (2016), it indicates that Uganda does not devise an operational policy or strategic action plan for diabetes, to reduce obesity and overweight, and to reduce physical inactivity; This limits information access on diabetes and a possible risk factor of development of diabetes majorly Type 2.

In a survey of health settings and availability of diabetes services in Mozambique, Zambia and Mali by Bera and colleagues (2005), it was found out that in all heath facilities assessed, 82 % lacked urine glucose testing strips,79% lacked blood glucose meters in Mozambique, whereas in Mali, 46% and 87% and Zambia 39% and 51% respectively. This affects patients seeking for diabetes diagnosis and management (Bera et al., 2005).

According to Baumann and colleagues (2010) in Uganda, longer distance to the health facility is a big barrier to access treatment recommendations and vital patient's information. The relative distance from people's homes to the nearest health facility where a patient could access diabetes treatment was significantly associated with adherence to diabetes treatment in type 2 diabetes patients (Kibirige et al., 2014). Patients who live in a distance where they travel for less than 30 minutes are more likely to be adherent to their treatment and seek diabetes information than those who have to travel for longer hours (Baumann et al., 2010).

Otero and colleagues (2011) in Brazil , noted that availability of diabetes medication for patients refill, the attitude of health workers, staffing level of health workers and duration of waiting time prior to accessing health care services are factors that affect the level of adherence to diabetes treatment and those seeking for diagnosis of type 2 diabetes. Long waiting time at the health facility affects the busy working schedules of patients and at one point some patients miss their treatment because they cannot travel to the health facility or keep waiting in line at the health facility (Otero et al., 2011). Inaccessibility of health workers

at the facilities to carryout routine diabetes assessment of patients, yet they are a vital source of information regarding diabetes control and management (Otero et al., 2011).

In a cross sectional study by Tesfaye et al 2016, in Addis Ababa Ethiopia, there was a high occurrence of undiagnosed diabetes mellitus due to priority given to communicable disease, poor culture of visiting health facility for medical checkups and lack of decentralized health services for chronic non communicable diseases.

Bahendeka and colleagues (2014) in Uganda, Nsambya, addressed the need for detailed national population based data on prevalence and correlates in Uganda to form baseline data for surveillance, policies and interventions on diabetes mellitus type 2.

Whereas Tororo the study area, no available data or any study on diabetes yet there is a growing occurrences of type 2 diabetes mellitus and hence the purpose of this research to identify the health system factors associated with type 2 diabetes mellitus among persons aged 30 to 65 years old attending diabetic clinic at Tororo district hospital.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter describes the methodology that was used to carry out the study which includes the research design, study population and the area of study, sampling procedures, sample size calculation, study variables, data collection technique, data management and analysis methods, quality control, ethical considerations and plan for dissemination of the study findings.

3.2 The study design

This research study was a descriptive cross-sectional study involving the use of quantitative methods of data collection. This study design is suitable for this study mainly because the researcher seeks to determine the prevalence and factors associated with type 2 diabetes mellitus among persons aged 30 to 65 years attending the diabetic clinic at Tororo hospital. This study design is also feasible in terms of time saving since the study has a time frame in which it has to be done.

3.3 The study area

This study was done at diabetic clinic in Tororo Hospital located in Tororo town because it provides specialty health care service in diabetes diagnosis and management, being the only diabetic center in Tororo and is cost effective in terms of transport and accessibility to the researcher. The hospital is also known as Tororo General Hospital, Tororo Government Hospital and Tororo Main Hospital. However, basically this is a public hospital owned by the Government of Uganda and administered by the Uganda Ministry of Health. The hospital is located in the Central Business District of the town of Tororo District, in the Eastern region of Uganda.

The hospital is located approximately 46 kilometers south of Mbale Regional Referral Hospital.

The coordinates of the hospital are: 0º41’42.0’’N, 34º11’16.0’’E (Latitude: 0.695000; Longitude: 34.187766).

The hospital has got several clinics including the diabetes clinic which offers treatment and therapies to diabetic patients. This is was the focus in the study area.

3.4 Sources of data

3.4.1 Primary data

The major source of data were primary data which was collected from all patients aged 30 to 65 years old attending the diabetic clinic at Tororo District Hospital.

3.4.2 Secondary data

This were collected from care takers and health workers at the diabetic clinic.

3.5 Study variables

The study was guided by 3 independent variables which will include; socio-economic, lifestyle and the health system factors influencing the prevalence of diabetes 2 among the population. The dependent variable were the prevalence of diabetes type 2 among individuals aged 30 to 65 years attending the diabetes clinic at Tororo District Hospital.

3.6 Study population

The population under this study was all persons already or newly diagnosed with diabetes mellitus and attending the diabetes clinic at Tororo District Hospital.

3.7 Selection criteria

3.7.1 Inclusion criteria

This study included all patients aged 30 to 65 years attending the diabetes clinic, and health workers working at the diabetic clinic as key informants.

All participants who meet the above requirements and have consented to get involved in the research.

3.7.2 Exclusion criteria

Participants who did not accept to consent and those who were found to have communication hindrances such as the deaf and mute as well as those too sick to communicate were excluded from the study. Patients aged less than 30 years or above 65 years were excluded from the study.

3.8 Sample technique and procedure

The study used convenience non-probability sampling method to obtain the required 110 samples of diabetes patients because it enables you to achieve the required sample size in a relatively fast and inexpensive way.

The researcher will consecutively recruit clients attending diabetes clinic at Tororo district hospital. The researcher went to the hospital on every clinic day and every patient aged at least 30 years and consent to participate were recruited in the study, this process was repeated until sample size of 110 is attained.

3.9 The sample size determination

For quantitative data, the sample size n is determined by the main outcome. From Kish and Leslie (1965) formula,

$$n= Z^2\ \alpha/2\ P\ (1-P)/\ e^2$$

Where n is the minimum sample size, P is the proportion of patients attending diabetic clinic. It is conventionally accepted that if this proportion is not anywhere in the literature then the study P is estimated to be 0.5 and Z value is at α/2. The value Z α/2 is equal to 1.962 (approximately to 2) at α equals to 0.05 and e is the precision with value of 0.1.by substitution in this formula. n= 2x2x0.5 (1-0.5) /0.1x0.1=**100**.

To account for non-respondency, 110 respondents were enrolled for this study.

3.10 Data collection technique

The research method used during the process of data collection included questionnaires to patients. A structured questionnaire with both open and close ended questions was designed in accordance with the objectives of this study and key variables to be assessed include: socio-demographic factors, life style factors and health system factors. Furthermore, observational study approach whereby the researcher simply observes behaviors in a systematic manner without influencing or interfering with the behavior of respondents was used.

3.10.1 Data collection tool

The data collection tool that were used for this study was a researcher-administered questionnaire with both open and close ended questions which were pre-coded for easy data entry and analysis.

3.11 Quality control issues.

A pre-test of the questionnaires was done in other health facility of the same level like St. Anthony hospital, Tororo so as to check and ensure the suitability, reliability and validity of the data collection tool on 5 respondents. Questions that were identified as not clear or irrelevant to the study were edited or omitted respectively. Research assistants who were used in the collection of data were properly trained prior to the collection of data such that they are will conversant with the questionnaire and can properly use it for effective collection of the required data.

The questionnaires that were collected were kept under lock and key immediately after the research assistants have handed them to the researcher upon returning from the research center. The researcher will later on clean the data by checking for errors and any other inconsistencies in the collected data and thereafter enter it into the computer. The questionnaire will also be translated into the most appropriate language which is Japadhola and Ateso to ease communication.

3.12 Data analysis

3.12.1 Data entry

The data collected from the questionnaire were coded and entered into the computer system.

3.12.2 Data cleaning.

The data were cleaned by checking whether the respondents gave the right answer for the questions and if the data was properly coded and entered into the computer system.

3.12.3 Analysis of data.

The researcher used a computer software-SPSS version 16.0 and the findings were presented using charts, graphs and contingency tables.

Chi-square tests were used to determine the level of association between the dependent and independent variables. Also, regression analysis was used to determine the association among the variables under the study.

3.13 Ethical consideration

The researcher followed the guidelines provided by International Health Sciences University by seeking legal acceptance from the university in form of a letter of authorization from both the University and Administrators of Tororo District Hospital. Also, all participants will have to give informed consent prior to their participation in the study and all information collected were confidential and only used for academic purposes.

3.14 Plan for dissemination of results

The results of the study were disseminated to International Health Sciences University and the health care leaders in Tororo District Hospital.

CHAPTER FOUR: RESULTS

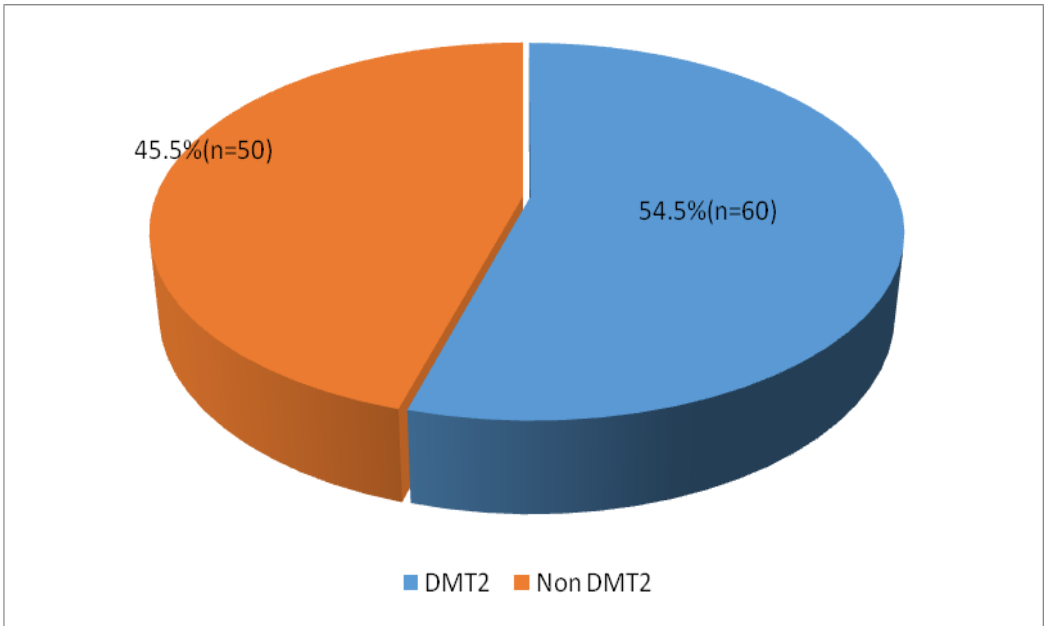
4.0 Introduction

This chapter presents findings obtained from the study of Prevalence and factors associated with type 2 diabetes mellitus among persons aged 30 to 65 years old attending diabetic clinic at Tororo district hospital May to June 2017. A total of 110 participants took part in the study, these all completed the survey making 100% response rate.

4.1 Prevalence of type 2 diabetes mellitus

From 110 respondents who were enrolled in the study, 60 of them were confirmed having type 2 diabetes mellitus making a prevalence of 54.5%. These results are as shown in the figure below.

Figure 3: Prevalence of Diabetes mellitus type 2 patients among the respondents.



Key: *DMT2- diabetes type 2.*

Therefore, it revealed that majority of the respondents 60 (54.5%) were diabetes mellitus type 2 patients whereas 50 (45.5%) of respondents were non-diabetes type 2 clients.

4.2 Socio-demographic factors associated with diabetes mellitus type 2.

The sociodemographic factors considered in this study include age, gender, family history of diabetes type 2, occupation, level of education and average monthly income in Uganda Shillings.

4.2.1 Socio- demographic characteristics of respondents.

Table 1:.Socio-demographic characteristics of the sample (n=110)

Variable	Categories	Frequency (n)	Percentage (%)
Gender	Male	36	32.7
	Female	74	67.3
Age	30-40 years	45	40.9
	41-65 years	65	59.1
Family history of DM	Yes	23	20.9
	No	87	79.1
Relation to family with DM *(n=23)* **	Father	4	17.4
	Mother	6	26
	Sibling	2	8.7
	Uncle	3	13
	Aunt	1	4.3
	Grandparent	7	30.4
Occupation	Civil servant	24	21.8
	Peasant	68	61.8
	Self-employed	11	10
	None	7	6.4
Highest level of education attained	Primary	45	40.9
	Secondary	23	20.9
	Tertiary education	11	10
	None	31	28.2
Place of residence	Rural	97	88.2
	Urban	13	11.8
Average monthly income in Uganda shillings	<10,000	10	9.1
	10,000 to 100,000	76	69.1
	Above 100,000	24	21.8

Source: primary field data

Majority of the respondents were female 74 (69.1%), above 40 years of age 65 (59.1%) and reported no family history of type 2 diabetes mellitus 87 (79.1%).

Most of those who reported a family history of diabetes mellitus type 2 was among grandparents (30.4%) as the commonest member of their family who had diabetes mellitus type 2.

Most respondents were peasants 68 (61.8%), had at least attained primary level of education 45 (40.9%), were living in rural areas (88.2%) and majority earned between 10,000 to 100,000 Uganda shillings per month (69.1%) as shown in the table above.

The bivariate analysis of the socio-demographic data yielded the results shown in table 2.

Table 2: Association of socio-demographic factors and diabetes type 2 (n=110).

Variables	Diabetes mellitus (DM).		P-value
	DM II n (%)	Other types of DM n (%)	
Gender			0.0001*
Males	12 (33.3)	24(66.7)	
Female	48 (64.9)	26(35.1)	
Age			0.000*
30 - 40	37 (82.2)	8 (17.8)	
41-65 years	63 (96.9)	2 (3.1)	
Family history of DM			0.0674
Yes	17 (73.9)	6 (26.1)	
No	60 (69.0)	27 (31.0)	
Occupation			0.567
Civil servant	20 (83.3)	4 (16.7)	
Peasant	67 (98.5)	1 (1.5)	
Self-employed	7 (70.0)	3 (30.0)	
None	6 (85.7)	1 (14.3)	
Level of education			0.967
Primary	30(66.7)	15(33.3)	
Secondary	16(69.6)	7(30.4)	
Tertiary education	7(63.6)	4(36.4)	
None	24 (77.4)	7(22.6)	
Place of residence			0.567
Rural	77(88.5)	10(11.5)	
Urban	10(76.9)	3(23.1)	
Average monthly income			0.000*
<10,000	2 (20.0)	8 (80.0)	
10,000 to 100,000	71 (93.4)	5(6.6)	
Above 100,000	21(87.5)	3(12.5)	

Source: Primary field data. variables significant at P<0.05.*

Socio-demographic factors such gender, age and average monthly income were significantly associated with type 2 diabetes *(P<0.05).* More females respondents 48(64.9%) had DM II than males 12 (33.3%). Majority of respondents with DM II 63(96.9%) were aged 41-65 years than aged 30-40 years 2(3.1%).

In this study, high percentage of respondents 60(69%) reported no family history of DM compared to 27(31%) in other DM II, and 17(73.9%) respondent had family history of DM II compared to 6(26.1%).

Occupation, level of education attained , family history of DM and place of residence were not significantly associated with type 2 diabetes as shown in the table 2 above (P>0.05).

4.3 Assessment of life style factors associated with type 2 diabetes mellitus.

The lifestyle factors considered in this study include unhealthy diet, obesity, smoking, physical inactivity, and excessive alcohol consumption. A descriptive statistic of these variables is presented in table below.

Table 3: Life-style characteristics of the respondents (n=110).

Variable	Categories	Frequency(n)	Percentage (%)
Favorite food	Posho &Beans	13	11.8
	Posho & Greens	18	16.3
	Rice and pork	26	23.6
	Kalo and fish	32	29
	Others	21	19.3
Total		110	100
How often do you eat the above food mentioned in a week Once		68	61.8
Twice		7	6.3
Thrice		11	10
Daily		24	21.8
Total		110	100

Source: Primary field data.

With regards to lifestyle characteristics of the respondents, majority of the respondents reported that they consumed Kalo and Fish as their favorite meal 32 (29%), they further reported that they at least consumed once a week 68 (61.8%).

Table 4: Weight and body mass index status of respondents (n=110)

Variables	Categories	Frequency(n)	Percentage (%)
Weight (Kg).	50 to 70	10	9.1
	70 to 90	76	69.1
Total	Above 90	24	21.8
		110	100
Height (Meters).	1.00 to 1.50	13	11.8
	1.51 to 1.80	87	79
	Above 1.80	10	9.2.
Total		110	100
Body Mass Index (Kg/m2).	Below 18	7	6.4
	18 to 25	20	18.2
	25 to 30	45	40.9
	Above 30	38	34.5
Total		**110**	**100**

Source: Primary field data.

Most respondents weighed between 70 to 90kgs 76 (69.1%), had a height of 1.51 to 1.80 meters 87(79%). Furthermore, 45 (40.9%) are overweight with Body Mass Index of 25 to 30 kg/m2, and 38 (35%) of respondents were obese with Body mass index above 30 kg/m2.The overall results from this study show that majority of respondents are overweight (40.9%) and obese (35%) as shown in the table above.

Table 5: Smoking status of respondents.

Variables	Categories	Frequency (n)	Percentage (%)
Smoke Cigarette or Tobacco.	Yes	11	10
	No	99	90
Total		110	100
Sticks of cigarette or tobacco smoked daily *(n=11)***	1 to 3	3	27.4
	3 to 5	4	36.3
	>5	4	36.3

Source: Primary field data

The study found that, majority of the participants 99 (90%) never smoked cigarette or Tobacco, only 11(10%) reported smoking cigarrete or tobacco by time of this study. The overall results indicated that majority of the subjected were not smokers.

The study further found that, of the 11 respondents who smoked, 3(27.4%) reported smoking 2 sticks of cigarrete or tobacco on average daily, respondents who smoked 4 sticks on average and more than 5 stick of cigarrete or tobacco were the same 4 (36.3%).

Table 6: Status of respondents' physical activity and their favorite exercise.

Variables	Categories	Frequency (n)	Percentages (%)
Do you Exercise	Yes	98	89.1
	No	12	11.9
Total		110	100
Favorite exercise	Walking	45	45.9
(n=98)*	Jogging	15	15.3
	Running	11	11.2
	Others	27	27.6
Total		**98**	**100**
How often do you do the exercise	Daily	11	11.2
	Weekly	50	51
	Monthly	14	14.2
	Rarely	23	23.5
Total		**98**	**100**
How long do you practice (minutes)	<30 minutes	65	66.3
	30 to 1 hour	23	23.4
	> 1 hour	10	10.3
Total		**98**	**100**

Source: primary field data.

From the above table, it is interesting to note that most respondents 98 (89.1%) perform exercises, then other 12 (12%) reported not to participate in any exercise. of which those who exercise at least weekly were (51%). Furthermore, respondents who exercised (n=98) reported that they commonly do walking exercise 45 (45.9%) and a few 11(11.2%) participate in running, and they do exercises for less than 30 minutes 65 (66.3%).

Table 7: Alcohol status of respondents.

Variables	Categories	Frequency (n)	Percentage (%)
Take alcohol	**Yes**	**110**	**100**
	No	**0**	**0**
Favorite beverage	Local spirits	45	40.9
	Local brew	31	28.2
	Beer	11	10
	Wine	23	20.9
Total		**110**	**100**
How often do you take the above drink	Daily	45	40.9
	Weekly	28	25.4
	Monthly	7	6.3
	Occasionally	30	27.2
Total		**110**	**100**

Source: Primary field data.

The researcher found out that, majority of the respondents reported that they have ever consumed alcohol (100%), and their commonly consumed local spirits and local brew called waragi and *Kongo* (40.9% and 28.2% respectively). They commonly consumed this alcohol on a daily basis or occasionally (40.9% and 27.2% respectively) as shown in the table above. Bivariate analysis showing association of life style factors and type 2 diabetes mellitus is presented in table below.

Table 8 Table 8. Association of Lifestyle factors and occurrence of diabetes mellitus type 2 amongthe respondents.

Variable	**Categories**	**Diabetes Mellitus status**		**P-Value**
		DM II n (%)	Other types n (%)	
Favorite food	Posho &Beans	11 (84.6)	2 (15.4)	0.0001*
	Posho & Greens	11(61.1)	7 (38.9)	
	Rice and pork	24(92.3)	2(7.7)	
	Kalo and fish	20(62.5)	12(37.5)	
	Others	10(47.6)	11(52.4)	
how often do you eat the above food mentioned in a week	Once	60(88.2)	8(11.8)	0.567
	Twice	7(100)	0	
	Thrice	9(81.8)	2(18.2)	
	Daily	17(70.8)	7(29.2)	
Weight (Kg)	50 to 70	10(100)	0	0.0334*
	70 to 90	73(96.1)	3(3.9)	
	Above 90	23(95.8)	1(4.2)	
Body Mass Index (Kg/M2).	Below 18	3 (42.9)	4(57.1)	0.000*
	18 to 25	13(65.0)	7(35.0)	
	25 to 30	40(88.9)	5(11.1)	
	Above 30	37(97.4)	1(2.6)	
Smoke Cigarette or Tobacco	Yes	10(90.9)	1(9.9)	0.967
	No	92(92.9)	7(7.1)	
sticks of cigarette or tobacco smoked daily	1 to 3	2 (66.7)	1(33.3)	0.000*
	3 to 5	3 (75)	1(25)	
	>5	4(100)	0	
Do you Exercise	Yes	80 (81.6)	18(18.4)	0.0001*
	No	11 (91.7)	1(8.3)	
How often do you do the exercise	Daily	8(72.7)	3(27.3)	0.0001*
	Weekly	39(78.0)	11(22.0)	
	Monthly	9(64.3)	5(35.7)	
	Rarely	22(95.7)	1(4.3)	
How long do you practice (minutes)	<30 minutes	60(92.3)	5(7.7)	0.567
	30 to 1 hour	17(73.9)	6(26.1)	
	> 1 hour	8(80.0)	2(20.0)	
Alcohol consumption	Yes	98(89.1)	12(10.9)	0.0274*
	No	0	0	
How often do you take the above drink	Daily	39(86.7)	6(13.3)	0.000*
	Weekly	26(92.9)	2(7.1)	
	Monthly	6(85.7)	1(14,3)	
	Occasionally	26(86.7)	4(13.3)	

*Source: Primary Field data. * Variable significant at P< 0.05.*

Analysis of association of lifestyle factors and prevalence of diabetes mellitus type 2 among persons aged 30 to 65 years old attending diabetic clinic at Tororo hospital revealed that food consumed, weight, BMI, quantity of smoking in a day, exercising, interval of exercise per week, duration of exercise, alcohol consumption and intervals of alcohol consumption per week were significantly associated with diabetes type 2 ($P<0.05$) as shown in the table above.

4.4 Health system factors associated with type 2 diabetes mellitus.

In assessing the health system factors the respondents focused on inadequate diabetic services, inadequate health sensitization, estimated distance to health facility and attitude of health workers towards patients.

Table 9: Health system factors associated with type 2 diabetes mellitus.

Variable	Categories	Frequency(n= 110)	Percentage (%)
Availability of healthy facility in your home area	Yes	96	87.3
	No	14	12.7
Estimated distance to the health center	<500m	15	13.6
	500 to 1000m	11	10
	>1 Km	84	76.5
Availability of diabetes service at the health center	Yes	65	59.1
	No	45	40.9
Adequate staffing at health center.	Yes	14	12.7
	No	96	87.3
Attitude of Health workers towards patients.	Fair	45	40.9
	Good	31	28.2
	Very good	11	10
	Excellent	23	20.9

Source: primary field data

From the results in the table above, it reveals that most of the respondents had healthy facility within the home area 96 (87.3%), only 14(12.7%) reported no health centers in their area.

Majority of clients were at least a kilometer from health centers 84 (76.5%), those in close distance of less than 500 meters 15 (10%) whereas other subjects were very close to the health facility 15 (13.6%) of participants.

Out of the responds who were assess for health factors 65 (59.1) reported availability of diabetes services at the health centers, 45 (40.9%) do not have diabetes services at the nearest health facility. To a large extent, health facility are under staffed 96 (87.3%), only 14 (12.7%) were reported adequate staffs at health center.

4.4.1 Association of Health system factors and occurrence of diabetes type 2.

The bivariate analysis of health system factors associated with type 2 diabetes mellitus is presented in the table 10 below.

Table 10: Association of Health system factors and occurrence of diabetes type 2.

Variable	Categories	DM status	DM II n (%)	None DM II n (%)	P-value
Availability of healthy facility in your home area		Yes	60 (62.5)	36 (37.5)	0.0001*
		No	8 (57.1)	6 (42.9)	
Estimated distance to the health center		<500 m	11(73.3)	4 (26.7)	0.030*
		500 to 1000 m	10(66.7)	5(33.3)	
		>1 Km	82(97.6)	2(2.4)	
Availability of diabetes services		Yes	15 (23.1)	50 (76.9)	0.567
		No	41(91.1)	4(8.9)	
Adequate staffing at health center.		Yes	4 (28.6)	10 (71.4)	0.000*
		No	68(70.8)	28(29.2)	
Attitude of health worker towards patients		Fair	38(84.4)	7(15.6)	0.0674
		Good	23(74.2)	8(25.8)	
		Very good	8(72.7)	3(27.3)	
		Excellent	18(78.3)	5(21.7)	

*Source: Primary field data. * Variables significant at P<0.05.*

Health facility factors such having a Healthy facility in home area, estimated distance between your home and the health center and the number of health service providers at health facility were significantly associated with diabetes mellitus type 2 (*P<0.05*) as shown in the table 10 above.

CHAPTER FIVE: DISCUSSION OF RESULTS

5.0 Introduction

This section presents discussion of findings from the study. This was done according to the study objectives and in relation to similar study findings of similar studies to the research objectives of this study.

5.1 Prevalence of type 2 diabetes mellitus.

The prevalence of diabetes type 2 among the respondents attending the diabetic clinic in Tororo district hospital May to June 2017 has been assessed by this study. Results from table 1 indicate that the proportion of those with DM II to those with other DM was 60 giving a 54.5% prevalence. However this is far greater than the estimated prevalence of Africa 4.9% in 2013 and national prevalence of 2.8% in Uganda (WHO, 2016). High prevalence of 54.5% might be probably related to patient's life style, particularly those who are obese or overweight and alcohol consumption. It should be emphasized that this research assessed hospital prevalence, and therefore is not generalized or comparable with community prevalence studies. All those over 40 years and are overweight should be screened for DM II and appropriate health education given to all diabetic patients.

5.2 Assessment of Socio-demographic factors associated with diabetes mellitus type 2.

Socio-demographic factors assessed included gender, age, relation to member of family with diabetes type 2, and average monthly income. Gender, age and average level of income were significantly associated with diabetes type 2 ($P<0.05$) table 2. On the other hand, occupation, highest level of education attained and place of residence were not significantly associated with type 2 diabetes ($P>0.05$) as seen in table 2.

A big number of respondents 65 (59.1%) were 41 to 65 years old, of these, 63(96.9%) were type 2 diabetes. The age of respondents was significantly associated with diabetes type 2($P<0.05$) This may be attributed to responsible mechanisms of age-related glucose intolerance which include decreased insulin sensitivity and decreased beta (β) cell function that occur with increase in age. This is in line with the finding of the study by Kibirige and colleagues (2014); Choi and Shi, (2011), who reported that age is a risk factor for diabetes especially in people above the age of 45 years. Furthermore, in Uganda a national cross sectional study by Bahendeka and colleagues (2014), on the prevalence and correlates of diabetes, reported that the occurrence of diabetes mellitus type 2 increases with age. Therefore

special care such as routine screening of DM II and diabetic education should be drawn to individual aged 41 years and above as these are the most risk groups to DM II.

A big number of type 2 diabetic patient 48 (64.9%) were female and only 12(33.3%) were male. Therefore, there is a high prevalence rate of type 2 diabetes mellitus among female compared to their male counterparts. This can be explained in a way that men experienced more regular physical activity than women and similarly the relative risk for obesity which is higher in female 6.5% than in male 1.3% in Uganda (WHO,2016) . This suggests an increased risk factor for developing type 2 diabetes mellitus in females than males as reported in this study. However, the high prevalence registered among females might have been due to women's vulnerability in health seeking behaviors unlike in men who rarely seek medical attention.

Family history was not statistically associated with type 2 diabetes in this study (P>0.05). The lack of association probably results from respondents missing diabetes mellitus status of their parents or siblings. On the contrary, significant and positive association (60%) between family history and diabetes type 2 was reported by Kajoba and colleagues (2014), among adult patients attending Kitagata hospital in Sheema district Uganda.

Occupation was not significantly associated with occurrence of type 2 diabetes in this study (P>0.05). The lack of association in this study might be justified by the number of other groups than the peasant subjects who were the majority 68 (61.9%). On the contrary, statistically significant and positive association of occupation and DM II was revealed by Zhao and colleagues (2013), in Ninguxia Hui Autonomous Region of China where individuals with moderate and severe occupational stress were associated with risk of DM II. Furthermore, the higher the degree of occupational stress, the greater the risk of developing type 2 diabetes mellitus (Zhao et al., 2013).

There was no significant association between education level and DM II in this study (P>0.05). In this study, the big number 30 (66.7%) of respondents with DM II and primary education status might be related to ignorance on awareness and opportunities for prevention of DMII. This is in contrast with a study by Agardh and colleagues (2011) in Swedish population, who reported a significant association between educational level and risk for DM II. They found out that 17.2% of diabetes burden in men and 20.1% of the diabetes burden in women was attributed to lower educational levels in all age groups. The ministry of health

should create community awareness and campaign on prevention of DM II in all public gathering, television talk shows and local radio station in area in language people understand best.

Average monthly income was significantly associated with occurrence of type 2 diabetes mellitus in the study population (P<0.05). The 71 (93.4%) Respondents who earned between10, 000 to 100,000 might be associated with eating junk food and high carbohydrate diet that increase fats and glucose levels respectively. An increase in economic status may be coupled with knowledge on diet and choice of the food to eat.

On the contrary, study by Jongnam and Changwoo (2012) in Korean population reported that individuals with lowest income were at more risk of type 2 diabetes than individuals with high income individuals. Furthermore, they concluded that, prevalence of diabetes increased inversely with income (Jongnam & Changwoo, 2012).

5.3 Life-style factors associated with type 2 diabetes mellitus

The study examined lifestyle factors and occurrence of DM II among person 30 to 65 years attending diabetic clinic at Tororo hospital. The researchers included food consumed, weight, body mass index, smoking cigarrete or tobacco, exercising, and alcohol consumption. Weight and body mass index were used to categorize obesity.

In this study, the researcher reported a significant association between food consumed with the risk of developing type 2 (P<0.05) as in table 8. This may be due to frequent consumption of high carbohydrate diet, and sugar-sweetened beverages for instance sodas which results in a greater magnitude of weight gain because of excessive calories content and largely absorbable sugars. This is consistent with the findings of Matovu and colleagues (2017) in Uganda, who also reported a positive association between diet and type 2 diabetes.

Body mass index was significantly associated with type 2 diabetes mellitus (P<0.05) as seen in table 8. Overweight and obesity which is a BMI of 25 to 30 kg/m2, and 31kg/m2 and above respectively was reported in 40.9% and 35% of respondents as seen in table 8. This is explained by expanded abdominal fat store also called belly fat that affect insulin metabolism by releasing free fatty acid molecules. Additionally, these fat molecules secrete signaling factors like interlukein-6 and tumor necrotic factor which are key in development of insulin resistance, hence risk for type 2 diabetes mellitus (Ekpenyong et al., 2012).

This research finding were consistent with Sushmita and colleagues (2010) in Chicago USA, and Muyer and colleagues (2012) in Congo. Therefore an increase in BMI is associated with

risk of type 2 diabetes mellitus. It is therefore, important to routinely screen obesity and overweight in all patients especially aged 30 years and above at each outpatients visit to the hospital so as to identify earlier risk for DM II. To all nurses, weight and height should be included when assessing vital signs of a patient and provide weight control measures.

No significant association was reported between cigarette or tobacco smoking and DM II ($P>0.05$) as seen in table 8 of results. The findings in table 5 revealed that current smokers accounted for 10% (n=11), of which majority were over the age of 40.The findings in table 8 showed that cigarette or tobacco use is high (90.9%) in DM II than in other types of DM (9.9%). However, the researcher reported a positive association between number of cigarrete or tobacco sticks smoked in a day and DM II ($P<0.05$) as seen in table 8. This is because increase in age comes with many responsibilities and eventfully emotional stress. Individuals may therefore resort to cigarette smoking habits as recreation to keep them off worrying. Therefore, the lack of association in this study could be justified by small respondents of smaller proportion of smokers (n=11). On the other hand, Sargeant and colleagues (2014) in USA, and CDC (2014), reported an association between smoking and DM II. Tobacco has an implication on health, therefore government policy to restrict its production should be put in place so as to reduce the burden on health care. The nature of advertisements on tobacco should include the dark side of tobacco smoking.

The association between exercise and type 2 diabetes was statistically significant in this study ($P<0.05$) as seen in table 8. This study reported a great proportion of respondents 98(89.1%) do exercise, with majority 50 (51%) exercising weekly and minority 11(11.2%) exercise daily. Of these (n=98), 80 (81.6) % were DM II and 18(18.4%) were other types of DM.
The frequency of exercise is significant with DM ($P<0.05$) as seen in table 8. The association in this study probably reflects on community awareness and prevention of diabetes mellitus.
Similarly studies by Mutebi and colleagues (2012); Mayega and colleagues (2014) both in Uganda reported a significant association between physical activity and diabetes type 2. Therefore, adequate sensitization on local radio stations, public gathering for instance churches and mosques should be emphasized to ensure community awareness and prevention of DM II.

Alcohol consumption was significantly associated with DM II ($P<0.05$) as in table 8. In this study, the reported frequency of alcohol consumption was very high 110 (100%), 45(40.9%)

and 31(28.25%) take mostly local brew (*koongo*) and spirits (*waragi*) respectively, followed by wine 23 (20.9%). Majority of respondents 98(89.1%) were DM II and 12(10.9%) were other types of DM. This could be explained by culture in this region, where alcohol taking is prestigiously considered a cultural practice hence majority take alcohol. Similarly, studies by Hodge and colleagues (2006), Muyer and colleagues (2012) in Congo, and Oyebade and colleagues (2007) in Nigeria reported a significant association between alcohol consumption and DM II. The hypothesized effect of alcohol including its contribution to inadequate insulin release, reduced insulin binding and inhibition of intracellular signaling with eventual development of insulin resistance (Kim, 2012). Alcohol impairs the immune system, and therefore increases risks of diabetic complications such as diabetic foot and frequent infections. Through clan elders and local leaders, we should discourage alcohol consumption and increase awareness on its relation to DM II.

5.4. Health system factors associated with type 2 diabetes mellitus.

The health system factors assessed included availability of healthy center in respondent's home area, availability of diabetes service, level of staffing and lastly attitude of health workers. In this study there was a significant association between availability of the health facility within respondents home area and type 2 diabetes ($P<0.05$) as in table 10. The majority of respondents 96(87.3%) had health centers unlike 14 (12.7%) with no health centers. of these (n=96) in their locations, 62.5% were type 2 diabetic patients. Additionally, 76.5% were located at a distance greater than 1km away from the health center, 15.3% and 11.2% were in less than 500m, and between 500 to 1000m respectively.

In this research estimated distance from the respondents home to the healthy facility was significantly associated with occurrence of type 2 diabetes ($P<0.05$). Majority of respondent 82 (97.6%) who were DM II travel for a distance greater than one kilometer to the health center while 2(2.4 %) were other types of DM as seen in table 10 . This could because of traveling long distance to health center coupled with financial constraints impinges health seeking behaviors, in that the patients will only come to the hospital when severely ill unlike short distance where client easily goes for screening and seek preventive measure before disease onset. In addition, most patients are in the rural areas where means of transport to health facility are scarse. This research is consistent with studies by Kibirige and colleagues (2014) Nsambya Uganda; Baumann and colleagues (2010) in Uganda, who reported significant association between distance from health center and DM II.

In this cross sectional study, the association between availability of diabetes services and DM II was not statistically significant (P>0.05).

The researcher found out that, 65(59.1%) respondents reported availability of diabetes services in their health centers of which 15(23.1%) were DM II . The other 45 (40.9%) reported no diabetes services in their health centers, of which 41(91.1%) were DM II as seen in table 9. On contrary, Otero and colleagues (2011) in Brazil; Bera and colleagues (2005) in Mozambique, and Zambia reported a significant association between availability of diabetes services and DM II. Formation of peer groups among diabetic patients to share knowledge on care and prevention of diabetes and they should be motivated and supported by government. Level of staffing was significant with DM II (P<0.05) as in table 10. Only 4(28.6%) of respondents with DM II reported adequate staffing at the health center compared to 10 (71.4%) with other type of DM. Furthermore, 68(70.8%) with DM II reported low level of staffing compared to 28(29.2%) with other types of DM. This means the number of staffs available to provide care determine the number of patients attending the clinic because most patients waiting for long hours in a queue to be attended to by one doctor or nurse, this affects the seeking behavior seen in diabetic clients and most resort to not turn up. Low staffing was explained by a number of staffs on maternity and study leave. This is line with finding by Otero and friend (2011) in Brazil. The hospital administrators should devise annual staff leaves putting in mind the minimum number of staff on duty.

Attitude of health providers in the health centers was not significant with type 2 diabetes mellitus (P>0.05). Most of the DM II patients 38(84.4%) reported a fair attitude of health workers and 18(78.3%) reported an excellent attitude of health workers. This may be due to motivation from government and hospital, exhibition of good professional conduct especially amongst nurses and doctors at the clinic. In contrast to Otero and colleagues (2011) in Brazil who reported a significant association between attitude of health workers and prevalence of type 2 diabetes.

The attitude of health workers at the facilities may alter client's health seeking behaviors since health workers key informants regarding diabetes control and management.

5.5 Study Limitations

The results of this must be considered with caution because of some methodological issues which include;

First and foremost, the study population was selected from individuals attending the diabetic clinic at Tororo district hospital only; hence the results of the study cannot be generalized to the whole population of Tororo district. Therefore it is limited to adults of Tororo district attending diabetic clinic.

Secondly the sampling method used is convenience sampling method which is a nonprobability sampling method which results into selection bias. This may lead to either under or over estimation of prevalence of diabetes type 2.

Finally, the key parameter for independent variables were based on self-report specifically interviewer administered questionnaires for life style and health seeking behaviors. This is a type of bias where respondents tend to opt what they fill that the interviewer would like to hear yet in actual sense it's not the truth. This too might lead to over or under estimation of lifestyle factors.

Never the less the study still provided an insight into the prevalence and factors associated with type 2 diabetes mellitus in among individuals aged 30 to 65 years old attending diabetic clinic at Tororo district hospital.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.0 Introduction

The aim of this chapter is to capture the main findings and present recommendations drawn from findings of the study. This captures conclusions about findings on the study objectives.

6.1 Conclusion

The study aimed at assessing the prevalence and factors associated with type 2 diabetes mellitus in Tororo district hospital during the month of May to June, 2017. The prevalence of diabetes mellitus type 2 among the respondents aged 30 to 65 years old who took part in the study was 54.5%. This implies there is a higher proportion of a person living with Dm II in Tororo district. Socio-demographic factors such gender, age, relation to member of family with diabetes type 2, and average monthly income were significantly associated with diabetes type 2 *(P<0.05)*. Analysis of association of lifestyle factors and Prevalence of diabetes mellitus type 2 revealed that food consumed, obesity, number of cigarrete or tobacco smoked in a day, exercising, alcohol consumption were significantly associated with diabetes mellitus type 2 (*P<0.05*). Furthermore , health system factors such availability of healthy facility in the home area, estimated distance to the health center and adequate staffing were significantly associated with diabetes type 2 (*P<0.05*). In conclusion DM II is the most predominant (54.5%) among diabetic patients attending the clinic, also having an increased prevalence in those over 40 years , are overweight or obese.

6.2 Recommendations

Ministry of health in Uganda with assistance from academic institutes, should ensure that local diabetes prevalence and incidence data are collected for example through the recurring demographic and health survey (DHS) to increase the availability of information on current epidemiological trends of diabetes type 2.

An operational policy or strategic action plan for diabetes, to reduce obesity and overweight, and to reduce physical inactivity should be included in the diabetic package at all diabetic clinic in various hospital in Uganda. This will increase awareness and information access on diabetes and a possible reduction of development of diabetes majorly type 2.

6.3 Areas for further study

The researcher provides the following areas that require urgent study.

I. Risk factors and prevention of diabetic complication among type 2 diabetic patients.

II. Relationship between type 2 diabetes mellitus and other co-morbidities such as hypertension and kidney disorders.

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APPENDIX I: CONSENT FORM

Dear respondent, I am by Names ***Nyakuri Emma***, a student nurse from international health sciences university (IHSU) Kampala. I am here to carry out research of prevalence and factors associated with diabetes type 2 among persons attending the diabetic clinic at Tororo district hospital. The purpose of this study to generate information on the knowledge, attitude and accessibility regarding diagnosis and care of diabetes type 2. Furthermore the study will help in standardizing the priority health care need and how possible we can prevent diabetes type 2 in our community. The research is purely academics purpose and all the information that were presented were kept strictly confidential.

Thank you so much in advance for you time and participation.

Consent form

You are invited to participate in a research study conducted by ***Nyakuri Emma*** from International Health Sciences University Kampala. You are selected as a suitable participates in this study because your views are absolutely helpful.

To participate, you were asked questions about diabetes mellitus and the experiences with this medical condition. The interview will take place at Tororo Hospital and it will take about 20 minutes while you are seated at a place of you convenience.

You participation is so important in making good policies about diabetes type 2 in Uganda. However I cannot promise a direct benefit or profit to the participant, but the information gathered will benefit us as a whole.

Gathered information were entered and processed in a computer. Your name and other personal identification will not be needed in this research. Personal information gathered during this study is kept private from all other than the study research and supervisor. Feel free if you want to withdraw your consent and discontinue your participation, no penalty is subjected.

Your signature indicates that you have read and understood the information provided above, and willingly agree to take part in the study.

Signature of participant…… Thumb print…… Date ……..

Researcher's signature …… Date ……..

APPENDIX II: QUESTIONNAIRE.

Questionnaire about prevalence and factors associated with diabetes type 2 among persons aged 30 to 65 years attending diabetic clinic at Tororo District Hospital.

Section A: Interview on Socio-demographic Characteristics.

Tick the option that best describes you.

1. What is your Sex?

   Male [ ] Female [ ]

2. How old are you? ..... (Years)

3. Do you have anyone in the family with or had diabetes? Yes [ ], No [ ].

   If Yes,

   Father [ ] Mother [ ] Sister [ ] Brother [ ]

   Uncle [ ] Aunt [ ] Grandparent [ ].

4. What is your occupation?

   Civil Servant [ ] Peasant [ ] Self-employed [ ]

   None [ ].

5. What is your highest level of education?

   Primary [ ] O level [ ] A level [ ] Diploma [ ]

   Degree [ ] None [ ] others Specify [ ].

6. Place of residence

   Urban [ ] Rural [ ]

7. How much do you earn at the end of the month?

   Less than *10,000/=* [ ] *10,000 - 100,000* [ ] Above *100,000/=* [ ].

Section B: Interview on life style factors.

8. a) What is your favorite and commonest food consumed.(Main food and sauce)…….....

   .b) how often do you eat the above food mentioned in a week?

   Once [ ] Twice [ ] Thrice [ ] Daily [ ].

9. a) .Weight of Respondent …….. …….. …….. (Kg).

   b). Height of the Respondent…. ……. (Meters).

   c). Body Mass Index …… (Kg/M2).

10. a).Do you Smoke Cigarrete or Tobacco ? Yes [ ] No [ ]. If yes,

b) what is your favorite and commonest cigarette or tobacco smoked?.....

c).how many sticks of cigarette or tobacco do you smoke daily?

1 to 3 [ ] 3 to5 [ ] More than 5 [ ].

11.a) Do you Exercise ? Yes [ ], No [ ], If yes,

b) What is your favorite exercise?

Walking [ ] Jogging [ ] running [ ] others specify [……].

c) How often do you do the exercise mentioned above?

Daily [ ] Weekly [ ] Monthly [ ] Rarely [ ].

d) How long do you practice?. …… (Minutes).

12. a) Do you take alcohol? Yes [ ], No [ ]. If yes,

b) What is your favorite beverage?

Local Spirits [ ] local brew [ ] Beer [ ] Wine [ ]

c) How often do you take the above drink?

Daily [ ] Weekly [ ] Monthly [ ] Occasionally [ ].

Section C: Health system factors.

13. In which part of Tororo do you live? .....

14.a) Is there a healthy facility in your home area? Yes [ ] No [ ]. If yes,

b) What is the estimated distance between your home and the health center? Less than 500m [ ] 500m to 1 km [ ] more than 1 km [ ].

c) Does the health facility provide diabetes services? Yes [ ] No [ ].

d) Is the health facility well-staffed? Yes [ ] No [ ].If yes, how do you grade their attitude towards patients?

Fair [ ] Good [ ] very Good [ ] Excellent [ ].

Thank you for participating

APPENDIX III: INTRODUCTORY LETTER

IHSU INTERNATIONAL HEALTH SCIENCES UNIVERSITY
sanitas per scientiam

making a difference in health care

Office of the Dean, School of Nursing

Kampala, 27th June 2017

TO THE MEDICAL
SUPERINTENDENT, TORORO
DISTRICT HOSPITAL.

Dear Sir/Madam,
RE: ASSISTANCE FOR RESEARCH

Greetings from International Health Sciences University.

This is to introduce to you **Nyakuri Emma,** Reg. No. **2013-BNS-FT-019** who is a student of our University. As part of the requirements for the award of a Bachelors degree in Nursing of our University, the student is required to carry out research in partial fulfillment of the award.

The topic of research is: **Prevalence and Factors Associated With Diabetes Type 2 Among Persons Aged 30 to 65 years Old Attending Diabetic Clinic at Tororo District Hospital May -Jane.**

This therefore is to kindly request you to render the student assistance as may be necessary for the research.

I, and indeed the entire University are grateful in advance for all assistance that will be accorded to our student.

Sincerely Yours,

INTERNATIONAL HEALTH SCIENCES UNIVERSITY
27 JUN 2017
INSTITUTE OF ALLIED HEALTH SCIENCES
P. O. Box 7782, Kampala - Uganda

Ms. Agwang Agnes
Dean, School of Nursing

The International Health Sciences University
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APPENDIX IV: CORRESPONDENCE LETTER

TORORO DISTRICT LOCAL GOVERNMENT
TORORO GENERAL HOSPITAL

MS. Direct Line: 0774122456
Email: tororohospital@gmail.com
In any correspondence on this subject
Please quote

P.O. BOX 1,
Tororo.

29th, June, 2017

TO WHOM IT MAY CONCERN

RE: PLACEMENT FOR RESEARCH.

I am in receipt of your letter dated 29th, June, 2017 on the above topic.

This is to inform you that **Nyakuri Emma** has been offered a place to carry out research on prevalence and factors associated with Diabetes type 2 among persons aged 30 to 65 years old attending diabetic clinic in Tororo Hospital in Tororo District.

Indiscipline and professional misconduct shall lead to termination of your research.

Your Co-operation will be highly appreciated.

Thank You,

TORORO GENERAL HOSPITAL
29 JUN 2017
P. O. BOX 1, TORORO

Dr Ochar Thomas
Medical Superintendent

A HEALTHY AND PRODUCTIVE POPULATION THAT CONTRIBUTES TO SOCI- ECONOMIC DEVELOPMENT