PREVALENCE OF RISK FACTORS FOR DIABETES MELLITUS TYPE 2 AMONG RURAL POPULATION OF SELECTED SECTOR IN RWANDA

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2017

PREVALENCE OF RISK FACTORS FOR DIABETES TYPE 2 IN RURAL POPULATION OF SELECTED SECTOR IN RWANDA

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A dissertation submitted in partial fulfilment of the requirements for the degree of

Master of Sciences in Nursing (Medical surgical Track

In the College of Medicine and Health Sciences

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July 2017

DECLARATION

I **YAMURAGIYE Priscille** do hereby declare that this ***dissertation*** submitted in partial fulfillment of the requirements for the degree of **MASTERS OF SCIENCE** in **NURSING**, at the University of Rwanda/College of Medicine and Health Sciences, is my original work and has not previously been submitted elsewhere. Also, I do declare that a complete list of references is provided indicating all the sources of information quoted or cited.

Date and Signature of the Student

……..

a. *Authority to Submit the dissertation*

Surname and First Name of the Supervisor

…….

In my capacity as a Supervisor, I do hereby authorize the student to submit his/her **dissertation**.

Date and Signature of the Supervisor/Co-Supervisor

…….

ABSTRACT

Background: Diabetes mellitus type 2 is a significant health problem worldwide, including populations in Sub-Saharan African countries such as Rwanda. Therefore it is very important to get the risk factors which influence its occurrence among different people, especially the detection of modifiable risk factors to aid in the prevention and early intervention of this highly preventable disease.

Aim of the study: To find out the prevalence of risk factors for type 2 diabetes among a population of Kibirizi sector.

Methodology: The study was a descriptive cross-sectional population-based study of the prevalence of risk factors for diabetes mellitus Type 2 (T2DM). The target population was males and females of Kibirizi sector in Gisagara District aged 18-74 years. The study used a convenience sampling strategy with a sample size of 275. A structured diabetes risk questionnaire, anthropometric measurements, weight, height, waist circumference, arterial blood pressure measurement and BMI calculation were used to gather data. **Results**: Findings showed that among respondents 55.6% ranged between 18-44 ages, 56.7% of all participants studied primary school while other 27.3% was illiterate; 73.09% of the total respondents do not eat vegetables or fruits every day increasing the risk of being exposed to T2DM. Alcohol consumption was 55.6%. About the arterial blood pressure, (56.7%) have a pre hypertension that can be complicated in stage I hypertension. Being at risk is determined by the total scoring of the risk factors classified as moderate or high risk category; among participants 31.3% (13.1% male and 18.2% female) was in Moderate risk category ranged between 21 and 32 points, and 6.9% (3.3% male and 3.6% female) was in the high risk category ranged above 32 points. For this results female are highly exposed since 21.8% over 16.4% male were in the high risk.

Conclusion: Significant risk factors in this study were being educated at low level, not eating fruits or vegetable regularly, alcohol consumption, pre-hypertension among participant. Screening and health education should be engaged at the community level with measurement of anthropometric measures and blood pressure to prevent T2DM through risk factors screening.

DEDICATION

To the Almighty God, for his Mercy, Grace and invaluable Love. This work is also dedicated to my lovely family including my Husband and my Children, who tirelessly gave me many kinds of courage. I dedicate also this work to my Supervisor and Co-supervisor who guided me during preparation of this dissertation.

ACKNOWLEDGMENT

To complete this work the combined effort of different people and institutions played a huge role. It is not easy to remember all people who generously gave moral and physical support to facilitate my study but from my heart I am thankful for everyone who has made the effort to support me.

I thank Almighty God who protected me and guided my mind during preparation of this work, to God is the glory for His wondrous gifts of health, ingenuity and grace to the point of this submission I owe it all to him. I thank Rwanda Ministry of Health for allowance of scholarship and financial support; I acknowledge the effort that University of Rwanda especially College of Medicine and Health Sciences have used to facilitate my studies during this program. I thank University Teaching Hospital; here I mean leaders and my colleagues for their kind support to me during the whole period of this program.

I am thankful to my supervisor **Pamela Meharry PhD** who had guided me in this dissertation preparation with important advice and relevant comments. Thanks also to them for unfailing help by proper guidance, effective advice and with a good support, regardless other heavy responsibilities assigned to them.

My sincere thanks go to my husband ,namely Etienne NDINDIRIYIMANA ,my children UWASE TETA Gaelle and IRAKOZE MANZI YVAN for their love, assistance and motivation in the completion of my studies without their support I could not achieve my goals. I thank my Master's classmates for their advice and relevant suggestions while discussing the research procedure. Thank you all, may God bless you for your kindness.

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LIST OF SYMBOLS AND ACRONYMS

ADA: American Diabetes Association

BMI: body mass index

CKD: chronic kidney disease

CRF: chronic renal failure

CM: centimeters

CVD: cardiovascular disease

DBP: diastolic blood pressure

GDM: Gestational Diabetes Mellitus

HbA1: glycosylated hemoglobin A1

Hyperglycemia: high blood glucose

IDDM: insulin-dependent diabetes mellitus

IDF: International Diabetes Federation

Kg: kilograms

LMIC: low-and-middle income countries

MmHg: millimeters of mercury

NCDs: non-communicable diseases

NIDDM: non-insulin-dependent diabetes mellitus

OGTT: oral glucose tolerance test

SBP: systolic blood pressure

T1DM: type1diabetes mellitus

T2DM: type 2 diabetes mellitus

WHO: World Health Organization

CHAPTER 1: GENERAL INTRODUCTION

The initial section of this research addresses to the general introduction of the whole research. It is mainly includes five chapters, namely the general introduction of the research, literature review, methodology, the results, the discussion, whereby the last chapter is the summary of findings, conclusion and recommendation.

1.1 INTRODUCTION

This is the introductory part of the first chapter. It is mainly includes nine major points, namely the introduction, the definitions of the used key terms, the background of the study, statement of the problem, research objectives of the study; the research questions; significance of the study; subdivision of the research project, and the summary of the first chapter.

1.2 BACKGROUND TO THE STUDY

Diabetes is chronic non-communicable disease that affects people of all ages and geographical locations. The main types of diabetes include Type 1 diabetes mellitus (T1DM), which is insulin dependent, known as childhood or juvenile diabetes and Type 2 diabetes mellitus (T2DM) which is the most common type and the focus of this research, as it is a significant public health problem, whose global prevalence is increasing (Abdulfatai Olokoba, Olusegun 2012,p1).

Diabetes mellitus is a global pandemic disease that affects and kills many people with a increased health cost for patients ,relatives and country mainly in developing countries (Kajoba,2016p1).

Globally, the diabetes prevalence has almost doubled because the estimation of the number of adult people with diabetes in 2014 was 422 million, whereas it was 108 million in 1980. It has risen from 4.7% to 8.5% among adults people (WHO, 2016,p6)

Currently, 415 million people have diabetes worldwide, with more than 14 million in Africa. By 2040, those numbers are expected to double (International Diabetes Federation, (IDF) 2015)

According to the World Health Organization (WHO) Global Report (2016), diabetes has been increasing for many years in young and older adults, and it is no longer considered as a disease of rich people. Uncontrolled diabetes results in macro vascular adverse complications such as stroke and heart disease; and micro vascular complications such as neuropathy, retinopathy, and nephropathy (Beagley *et al.*, 2013). Worldwide, Type 2 diabetes mellitus is expected to increase

one and a half times by 2030, up from 285 million in 2010 in adults older than 20 years of age (Pearson,2016).

Type 2 diabetes mellitus is main health problems that affect people in developed and developing countries, and many of the risk factors are modifiable among them there are lifestyle-related risk factors such as obesity, diet, Body Mass Index (BMI), physical inactivity, tobacco use, concurrent hypertension, and occupation, are likely to be modifiable or preventable. Though others, such as age, ethnicity, and family history are not modifiable (Valliyot, Sreedharan and Muttappallymyalil, 2013a).

There are many fatalities associated with T2DM in 2012,whereby 1.5 million individuals were killed by diabetes, with an additional 2.2 million deaths from cardiovascular diseases (CVD) and chronic kidney disease (CKD) related to hyperglycemia with the mortality rate(43%) related to hyperglycemia that occurs before 70 years of age and raising in low-and-middle income countries (LMIC) more than in developed ones (WHO,2016).

Type 2 diabetes may be asymptomatic for many years, during that period unmanaged high blood glucose can cause serious and irreversible development of micro and macro vascular complications like neuropathy, retinopathy, nephropathy, coronary artery disease, stroke, and peripheral vascular disease (Beagley *et al.*, 2013). Though diabetes is a chronic disease without a definite cure, 80% of T2DM may be preventable though communicating information about the importance of a healthy lifestyle may help prevent impaired glucose tolerance and when the disease happen it may be managed and controlled. Education on respecting a healthy diet and practicing physical exercise, and the adherence to anti-glycemic medications such as glyburide, metformin and insulin administration, could have a great impact and delay the complications or death (International Diabetes Federation (IDF), 2015)

Globally, 81.1% of people with undiagnosed diabetes live in LMIC and these people may live for many years without manifesting any symptoms. According to the results of a cross-sectional study about the risk factors of T2DM among rural India citizens in Northern Karnataka, the prevalence of diabetes increases with age. That study also showed an increased prevalence using

the following comparisons: Increase with age, 40-49 years (30.4%) and >60 years (37.8%); increase in female (64.6%) compared to male (35.4%); with higher BMI < 24.9 (21.7%) and BMI > 25 (44.1%) (Sanjay, 2014p5).

Lifestyles can be adjusted to reduce the risk of T2DM, in a study conducted by Bhalerao et al. (2014), people with a mixed diet had a prevalence of T2DM of 75.5%, whereas those on a vegetarian diet were only 24.3%. In that same study, 86.1% had a family history of diabetes. Interestingly, the prevalence was higher in those who had maternal history of diabetes (53.4%), whereas paternal history was lower 17.15%(Bhalerao et al. 2014: p5).

According to a cross sectional study conducted in Uganda, 83% of hypertensive patients and 147% who drank alcohol had diabetes (Gill, 2016b).

In Rwanda in 2015 there were 194,300 documented cases of diabetes while an estimated rate in Rwanda was 3.5% in 20-70 age group and adults with undiagnosed diabetes in (20-79) was 138.6 in 1,000 (IDF, 2015)

The gold standard of diagnosing diabetes is based on the measurement of glucose in a blood sample taken while the patient is in a fasting state of greater than eight hours, or two hours after taking 75g oral glucose load. Glycated hemoglobin (HgA1C) is another diagnostic measurement that can be used for the diagnosis of diabetes even when the patient is not in fasting state, but this test is more costly than blood glucose measurement (World Health Organisation (WHO), 2016).

According to many studies, diabetes previously affected predominantly older people, but now the demographics have changed as it affects more young adults and children (American Diabetes Association 2015,p 97). Eighty percent of NCDs including T2DM, heart disease, stroke and over a third of cancers may be prevented by reducing the risk factors such as an unhealthy diet, tobacco and harmful use of alcohol, though making people aware of the harmful risk factors has a huge role in prevention and decreasing the burden of disease (The World Diabetes Foundation, 2013)

1.3 PROBLEM STATEMENT

Diabetes is a public health problem that has been rising for decades and the numbers are predicted to double in the next 25 years (Chiwanga *et al.*,2016).The prevalence of T2DM continues to escalate worldwide and affects all populations including Rwandans. Yet, there are limited publications on the prevalence of T2DM risk factors in the East Africa region providing

accurate information. Since the data is limited, we do not know the significance of the problem, which is known to cause substantial morbidity and mortality (IDF, 2015)

In Africa, 366 million people had diabetes, whereas 4.6 million were killed by that disease in 2011 (Abdulfatai Olokoba, Olusegun 2012p1) .Early, in rural Africa diabetes was considered as a rare disease with few data about the disease due to less documentation (Mbanya *et al.*, 2010p1)

Sub-Saharan Africa, like other countries, is experiencing an elevated T2DM prevalence and the complications of T2DM such as retinopathy, neuropathy, nephropathy, infections and cardiac complications are common in Sub-Saharan Africa and both the prevalence and burden of T2DM tends to extend rapidly. In this region, diabetes is not only an endemic killer, but also causes significant morbidity, visual impairment, low limb amputation, and renal failure (Pearson 2016). These complications, and others, have a negative impact on both population health, finance and economy of country (Tapela, 2016). In Rwanda, diabetes was listed as the fifth leading cause of morbidity in the Health sector annual report at CHUB in 2013-2014 (Ministry of Health in Rwanda: MOH, 2014). People who live in the Southern rural areas of Rwanda still have it in their minds that diabetes is a disease of rich people (MOH, 2012:p45).

Even though different studies about diabetes have been done in sub-Saharan, and even some in East African countries, there is a gap in the literature as there appears to be no study done on the prevalence of T2DM risk factors in the rural areas of Rwanda as this disease nowadays affects all categories of people. Therefore the aim of this study is to assess the prevalence of risk factors for T2DM among the population in Kibirizi sector.

1.4 . OBJECTIVES

1.5.1. MAIN OBJECTIVE

Find out the prevalence of the risk factors of Type 2 diabetes mellitus among population of Kibirizi sector.

1.5.2. SPECIFIC OBJECTIVES

- Assess the prevalence of risk factors for T2DM among population of Kibirizi sector.
- Identify the risk factors of T2DM among the population of Kibirizi sector.
- To evaluate the relationship between demographic variables and the modifiable risk factors for T2DM.

1.6. RESEARCH QUESTIONS

- What is the prevalence of risk factors for T2DM among the population of Kibirizi sector?
- What are the risk factors for T2DM among population of Kibirizi sector?
- What is the relationship between demographic variables and modifiable risk factors for T2DM?

1.7. SIGNIFICANCE OF THE STUDY

The findings from this research therefore will give a better sense of the number of people currently at risk of having pre-diabetes and diabetes in a particular rural sector of Rwanda.

Nationally, findings from this study should contribute to the motivation for the MOH to establish universal screening guidelines of T2DM, which would significantly strengthen diabetes prevention among rural and urban populations. Locally, through the research findings people became aware of the risk factors for T2DM in this area and findings should contribute in the prevention of T2DM as well as in reduction of T2DM morbidity. Findings serve as a baseline for further T2DM research in the study area and other rural areas. According to the Ministry of Health in Rwanda(MOH, 2015) about 85% of Rwandan population lives in rural areas; so if the prevalence of the risk factors increases it will likely lead to a bigger health problem nationwide affecting many people, particularly if the modifiable risk factors are not managed well.

In education, study findings are useful for other students who will conduct further research among this population. Through this study, health professionals can become aware of the risk factors and target similar rural population, which may increase prevention efforts.

1.8. DEFINITION OF KEY TERMS

PREVELANCE: It is a percentage or proportion of people affected at a point of time, it is used for estimation of morbidity.(Indrayan2013p4).

RISK FACTOR: Risk factor is a characteristic that increase the risk of getting or developing a specific condition or disease. It may be genetic, demographic, behavioral, social that can be isolated or combined (WHO, 2005).

Diabetes mellitus type 2: Adult onset diabetes or non-insulin dependent. It is the most prevalent type of diabetes and accounts for around 95% of all diabetic patients (Lewis,2014).

1.9. ORGANIZATION OF THE STUDY

This research project is subdivided into five chapters whereby the first chapter is the general introduction which contains the introduction, the background of the study, the problem statement, research objectives of the study; the research questions; significance of the study; the definitions of the key terms subdivision of the research project, and the summary of the first chapter.

The second chapter states the literature review. It talks about the introduction, theoretical literature, empirical literature, conceptual framework and the summary of the chapter.

The Third states the research methodology includes the research design and approach, the study population, sampling strategy and sample size, method of data collection, data collection instruments and procedure, method of data analysis, data management as well as limitation and dissemination of data.

The fourth chapter states the main part of this work and aimed at analytical presentation of the results and detailed interpretation of the findings. The fifth chapter point on discussion of findings, highlighting limitations and the suggestion for further study. Finally, the sixth chapter deals with research summary of findings, conclusion, and the recommendation to the study.

1.10. SUMARY OF THE CHAPTER 1

This chapter described general introduction of the study including key terms, background of the study, problem statement, objectives of the study, research question, and the significance of the study.

CHAPTER 2: LITERATURE REVIEW

2.1. INTRODUCTION

The literature review provides information about the topic including theoretical and empirical review. It helps the researcher and the readers to understand better the topic assessing "**The prevalence of the risk factors for T2DM among population of Kibirizi Sector**".

This chapter covers the introduction of the chapter, theoretical literature, empirical literature, conceptual framework and the summary of the chapter.

Database used for literature information: Google, Medline, Google scholar, and Hinari

2.1. THEORETICAL LITERATURE

Diabetes is serious chronic metabolic disease that occurs when the pancreas is unable to produce sufficient insulin, or when the body is not able to effectively use the insulin produced. Type 2 diabetes is the most common form of diabetes mellitus (WHO, 2016). Diabetes occurs either when insulin is not produced as well by the pancreas (type 1) or when the body is not able to use effectively the insulin produced (Type 2).Even though Type 2 diabetes is due to insulin disturbance but it has risk factors include genetics, behavioral, social and environmental risk factors that are exposing populations to susceptibility (Yufang et al. 2012p1).

2.1.1 THE BURDEN OF NCDs AND DIABETES

Diabetes mellitus is among the largest health emergencies of 21st Century and there are three main types; T1DM, T2DM, and gestational diabetes (GDM) (IDF, 2015). T2DM is the most common type and important risk factors are related to lifestyle and include lack of physical activity, unhealthy eating, tobacco use and harmful alcohol (WHO, 2015). A recent study in rural Rwanda found that the prevalence of lifestyle risk factors was fairly low, compared to European and North American (Tapela, *et al.*, 2016).

Type 1 is an autoimmune disease that affects the beta cells of the pancreas and is also known as insulin-dependent diabetes mellitus (IDDM). The beta cells do not produce insulin and it requires daily administration of synthetic insulin. Type 2 diabetes mellitus is common, characterized by insulin resistance or relative insulin deficiency and it affects 90% of the population with diabetes (WHO, 2016).

Type 2 diabetes is also called non-insulin dependent diabetes mellitus (NIDDM) or adult onset diabetes caused by ineffective use of insulin by the body and it is the form that is most common, affecting about 95% of all diagnosed cases of diabetes (WHO, 2016).

Maturity–Onset Diabetes is an autosomal dominant disease related to a defective insulin secretion. It is manifested by inherited young-onset diabetes from a single gene mutation because it is frequent in adolescent and early adulthood. Six genes are involved in this condition. It is the mildest form of the disease and it is misdiagnosed with T1DM and T2DM. It usually causes only mild hyperglycemia and impaired glucose tolerance and the treatment necessitates the same insulin administration as T1DM (Gill 2016p7)

People at high risk of diabetes Mellitus may have increased level of blood glucose (prediabetes), though to decrease the incidence of diabetes the monitoring of blood sugar is not sufficient to diagnose that disease but other interventions like changing lifestyle and taking medications are crucial (Marinho *et al.*, 2013p5)

The patients affected by T2DM are exposed to many complications either in the short or long term. Type 2 diabetes affects macro vessels, which may cause a heart attack, hypertension, hyperlipidemia, coronary artery disease and stroke, while micro vessel damage results in neuropathy, retinopathy and nephropathy. Furthermore, T2DM not only affects vessels, but triggers cancer development(Wu et al. 2014)

2.1.2. RISK FACTORS OF T2DM

Generally, the risk factors of diabetes include overweight/obesity, arterial hypertension, advanced age, inappropriate eating habits, sedentary lifestyle and family history of diabetes and fasting plasma glucose over 100mg/dl(Wagner *et al.*, 2014p2).Others include physical inactivity, poor nutrition, and genetics, past history of GDM. T2DM can be managed by changing diet or by increasing physical activity but in some cases it requires medication, though many cases remain undiagnosed for many years (IDF, 2015).

The genetic risk factors, decreased physical activity, tobacco use and high systolic blood pressure are common in rural areas (Valliyot, Sreed haran and Muttappallymyalil, 2013p7).

Older age is a risk factor for T2DM. A study conducted in Kitagata Hospital in Uganda found

that T2DM affects people between 31-69 years old at a rate of 77% and the women were more affected than men at a rate of 60% (Kajoba, 2016p1). In a study conducted in North Kerala, India, people more than 50 years of age had a five times greater risk of getting diabetes, compared to the 20-30 year age group. (Valliyot, Sreedharan and Muttappallymyalil, 2013)

Family history is a significant risk factor of T2DM if one of the first degree relatives have suffered T2DM and the risk is higher if both parents affected (Bhatti *et al.*, 2014)

"A low literacy rate was also associated with diabetes". The study found that illiterate group accounted for 47.3%, primary education group was 19.2%, secondary school group was 28.7%, while the graduated group was 4.9% (Bhalerao, Somannavar, Vernekar, Ravishankar, & Goudar, 2014). A study conducted in Kenya found that consuming cassava more frequently during childhood increased the risk of developing T2DM by three times (Chege, 2010).

Gestational diabetes (GDM) occurs during the later part of the second or third trimester of pregnancy and may cause serious health risks for both the mother and fetus/infant. GDM is the risk factor for both the mother and child to develop T2DM in later life (IDF, 2015). If diabetes is diagnosed in early pregnancy before 20 weeks gestation it is considered pre-existing diabetes and not GDM. After 6-8 weeks post-partum women get retested for diabetes, if blood glucose is normal it is considered GDM, and if the glucose is persistent indicate preexisting disease (ACOG, 2013)

According to ADA(2015) the pathophysiology of T2DM is not well understood and the etiology is still unknown, even so there is a strong genetic link. Type 2 diabetes is manifested by insulin insensitivity due to insulin resistance, decreased production of insulin and failure of beta-cells, that results in a decline of glucose transport to the muscle and fat cells (Abdulfatai and Olusegun 2012p2)

2.2 EMPIRICAL LITERATURE

The global estimation of people over the age of 18 years living with diabetes in 2014 was 422 million and the prevalence of diabetes has increased faster with more in LMIC than in higher income counties (WHO, 2016). In LMIC the number of people living with diabetes has increased mainly in urban areas due to more Westernized diet and more sedentary lifestyle. It accounts for

186.2 million more than in rural areas where diabetes affects 126.7 million of people (IDF 2015 p53). In the African region, about 14.2 million adults have diabetes between the ages of 20-79 years. However, in Africa, there is a high number of undiagnosed diabetes; more than two thirds (66.7%) are unaware that they have diabetes (IDF, 2015). Many people with diabetes (58.8%) live in cities even if most of African population (61.3%) is living in rural area (IDF, 2015p71).

According to study survey conducted in Rwanda in 2012 to 2013, in Rwanda the prevalence rate of eating both fruits and vegetables is less ,whereby consumption of fruits is 0.3% and vegetables 0.9% (Rwanda 2015p2).

Conversely, physical activity provides a protective factor (Valliyot, Sreedharan and Muttappallymyalil, 2013c). The risk of diabetes is 1.69 times higher in ex-drinkers comparing with people who never drank alcohol (Gong *et al.*, 2015p8).

Early screening and treatment of T2DM is essential to decrease its complications. The detection has to be concentrated mainly on the high-risk population such as those with an immediate family member with diabetes, blood pressure over 140/90mmhg or taking or treated by antihypertensive drugs, history of GDM or giving birth to a baby greater than 4 kg, BMI > 30, inactivity, history of impaired fasting glucose, impaired glucose tolerance, or history of coronary artery disease (ADA,2015p99) Therefore hypertension is a complication of T2DM but it was found to be a significant risk factor for it ,specifically systolic blood pressure . So it is a requirement to screen blood pressure for people over 25 years without considering other risk factors (Valliyot et al. 2013bp6).

Arterial blood pressure for adults is subdivided in 4 categories and each one has a range include Normal BP for a systolic less than 120 mmHg ,diastolic less than 80 mmHg, pre-hypertension a systolic ranged between 120-139 mmHg and diastolic 80-89 mmHg, hypertension Stage 1 when a systolic BP ranged between 140-159 mmHg and diastolic 90-99 mmHg whereas for hypertension Stage 2, systolic BP is greater than 160 mmHg and diastolic 100mmHg(Minh T, Minh N ,2014)

During screening different methods of blood glucose analyses are used such as fasting blood glucose (FBG), oral glucose tolerance (OGTT),and random capillary blood glucose(RCBG) but among those ways of detection of diabetes, RCBG is the one that is appropriate for diabetes

screening of many people because it does not require high techniques (Somannavar *et al.*, 2009p1-2). An increased blood glucose result in serious effects on the heart ,blood vessels ,nerves ,kidney and the eyes(International Diabetes Federation, 2015p28).

Waist circumference measure is an indicator of intraabdominal fat circumference is useful for prediction of non-communicable diseases such as Diabetes mellitus and cardiovascular diseases(Hernandez, Padilla and Araya, 2013**).** For men the waist circumference of 102cm or over is a risk of T2DM while for women 88 cm of waist circumference is a risk for the same disease (Canadian Diabetes Association, 2013p1).

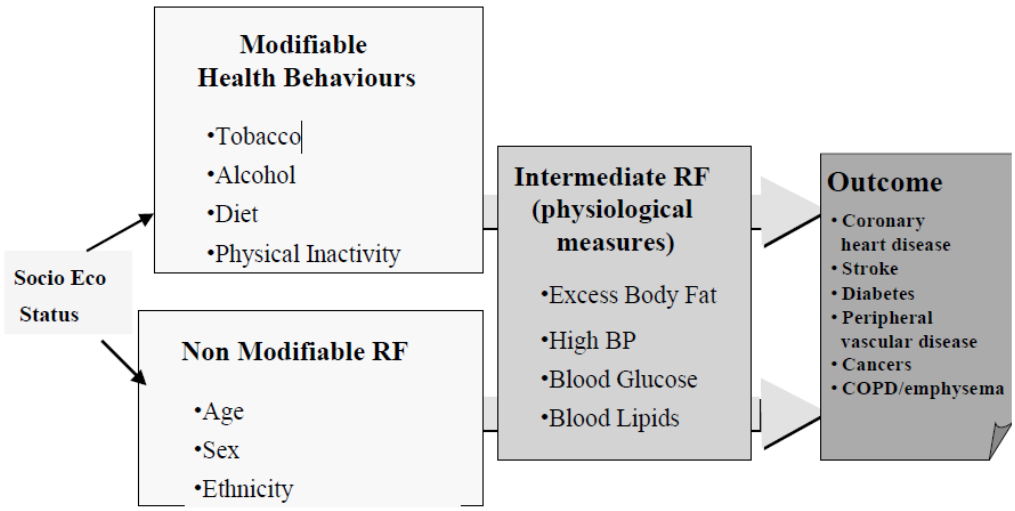
Internationally, the researchers have found that the prevalence of risk for T2DM is different for men and women whereby it is higher in men than women (Marinho *et al.,* 2013:4). Though in some Sub-Saharan countries, such as South Africa, Cameroun and Uganda, the higher prevalence of diabetes is expected to be in women rather than men, because women are more likely to be obese and overweight (Hilawe, Yatsuya and Aoyama, 2013:1)

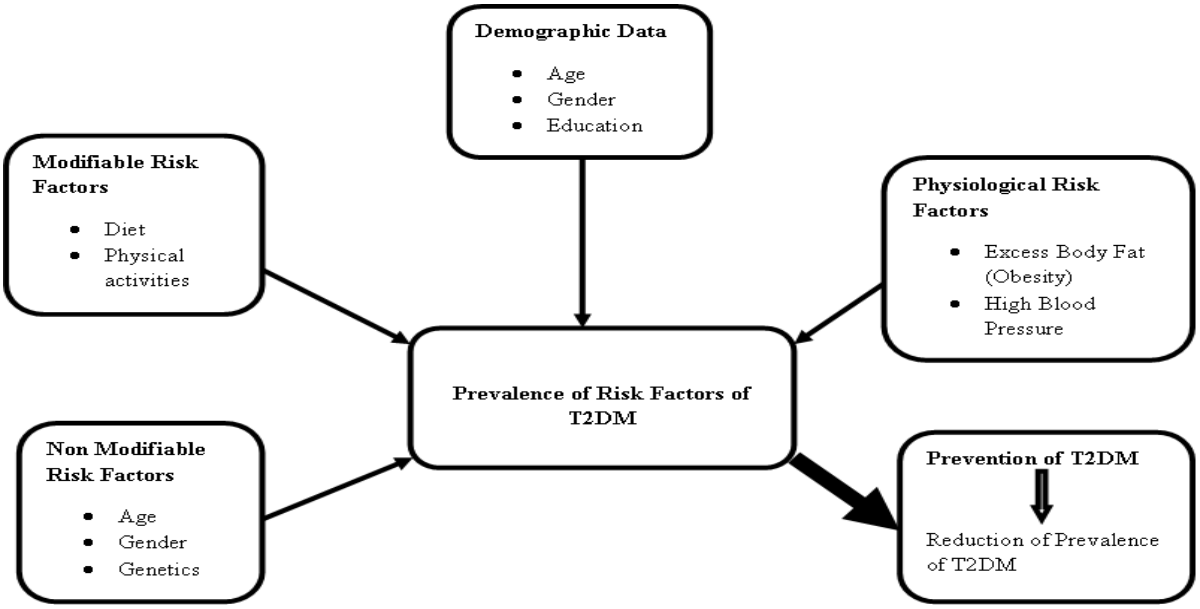
In sub-Saharan Africa about two third of diabetic patients are killed by cardiovascular complications, most of the cardiovascular patients admitted in intensive care units have diabetes while fifteen percent of patients with stroke have diabetes (Ganu, Njororai and Nyaranga 2016 p13).

2.3. CONCEPTUAL FRAMEWORK

The conceptual framework used in this study were adopted from the framework designed in the WHO STEP-wise approach to Surveillance of non-communicable diseases (STEPS) provided by (WHO, 2003). WHO framework was adapted because it is for NCDs yet T2DM is included and this framework show how risk factors interrelated.

Figure 1: CONCEPTUAL FRAMEWORK





Source: (WHO, 2003 :20)

This conceptual framework displays factors that influence prevalence of risk factors for T2DM.It show how both modifiable risk ,non modifiable and physiological risk factors influence the prevalence type 2 risk factors and by doing research on prevalence of risk factors through

screening play a role on prevention of T2DM as well as its prevalence reduction is concerned.

2.4. SUMMARY OF THE CHAPTER TWO

This chapter reveals that diabetes is a serious chronic disease. It continues to show the risk factors including overweight, arterial hypertension, advanced age, inappropriate eating habits, family history and fasting plasma glucose. It has been shown that in some countries, as well as in Rwanda, the high prevalence of diabetes is expected to be in women than men because women are likely obese and overweight.

CHAPTER 3. METHODOLOGY

3.1. INTRODUCTION

This chapter provides the methodology used in this study covering the research design, approach and setting; the study population, sample size and the sampling technique; the method of data collection including the data collection tool used to gather data in the rural population, the method of data analysis and the limitation of the study.

3.2. RESEARCH DESIGN

This study is a population based cross-sectional design adopting the descriptive. Data was collected using a structured questionnaire with potential risk factors and anthropometric measurements; height and weight for BMI and abdominal circumference, and blood pressure.

3.3. RESEARCH APPROACH

The study is a descriptive quantitative study was used to assess the prevalence of risk factors of diabetes in rural population of Kibirizi sector.

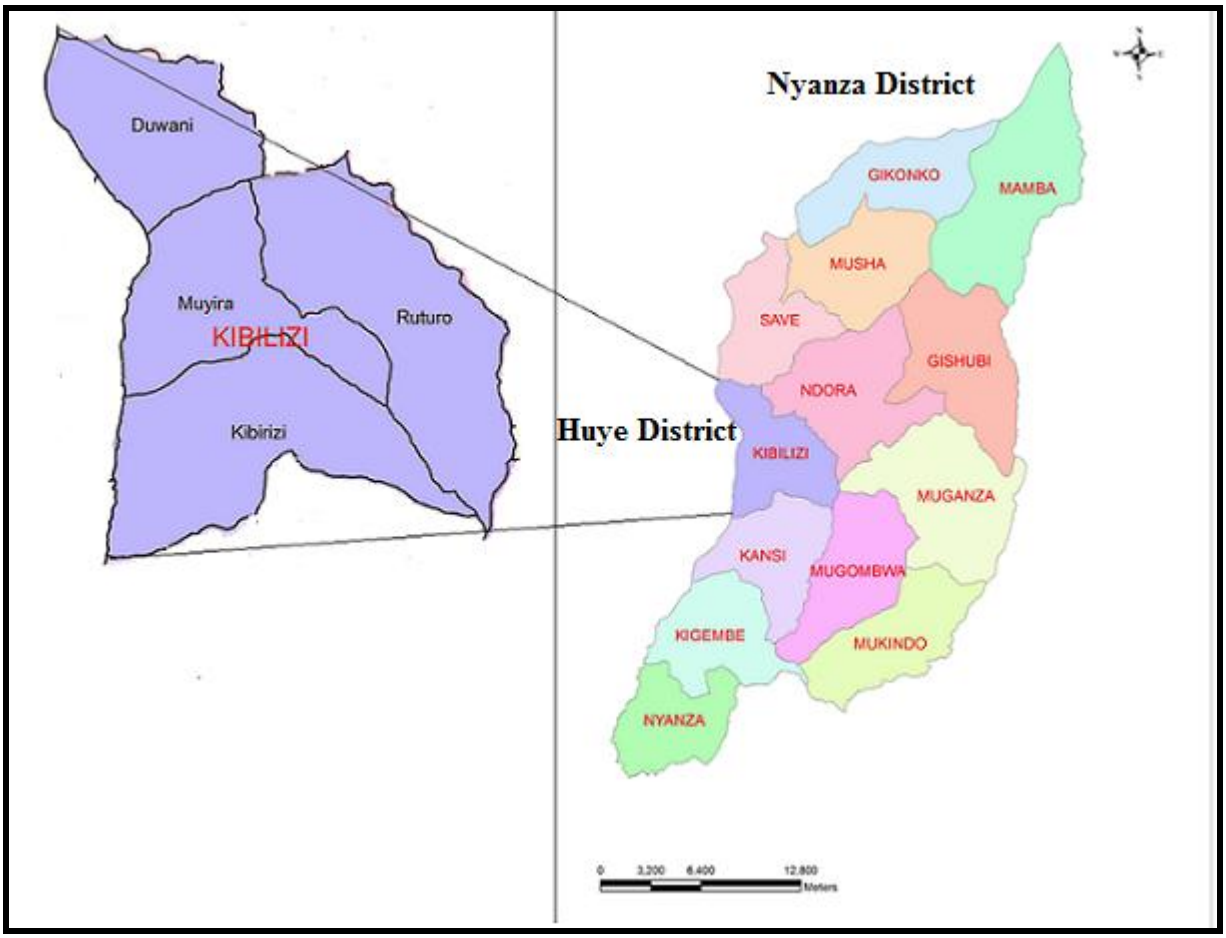
3.4. RESEARCH SETTING

The study was conducted in KIBIRIZI Sector, Gisagara District in Rwanda. KIBIRIZI is an administrative rural sector located geographically in Southern province of Rwanda situated in North by Save Sector, in West by NGOMA, TUMBA and MUKURA Sectors of HUYE District; in South by KANSI and MUGOMBWA Sectors, and lastly in EAST by NDORA and MUGANZA Sectors; its office is localized in Kibirizi cell Torero village. It is composed of four cells including Muyira, Kibilizi, Ruturo and Duwani.

This sector has a total population of 26,276 (men 11,912 and women 14,364) with 40 square kilometers total surface and the density is 658 inhabitant/km^2(Gisagara district, 2013:16). In this study data were collected among Kibirizi population aged between 18-74 years old.

The map below provides more details about the location of KIBIRIZI Sector, the area of the study.

Figure 2: GISAGARA DISTRICT ADINISTRATIVE MAP



Source: Gisagara District Plan 2013-2018

3.5. POPULATION

The target population in this study consisted of population of Kibirizi who live in this sector aged 18-74 years .The inclusion criteria included being a citizen of Kibirizi sector; aged between 18 and 74 years who agreed to provide consent for study participation. Exclusion criteria included those having diabetes or any disability that may compromise responding to the questions, such as being mental ill, outside the age range, or a citizen outside of Kibirizi sector or village.

3.6. SAMPLING METHOD

Non-probability convenience sampling method has been used in this study to get the research sample.

3.6.1. SAMPLING STRATEGY

The populations were reached in the villages, at health center, and at health posts before or after being served; those who have agreed to give consent for the study were enrolled.

3.6.2. SAMPLE SIZE

The sample size, **n** is 275. The sample size is directly proportional to the prevalence P in the population. It is needed to decide how to estimate this prevalence; it is measured as the desired margin of error in the prevalence estimate. A common recommendation is to set d =P/2 for rare and d= (1-P)/2 for very common conditions. Therefore, n is inversely proportional to the acceptable error d and the relationship can be written as follows:

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where n: is the sample size, Z: is z-score for confidence level equal to 95%, P: is the prevalence estimation of diabetes in Africa estimated to be 5.3% (IDF diabetes Atlas, 2015:51) and d: is the desired margin of error set as 2.65%= 0.0265 (Arya , Antonisamy &Kumar, 2012).

$$n = \frac{0.053(1-0.053)1.96^2}{0.0265}$$

= **275**

After completing the numerical application of the above formula, the sample size is 275.

This prevalence was estimated from the table 3.2 titled as IDF regions ranked by age adjusted prevalence (%) of diabetes (20-79 years) 2015 and 2040 whereby for Africa is ranged between 2.6 and 7.9% (IDF, 2015:P51).

3.7. DATA COLLECTION

The information from primary data was obtained through a paper-based questionnaire with 17 questions. As a researcher having the objectives of the study mentioned in the first chapter; this enabled me to explain certain items on the questionnaire to the respondents so that it would be properly filled. The questionnaire was administered by the researcher face to face to the respondents. In this research 275 questionnaires were used and the data collected include demographic information of the respondent, information about the risk factors, and

anthropometrics measurements. While researcher reached the site where there were many people, she talked to those people by introducing both herself and the study, people were received information about the purpose of the study, the criteria of the study , what the study looks for like responding close questions and anthropometric measurement. Each people motivated and who met the criteria received the information sheet and sign consent then responded to the study questions this followed by measuring anthropometric measures.

3.7.1. DATA COLLECTION INSTRUMENTS

The questionnaire used in this study was developed from Canadian Diabetes Risk Assessment tool, commonly known as CANRISK (Public Health Agency of Canada ,2011) developed to detect prediabetes and diabetes in a multi-ethnic population living in Canada (Appendix II) and it is adapted for Rwandan population. The evidence behind the accuracy of this statistically valid tool involved 6223 participants over a four-year period who completed the questionnaire and had their glycemic status confirmed with a fasting blood glucose and the standard 75 gram 2-hour oral glucose tolerance test (OGTT).

The tool was developed using paper and electronic versions of risk scores using logistic regression, validated against reference standard diabetes blood tests using test-set methods. A comparison of the CANRISK tool with other alternative risk-scoring models was used to assess hyperglycemia and the analysis indicated it was an accurate (reliable and valid) with an area under the curve (AUC) was 0.75 (95% CI: 0.73–0.78). The CANRISK was significantly more accurate than previous diabetes risk score questionnaires including the FINDRISC score (Finland) and the simple Obesity model(Robinson, Agarwal and Nerenberg, 2011p1)

This newer CANRISK includes questions about known risk factors for diabetes including a question of giving birth of a large baby for gestational diabetes. There are questions added about smoking and alcohol as other risk factors for T2DM according to the literature.

The tool has 17 questions divided in three parts addressing the participants' risk for T2DM. The first part consists of respondents’ demographic information including one question on each of the following: age, gender, and the level education attained. The second part consists of close

questions on the risk factors for T2DM including one question on each of the following: history of hyperglycemia, history of hypertension, history of giving birth to a large baby > 4000 grams, family history of diabetes, physical exercise, fruit and vegetable intake, smoking and alcoholism. While the last part of this questionnaire consists of questions on three anthropometric measurements including height and weight in order to calculate BMI, waist measurement, and blood pressure. In addition, the tool was slightly modified in order to include the variable blood pressure as it is a common co-morbidity with diabetes and it is not included in the CANRISK scoring. It will be identified as another risk factor outside the CANRISK score.

The CANRISK questionnaire was available in the English language and will be translated into Kinyarwanda as that is the most understandable language for the participants. The consent will also be available in Kinyarwanda.

- **Pre-test**

  To ensure the reliability of the tool in the context of study, the tool has been pretested on 25 people that would not include in the study. After pretest the data have entered into SPSS and 0.78 Cronbach's alpha was obtained which is acceptable value for internal consistency reliability of the tool.

3.7.2. DATA COLLECTION PROCEDURE

While the researcher reached the site,she introduce the study to the people including inclusion criteria and measurement of anthropometric measurement. People motivated A convenience sampling method was used, whereby each individual at the study sites who met the criteria and gives consent for participation was recruited. Also, as the population of Kibirizi sector seeks health services at Kibirizi Health Center and its health posts, the researcher attended different area for data collection where clients will be approached while they are waiting for consultation or after investigations results, the mothers who will brought their children for immunization and people who came for Voluntary, Counseling and Testing will be participate since they met inclusion criteria. Blood pressure was measured after five minutes of rest to be sure that the blood pressure was stable. Electronic Blood pressure machine was used to measure blood pressure; body weight has been measured by using portable scale after removing shoes while the height will be measured by using a metric tape. Body mass index will be calculated from body

weight in kilogram divided by height squared in meters. Waist circumference was measured using a non–elastic metric tape placed on midpoint between the final rib and the upper end of the iliac crest.

The participant was asked if he or she is able to complete the questionnaire himself/herself, when he /she were not able the researcher helped to read questions and to tick the answers chosen by the participant. Strength of this study over the CANRISK study is that the researcher is conducting the anthropometric measurements on site to eliminate the response bias of self-reported height and weight.

3.8. DATA ANALYSIS

The questionnaire is interpreted by adding up the point scores for each of the 11 scored questions and then comparing them the total score with the associated risk category which are: Low risk < 21, Moderate risk 21–32, and High risk > 32.

Descriptive statistics was used to assess the frequency distribution of the three risk categories. A Chi-square test assessed the categorical variables and trends in the prevalence of T2DM. Further analysis was done using SPSS (Version 24). Blood pressures, smoking and alcoholism were analyzed separately from the CANRISK questions as these parameters are not included in the eleven scored questions from the used tool.

3.9. ETHICAL CONSIDERATIONS

An ethical clearance from UR/Research committee and permission from Kibirizi local leaders, Kibirizi Health Center and health posts hospital was obtained prior to study commencement. Prior to carrying out the research, the purpose of the research was explained and the participant has provided signed consent. Participants were made aware that participation in this research was voluntary and inform him or her that she/he may withdrawal at any time without penalty of interference with access to healthcare. The participant also was informed that interviews will be given following their appointment, that there was no deception; the participant was told that all collected data will be used for the sole purpose of the study and that their names will not be published, as results will be disseminated in aggregate form.

3.10. DATA MANAGEMENT

After data collection, the anonymous questionnaires checked by the researcher for any mistakes. The anonymous questionnaires were kept in a locked cupboard by the researcher. The soft data kept in researcher's computer locked with security key and only shared with research supervisor or others for academic purpose.

3.11. DISSEMINATION OF DATA

After data analysis the results have been communicated to the concerned population, local leaders of Kibirizi sector, health center leaders, CMHS, peer-reviewed publication and MOH. The final work will be submitted in the CMHS library to be consulted by other researchers.

3.12. LIMITATION OF THE STUDY

- CANRISK, the tool used in this study was based on the appropriate diabetic risk factors among multiple ethnic backgrounds; the evidence-based study was conducted on a large North American population and therefore may not be generalizable to African populations.
- The mostly self-reported questionnaire is a form of response bias. Some people may not know their family history of diabetes or hypertension, as research indicates many people in rural areas suffered or died undiagnosed.
- The convenience sample of participants does not reflect the Rwandan population at large, but only the rural Kibirizi sector, the intended target group.
- The sampling method used was convenient, the majority of participants were young and this may affect the quality of data collected.

3.13. SUMMARY OF THE CHAPTER THREE

This chapter described area of the study, the research design, target population and sampling techniques, research instruments that were used to collect data. The local leaders as well as the participants have been contacted and explained the purpose of the study and have committed to participate in it.

CHAPTER 4. RESULTS

4.1. INTRODUCTION

This fourth chapter involves presentation, analysis and the interpretation of findings for the data collected from the field in order to make an appropriate conclusion. Data were analyzed and interpreted using descriptive statistics and Chi-square to assess the relationships between variables where frequency tables and percentages of responses were provided. By considering the research objectives and methodology, tables facilitate easy presentation and comparison of the results.

The main objective of this study was to find out the prevalence of the risk factors of Type 2 diabetes mellitus among population of Kibirizi. To achieve this objective I was required to get responses toward T2DM risk factors from the population and I took anthropometric measurement including height, weight, waist circumference and physiological measure like arterial blood pressure; findings and their interpretation has been briefly made as follows:

4.2. RESPONDENT'S DEMOGRAPHIC DATA

The total number of the respondents in the study was 275 and their demographic characteristics are presented (Table 1). The majority (55.6%) were aged between 18 and 44 years and female (63.6%). The majority (56.7%) had completed primary school education, a quarter (26.2%) was illiterate with no education, and a smaller number (13.5%) graduated from High school, or university (3.6%).

TABLE 1: THE DEMOGRAPHIC INFORMATION OF THE RESPONDENTS

Demographic Data	Frequency ***n* = 275**	Percentage
Age range		
18-44	153	55.6
45-54	58	21.1
55-64	45	16.4
65-74	19	6.9
Gender		
Female	175	63.6
Male	100	36.4
Education		
None	75	27.3
Primary school	153	55.6
High school diploma	37	13.5
College or University	10	3.6

4.3. THE RISK FACTORS CLOSER FOR T2DM BY GENDER

For closely related questions on the risk factors for T2DM, the result of findings showed (Table 2) that nearly all of the respondents 97.5% (36% of male and 61.5% of female) denied the history of hyperglycemia diagnosed through a blood test, during an illness or pregnancy; and also a high proportion of respondents 84.4% (30.2% being male and 54.2% female) denied the hypertension history while only 15.6% accepted it.

Among the respondents, women represented by 10.5% had given birth to the large baby with more than 4kg. About the family history, (3.3%) of the respondent said that their fathers were diagnosed by T2DM, while (2.5%) responded that their mothers were diagnosed. A high proportion of respondents 69.8% performed physical activity while others 30.2% (10.9% were

male and 19.3% were female) did not practice this physical activity since do not walk or not to do other physical activity every day increase the risk of getting T2DM, then those 30.2% of the total respondents representing 83 respondents composed by a high proportion of female were at risk.

Above the two third of our respondents 72.7% (28.3% were male and 44.4% being female) did not eat vegetables or fruits every day. Not eating fruits or vegetables every day is one of the risk factor for T2DM so this question is relevant to our study whereby most respondents reported that they do not eat either fruits or vegetables every day, this may increase the risk of getting T2DM.

In this study respondents are considered to be smokers if they used any tobacco products such as cigarettes, cigars or pipes at least one time. Then 30.5% of which 14.2% were male while 16.3% were female Smoked whereby smoking increase the risk of developing T2DM and 55.6% of the total respondent with only 24.7% male and 30.9% female drunk alcohol.

TABLE 2: CLOSELY RELATED QUESTIONS ON THE RISK FACTORS FOR T2DM (BY GENDER)

Risk factors	**Frequency(n=275)**	**Percentage**	**Male(n=100)**	**Female(n=175)**
History of diabetes on blood test, during illness or pregnancy			(%)	(%)
Yes	7	2.6	1 (0.4)	6 (2.2)
No	268	97.5	99 (36)	169 (61.5)
Hypertension history				
Yes	43	15.6	17 (6.2)	26 (9.4)
No	232	84.4	83 (30.2)	149 (54.2)
History of giving birth to a large baby (women only)				
Yes	29	10.5	0	29 (10.5)
No	146	53.1	0	146 (53.1)
Not applicable	100	36.4	100 (36.4)	0
Family history of diabetes				
Father	9	3.3	4 (1.5)	5 (1.8)
Mother	7	2.5	2 (0.7)	5 (1.8)
Siblings	3	1.1	2 (0.7)	1 (0.4)
Physical activity				
Yes	192	69.8	70 (25.5)	122 (44.3)
No	83	30.2	30 (10.9)	53 (19.3)
Eating fruits or vegetables				
Every day	75	27.3	22 (8)	53 (19.3)
Not everyday	200	72.7	78 (28.3)	122 (44.4)
Smoking				
Yes	84	30.5	39 (14.2)	45 (16.3)
No	191	69.5	61 (22.2)	130 (47.3)
Alcohol drinking				
Yes	153	55.6	68 (24.7)	85 (30.9)
No	122	44.4	32 (11.6)	90 (32.8)

4.4. THE ANTHROPOMETRIC MESUREMENTS

The anthropometric measurements are presented (Table 3), where the normal waist circumference for women and men varies so they were analyzed separately. The waist circumference for the majority of women (54.3%) in this study was between 80-88 cm and the majority (93.0%) of men had a waist circumference less than 94cm.

The majority (63.3%) of the total respondents had the normal BMI ranged between 18.5 and 24.9; but 21.5% of the total respondent were underweight considered to have BMI less than 18.5 while 14.9% of the total respondents (5.8% being male and 9.1% being female) were overweight. Only 0.4% female was obese.

In this study, hypertension was defined as having a systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90mmHg or history of using anti hypertensive drugs (Nelson, Nyarko and Binka, 2015)**.** The majority of respondents, 56.7% with 22.5% of them being male and 34.2% female had a SBP between 120-139 mmHg, which is considered to be pre hypertension, and a quarter (26.9%) had a normal blood pressure. Some respondents 13.5% (4.4% male and 9.1% female) were in Stage 1 hypertension with a SBP of 140-159, and (2.9%) were in Stage 2 with a SBP above 160mmHg.

Table 3: THE ANTHROPOMETRIC MESUREMENTS

Anthropometric measures	Frequency (n=275)	Percentage (%)	Male(n=100)	Female(n=175)
Waist circumference (cm)				
Women - Less than 80	60	34.3	0	60
- Between 80-88	95	54.3	0	95
- Greater than 88	20	11.4	0	20
Men - Less than 94	93	93.0	93	0
- Between 94-102	6	6.0	6	0
- Greater than 102 cm	1	1.0	1	0
BMI				
Under weight <18.5	59	21.5	18 (6.6)	41 (14.9)
Normal 18.5-24.9	174	63.3	66 (24)	108 (39.3)
Overweight 25.0-29.9	41	14.9	16 (5.8)	25 (9.1)
Obese > 30	1	0.4	0	1 (0.4)
Arterial BP (mmHg)				
<120 (Normal BP)	74	26.9	25 (9.1)	49 (17.8)
120-139 (Pre hypertension)	156	56.7	62 (22.5)	94 (34.2)
140-159 (Stage I)	37	13.5	12 (4.4)	25 (9.1)
160 and over (Stage 2)	8	2.9	1 (0.4)	7 (2.5)

The fourth table below demonstrated the demographic characteristics and anthropometric measurement using chi-square test. It is easy seen that the *p*-value (Asymp.Sig.)=0.000 less than 0.0265 the desired margin of error used in this study means that these variables are indeed related. Because the prevention of the diseases from no up to primary level of education still below, the reason of having 28 participants who were overweight compared to 13 participants with higher education and university.

Body Mass Index (BMI) was used in this study as a standard measure for weight. Respondents were classified as underweight, normal weight, overweight and obese.

Considering the BMI, those having no education up to primary composed by one respondent obese compared with other education level. Those with low or no education were more at risk of

being overweight or obese. The same table revealed that the education level is highly related to the prevalence of the risk factors, which is represented by scoring according to its P-value=0.000. Those with no education or primary education were in the majority, with 76 participants having moderate risk factors compared to 10 having higher level education. In addition, those with high risk factors included 18 with no education or primary education; compared to one respondent with higher education. Therefore, the higher the education level the lower the T2DM risk factors.
In this table 4, the chi-square test shows that the waist circumference and the level of education are highly related (*p*-value=0.000 less than 2.65% of the desired margin of error). Considering the greatest waist circumference >102cm for men, and >88cm for women, as more contributive T2DM risk factors; it is easily seen that combining those with no education and primary level make the majority of 16 respondents compared to 3 respondents with higher education up to university for women, and the majority of one respondent with no education up to primary school whereas we have none educated at primary level up to university.
Generally, from the output in table 4, we can say that having no education up to primary level contribute to the greatest waist circumference.

By combining the categories of being "overweight and obese" into "overweight" we can see that from the age group 18-44 (29 respondents), 45-54 (7 respondents), 55-64 (5), and 65-74 (1 respondent) the number of respondents reduced by the increase in age.

In accordance with the same table 4, it is easily seen that there is a strong relationship between the age group and the waist circumference since it is statistically significant (*p*-value=0.007). Taking the greatest waist circumference >102cm for men and that >88cm for women as more contributive risk factor for T2DM; from the age group18-44 (1 respondent) for men, and
18-44 (9 respondents), 45-54 (6 respondents), and 55-64 (4 respondents) for women, it is seen how for both men and women the increase in age reduces the number of the respondents participating in the research study, meaning that as the age increases the waist circumference decreases.

As revealed by the P-value=0.000, gender is highly related with the waist circumference because they are statistically significant. Considering the greatest waist circumference >102cm for men and >88cm for women as more contributive risk factors for T2DM; the significance difference in waist circumference between male and female were observed whereby we have 19 respondents with the waist circumference greater than 88cm for women compared to one respondent having the waist circumference greater than 102cm for men taken to be exposed at high risk of being attacked by T2DM as shown in this fourth table.

Table 4: THE ANTHROPOMETRIC MEASUREMENT AND DEMOGRAPHIC CHARACTERISTICS

Demographic information		BMI				*p*-Value	Waist Circumference						*p*-Value
							Men (%)			Women (%)			
		Underweight (%)	Normal weight (%)	Overweight (%)	Obese (%)		<94	94-102	>102	<80	80-88	>88	
Education level	None	22(37.3)	44(25.3)	6(14.6)	0	0.000	26(28.9)	0	0	23(36.5)	19(19.8)	4(21.1)	0.000
	Primary School	32(54.2)	101(58.1)	22(53.7)	1(100)		47(52.2)	1(16.7)	1(100)	33(52.4)	62(64.6)	12(63.2)	
	High school	5(8.5)	26(14.9)	6(14.6)	0		15(16.7)	2(33.3)	0	7(11.1)	10(10.4)	3(15.8)	
	University	0	3(1.7)	7(17.1)	0		2(2.2)	3(50.0)	0	0	5(5.2)	0	
Age	18-44	23(39.0)	101(58.0)	28(68.3)	1(100)	0.031	45(50)	5(83.3)	1(100)	25(39.7)	68(70.8)	9(47.4)	0.011
	45-54	11(18.6)	40(23.0)	7(17.1)	0		26(28.9)	0	0	16(25.4)	10(10.4)	6(31.6)	
	55-64	18(30.5)	22(12.6)	5(12.2)	0		14(15.6)	0	0	13(20.6)	14(14.6)	4(21.1)	
	65-74	7(11.9)	11(6.3)	1(2.4)	0		5(5.6)	1(16.7)	0	9(14.3)	4(4.2)	0	
Gender	Male	18(6.5)	66(24.0)	16(5.8)	0	0.625	93(33.8)	6(2.2)	1(0.4)	0	0	0	0.000
	Female	41(14.9)	108(39.3)	25(9.1)	1(0.4)		0	0	0	60(21.8)	95(34.5)	20(7.3)	

TABLE 5: RELATIONSHIP BETWEEN DEMOGRAPHIC CHARACTERISTICS AND RISK SCORE

Demographic information		Risk Score			*p*-Value
		Low risk(<21) n (%)	Moderate (21-32) n (%)	High risk(>33) n (%)	
Age	18-44	133(48.4)	19(6.9)	1(0.4)	0.000
	45-54	32(11.6)	24(8.7)	2(0.7)	
	55-64	5(1.8)	29(10.5)	11(4.0)	
	65-74	0	14(5.0)	5(1.8)	
Gender	Male	55(20)	36(13.1)	9(3.3)	0.192
	Female	115(41.8)	50(18.2)	10(3.6)	
Education level	None	21(7.6)	38(13.8)	13(4.7)	0.000
	Primary School	113(41.1)	38(13.8)	5(1.8)	
	High school	30(10.9)	7(2.5)	0	
	University	6(2.2)	3(1.1)	1(0.4)	

Table 5 shows the significant (*p*-value = 0.000) relationship given by the chi-square test table, this reveals how the prevalence of the risk factors positively influenced by the age group since their p-value is statistically significance. Combining "moderate and high risk" factors from scoring into "high risk" factors, respondents by their age group are as follow: group18-44 (7.3%), 45-54 (9.4%), 55-64 (14.5%), and 65-74 (6.8%).

This arrangement shows how the risks increase by the increase in age, to mean that the older respondents are exposed at high risk for T2DM because of the reduction in the metabolism rate, the reduction in the use of the blood glucose and the reduction in the physical exercise at advanced ages.

Respondents' risk classification according to their level of education is as follows: None (18.5%), Primary (15.6%), secondary (2.5), University or college (1.5%) and it is easy seen that as the level of education increases the number of people in the high risk category decrease. Gender and T2DM risk classification in table 5 show that female are in high risk compared to men since 21.8% of the total respondents are female while 16.4% are men.

4.5. THE RELATIONSHIP BETWEEN THE DEMOGRAPHIC VARIABLES AND MODIFIABLE RISK FACTORS

Table 6: RELATIONSHIP BETWEEN THE DEMOGRAPHIC VARIABLES AND MODIFIABLE RISK FACTORS

Demographic information		Modifiable risk factors											
		Physical activities			**Diet**			**Smoking**			**Alcohol drinking**		
		Yes (%)	No (%)	*P*-Value	Every day	Not Every day	*P*-Value	Yes	No	*P*-Value	Yes	No	*P*-Value
Age	18-44	110(40.0)	43(15.6)	0.002	37(13.5)	116(42.2)	0.508	22(8)	131(47.6)	0.000	69(25.1)	84(30.5)	0.001
	45-54	47(17.1)	11(4.0)		20(7.3)	38(13.8)		23(8.4)	35(12.7)		38(13.8)	20(7.3)	
	55-64	28(10.2)	17(6.2)		13(4.7)	32(11.6)		29(10.5)	16(5.8)		34(12.4)	11(4.0)	
	65-74	7(2.5)	12(4.4)		5(1.8)	14(5.1)		10(3.6)	9(3.3)		12(4.4)	7(2.5)	
Gender	Male	70(25.5)	30(10.9)	0.960	22(8.0)	78(28.4)	0.138	39(14.2)	61(22.2)	0.021	68(24.7)	32(11.6)	0.002
	Female	122(44.4)	53(19.3)		53(19.3)	122(44.4)		45(16.4)	130(47.3)		85(30.9)	90(32.7)	
Education level	None	36(13.1)	39(14.2)	0.000	19(6.9)	56(20.4)	0.631	43(15.6)	32(11.6)	0.000	51(18.5)	24(8.7)	0.001
	Primary School	119(43.3)	34(12.4)		44(16)	109(39.6)		38(13.8)	115(41.8)		76(27.6)	77(28.0)	
	High school	30(10.9)	7(2.5)		8(2.9)	29(10.5)		3(1.1)	34(12.4)		16(5.8)	21(7.6)	
	University	7(2.5)	3(1.2)		4(4.5)	6(2.2)		0	10(3.6)		9(3.3)	0	

The relationship between demographic variables and modifiable risk factors is presented (table 6) and reveals that the physical activities are influenced by the age group (*p*-value=0.002) provided by the Pearson Chi-square test for independence (p=0.0265).

From this table, it is easy seen that the number of respondent who does not walk or do other physical activity every day is decreased by age from 18-44 (40%), 45-54(17.1%), 55-64(10.2%), 65-74(2.5%); it decreased by the increase in ages. Since do not walk or not to do other physical activity every day increase the risk of getting T2DM; and the increase in age reduces the rate of performing physical activity, the reason why the number respondents walking and doing these physical activities decreased as the age increase; to show how the aged are highly exposed to T2DM.

Physical inactivity is decreased by the increase in the education level from none (14.2%), primary School (12.4%), High school (2.5%), university (1.2%). Because having education from none up to primary education level is insufficient about T2DM prevention then these 26.5% combined respondents are at risk of developing this T2DM being one of the non-communicable diseases (NCDs).

The same table reveals that the rate of smoking is negatively influenced by the level of education as they are statistically significant (*p*-value=0.000), since the rate of smoking decreases as the level of education increases from none (15.6%), primary School (13.8%), High school (1.1%), and university (0); this informs us how participants with no up to primary level of education are highly exposed for gtting T2DM because of a high rate of smoking coopared to others.

The result of finding in this table shows that the rate of smoking is increased as the ages increase from 18-44 (8%), 45-54(8.4%), 55-64(10.5%), 65-74(3.6%); to mean that they are positively related because they are statistically significant (*p*-value=0.000). This shows how the aged people are highly exposed to T2DM while smoking.

As they are statistically significant (*p*-value=0.001), the rate of drinking alcohol is diminished by the level of education attained by our respondents from none (18.5%), primary School (27.6%), High school (5.8%), and university (3.3%). In this study the above table showed that the rate of

drinking alcohol is decreasing as the ages increased from the age group18-44 (25.1%), to 45-54(13.8%), 55-64(12.4%), and 65-74(4.4%).

Alcohol drinking depends upon the gender (male or female) of the respondent, here the majority of respondent (30.9%) among those who drink alcohol were female whereas 24.7% of the respondent drinking it were male, this reveals how female are highly exposed to T2DM drinking alcohol compared to their counterpart male.

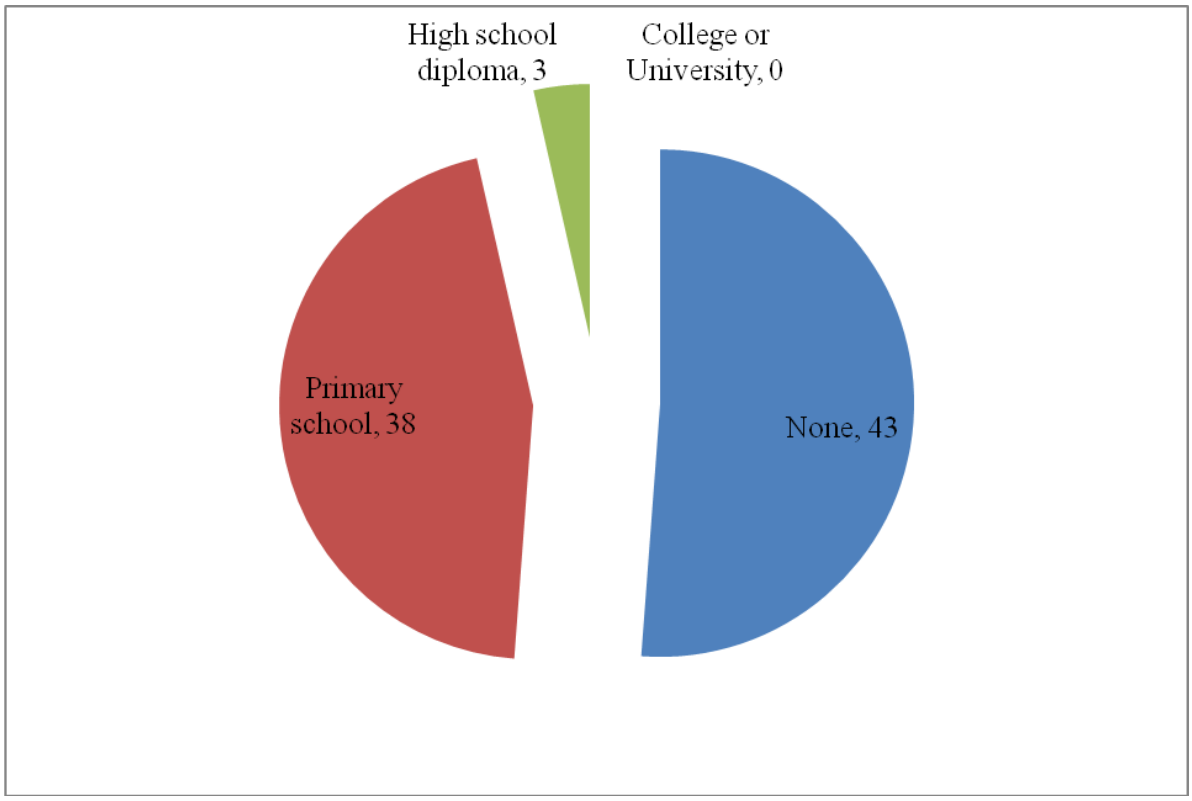


FIGURE 3: THE DISTRIBUTION OF THE RESPONDENTS' SMOKING WITH EDUCATION.

Chi-square test for independent shows the strong positive relationship between smoking and the education level attained by the respondents having the P-Value=0.000, this show how they are statistically significance and how being a smoker depends on the attained level of education. The majority of 51% who smoke are those with no education level, 45% of the total respondents studied only primary school and a small number, 4% of the total respondents attained high school level of education and higher. This informs us how participants with no up to primary

level of education are highly exposed for gtting T2DM because of a high rate of smoking coopared to others .

From all the above results of findings the prevalence of the risk factors for T2DM are as follows: lacking of education or educated at low level, being older, having high blood glucose, not eating fruits or vegetables regularly, having an increased BMI, having the waist circumference >102cm for men and >88cm for women, alcoholism, hypertension as our objective were to determine the prevalence of the risk factors of Type 2 diabetes mellitus among population of Kibirizi.

4.6. SUMMARY OF THE CHAPTER FOUR

In this chapter data have been analyzed and interpreted using descriptive statistics and Chi-square. However, basing on the research purpose of determining the prevalence of the risk factors of T2DM among the population of Kibirizi, the results showed that the low level of education increased BMI, irregularity of eating fruits and vegetables, smoking and drinking alcohol, getting older, etc. influence respondents to be affected by T2DM.

CHAPTER 5. DISCUSSION

5.1. INTRODUCTION

The main objective of this study was to find out the prevalence of the risk factors of T2DM among the population of Kibirizi Sector. The researcher highlighted three specific objectives namely the identification of the risk factors for T2DM among the population of Kibirizi, to evaluate the relationship between demographic variables and modifiable risk factors, and to assess the prevalence of the risk factors of T2DM among Kibirizi population as stated in the first chapter.

To achieve these objectives a non probability convenience sampling method was used to sample two hundred and seventy five respondents, and they were investigated using the questionnaire developed from the CANRISK tool also known as Canadian Diabetes Risk Assessment revealed in appendix IX where self-gathered data on demographics information, anthropometric measurements and modifiable risk factors was highlighted; outputs have been presented above but the relationship between the current study and other previous research study conducted is below:

5.2. IDENTIFICATION AND PREVALENCE OF THE RISK FACTORS FOR T2DM AMONG THE RESPONDENTS

In our current research female form the majority (63.6%) of the sample with 36.4% of male in the same relation with the study conducted by Ekpenyong *et al.*(2012) in Nigeria by selecting 3500 respondents randomly, and the result showed that 43.8% were male while the majority 56.2% were female. This is in contrast with the study conducted by (Nelson, Nyarko and Binka, 2015) revealing that a high proportion of respondents were male (54.3%) than 45.7% female.

For the age group 78.2% aged between 18 and 44 years is in low risk category decreasing as the age group increases compared to the 57.9% whose age range from 55 to 64 years being in high risk category increasing as the age group increases. This shows how the risk of getting T2DM increases as ages increase also, it is similar to the study done in Nigeria and Tanzania found that the raise in new cases of diabetes was recognized after the age 45-50 increasing by age as in our research; and the study conducted in Nigeria found that the risk of getting T2DM increases more time after 44 years to mean that many diabetes are found in the aged population (Ekpenyong *et*

al., 2012), the same as the result of findings in my study where after 44 years the risk factors increased about five times from 10.5% to 57.9% for those in the high risk.

Primary school education is 56.7% of the total respondents as the study conducted on risk for T2DM and associated factors confirming that people aged above 44 years with low education are more exposed to type 2 diabetes mellitus in relation with the study conducted in GHANA by (Nelson, Nyarko and Binka, 2015)that has found that many respondents have only the basic education as the majority of 73.5% completed primary/secondary level of education.

Combining those in the overweight and obese categories into "obesity", the results on BMI in relation with gender in table 3 reveals that the majority of male 16 (5.8%) respondents were obese compared to the majority of 25 (9.5%) female respondents who were obese to mean that female are highly exposed than male; in relation to the study conducted by Ekpenyong *et al.* (2012:7) finding that women have important predisposition for development of T2DM than men and(Nelson, Nyarko and Binka, 2015) found that many female about 45.7% of the total respondent were obese while 36% were male, as female's fat is largely distributed than for men. From different studies conducted, the important risk factor for getting T2DM as shown was the obesity.

Female are highly exposed to T2DM than men because 52.6% is female compared to that (47.4%) male located in the high risk category. The results like these were found from the Brazilian survey showed that the prevalence of type 2 diabetes mellitus was higher among women (6.0% *versus* 4.4%). This result is different from that found in the study conducted by (Saaristo, 2011) and found that the prevalence of diabetes, increased with age in both sexes whereby One quarter of individuals aged 45−64 years were at high risk for diabetes.

In the current study many respondents 63.3% have normal BMI ranged between 18.5 and 24.9 and it is the same result as those elaborated by (Namusisi *et al.*, 2011) that 42.4% have normal BMI, while 9.5% were underweight and 6.3% were obese. From the study done by Trishnee and Rajesh (2014) it is said that having the normal BMI does not make people free from obesity risk that exposure people to T2DM.

Since hypertension is also another risk factor of diabetes, (56.7%) had a BP between 120 and 139 mmHg named in this study as pre-hypertension, and a quarter (26.9%) had a normal blood pressure. This coincide with the results found by (Namusisi *et al.*, 2011) revealing that the mean

systolic blood pressure was 128.4 ± 12.5 and the mean diastolic blood pressure was 81.1 ± 13.0 and for them most of patients attained were hypertensive.

5.2. THE RELATIONSHIP BETWEEN DEMOGRAPHICVARIABLES AND MODIFIABLE RISK FACTORS

5.2.1. PHYSICAL ACTIVITY AND GENDER

In the present study physical activity is defined as walking or does other physical activity at least 30 minutes every day. From the result of findings presented (table 6) in the previous chapter shows that 30.2% of the total respondents are at risk whereby 10.9% of them were male and 19.3% female, because they neither walk nor do any other physical activity every day and the risk of getting T2DM is increased for them. This is in relation with the study conducted by (Nelson, Nyarko and Binka, 2015)and found that a high proportion of respondents with physical inactivity were female (65.7%) compared to male (44.8%). In accordance with the study conducted by(Dagdiya, Thakre S and Thakre B, 2016) found that the majority of respondents are physically inactive and he has said that the promotion of physical activity at high level lowers the risk of developing type 2 Diabetes Mellitus in both hypertensive and non-hypertensive individuals. Valliyot et al. (2013) found that among the working group, the prevalence of diabetes is lower compared with those in sedentary lifestyle and he stated that physical activity has a protective role in the development of T2DM.

5.2.2. ALCOHOL DRINKING AND SMOKING

The findings presented in the previous chapter reveals that the majority 55.6% (24.7% male and 30.9% female) drink alcohol in relation with the study conducted by Trishnee and Rajesh (2014), Emphasizing those alcohol users has many tendencies to developing T2DM.This is in contradiction with the study conducted by Nelson, Nyarko and Binka(2015) who found that the prevalence of alcohol consumption in this study was 72% in male and 56.19% in female.

This is probably due to the development of insulin resistance, which is a key factor in the pathogenesis of T2DM among heavy alcohol drinkers and this has been shown by some studies to be mediated by increased obesity, especially abdominal obesity. From these findings about 30.6% (14.2% male and 16.4% female) smoke differ from findings from the study conducted by

Nelson, Nyarko and Binka(2015) who found that a big number of respondents among those who smoke was 6.4% male compared to 2.9% female

5.2.3. DIET

One of the known determinants for non-communicable disease in which T2DM includes is diet whereby in the current study it is taken to be as taking fruits or vegetables daily. We have seen from table 6 that the majority of 73.09% of the total participant don't eat fruits or vegetables every day exposing them to the risk of developing T2DM, the same output as it was found by (Dagdiya, Thakre S and Thakre B, 2016)that the majority (62%) denied daily intake of fruits or vegetables. It is highlighted by the ministry of health in Rwanda that the rate of people who consumed fruits and vegetables still very low 0.3% of fruit consumption per day, 0.9% they eat vegetables (MOH Rwanda, 2015p2).

CHAPTER 6: SUMMARY, CONCLUSION AND RECOMMANDATION

6.1. INTRODUCTION

This chapter highlights the key findings of this research study. We highly emphasize on Summary and conclusion, whereby recommendations based on the main results of finding in this study are finally elaborated.

6.2. SUMMARY OF FINDINGS

With the research questions that the researcher set to verify at the beginning of the research work; after data processing, analysis and interpretation of output from gathered data based on the realities that were discovered along the research period, the researcher highlights the following summary of findings. This study was conducted to find out the prevalence of the risk factors for Type 2 diabetes mellitus among the population of Kibirizi sector. To achieve this objective, different subdivided specific objectives are stated from the first which is the identification of different risk factors of T2DM; this is attained according to the frequency of the respondents' answers. One of the risk factor is low education level among the respondent the majority, 56.7% studied primary school while other 26.2% was illiterate.

Another risk factor is not eating fruits or vegetables regularly. For alcohol drinking, the majority drank alcohol to mean that a great number of respondents in our study are at risk of developing T2DM due to alcoholism. Also having an increased BMI ranged between 25.0-29.9 and that >30.0 is another risk factor since 14.9% were overweight while only 0.4% was obese and all of those are at risk. The arterial blood pressure is among these risks because the majority (56.7%) are located in the pre hypertension (BP=120-139mmHg) category tending to get stage I hypertension.

The second and the third specific objective is the relationship between demographics factors and modifiable risk factors, and classifying people as being in the high risk, moderate or low risk category for getting T2DM respectively. The results of findings presented are summarized below: the prevalence of the risk factor and age are found to be statistically significance according to their *p*-value from the chi-square test; where the increase in age cause the population located in the high risk category to increase too.

6.3. CONCLUSION

We can draw the conclusion saying that generally female, aged people and those with no up to primary education level are highly exposed for developing T2DM since they have increased risk factors score. For that the following risk factors for T2DM are highlighted: low education level, diet which stands for not eating fruits or vegetables every day, to have the increased waist circumference >102cm for men and that >88cm for women, having an increased BMI, giving birth to a large baby of 4kg. Considering high and moderate risk category as high risk category, the results showed that female are highly exposed compared to male.

6.4. RECOMMENDATION

From the findings of this research study, the following are recommendations suggested by the researcher:

- I address my recommendation to Ministry of health to conducted mass screening of risk for T2DM not only in the urban area but also include the rural area to find those who are at risk unknowingly.
- I recommend to Kibilizi health centers and its stakeholders to increases health education about T2DM risk factors.
- I also recommend Kibilizi health center to engage periodic screening for T2DM risk factors at the community level through measurement like taking blood pressure is advisable.
- I recommend Kibilizi local leaders, and the Health center to educate the population continually about measure of malnutrition.
- From the study conducted it is recommended for other researchers to conduct this kind of research measuring blood sugar.
- It is also recommended that this type of research study should be conducted in other districts different from that of this study, GISAGARA District.

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APPENDICES

APPENDIX 1: APPLICATION FOR FEE WAIVER OF PROTOCOL

YAMURAGIYE Priscille

Tumba- Huye

Email: peacepriscille@gmail.com

Cell number : +250788883676

April 15th December 2016

TO: The IRB Chairperson UR/CMHS

Re: **Application for fee waiver of protocol**

Dear Sir,

I am humbly request for fee waiver for protocol review at CMHS in CMHS Institution Board.

In fact, I am a Master student in Medical Surgical Specialty at University of Rwanda /CMHS and my research titled Prevalence of Risk factors of diabetes mellitus and I have interest of conducting my research in community of selected Sector in Gisagara District and I sincerely need fee waiver as my research will not be granted an I am student it is hard for me to pay protocol review fee.

I am looking forward to hearing from you soon.

Yours faithfully,

Priscille YAMURAGIYE

APPENDIX 2: APPROVAL FORM FROM IRB

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 09/01/2017
Ref: CMHS/IRB/044/2017

YAMURAGIYE Priscille
School of Nursing and Midwifery, CMHS, UR

Dear YAMURAGIYE Priscille

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Prevalence Of The Risk Factors For Diabetes Among Rural Population Of Selected Sector In Rwanda."***

Having reviewed your protocol and found it satisfying the ethical requirements, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

for Professor Kato J. NJUNWA
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:
- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR

EMAIL: *researchcenter@ur.ac.rw* P.O. Box: 3286, Kigali, Rwanda WEBSITE: http://cmhs.ur.ac.rw/

APPENDIX 3: LETTER FROM THE SCHOOL TO COLLECT DATA

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

SCHOOL OF NURSING AND MIDWIFERY

Kigali, on 30 / 01 /2017

Ref. No: ...96.../ UR-CMHS/SoNM/17

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

Re: Request to collect data

Referring to the above subject, I am requesting for permission for **YAMURAGIYE Priscille**, a final year student in the Masters of Science in Nursing at the University of Rwanda/College of Medicine and Health Science to collect data for his/her research dissertation entitled "Prevalence **of Risk Factors for Diabetes in Rural Population of Selected Sector in Rwanda."**

This exercise that is going to take a period of 2 months starting from 13th February 2017 to 12th April 2017 will be done at **Kibirizi Sector (Gisagara)**

We are looking forward for your usual cooperation.

Sincerely,

for **Dr. Donatilla MUKAMANA, RN, PhD**
Dean, School of Nursing and Midwifery
College of Medicine and Health Sciences

Email: schoolofnursingandmidwifery@ur.ac.rw, P.O.Box: 3286 Kigali-Rwanda, Website: www.ur.ac.rw

APPENDIX 4: LETTER FOR DATA COLLECTION WRITEN FOR SECTOR

YAMURAGIYE Priscille

University of Rwanda /College of Medicine and Health Sciences /school of Nursing and Midwifery

Masters program

Medical Surgical

Contact: 0788883676

Email: peacepriscille@gmail.com

Date: 7th February 2017

To Executive Secretary of Kibirizi sector at Gisagara

Dear Sir

RE: Requesting for data collection at Kibirizi sector

I humbly request for the permission to collect data among population of Kibirizi sector.

In fact Sir, I am a student at university of Rwanda /College of Medicine and Health sciences in the school of Nursing and midwifery. For fulfillment of requirements for the Masters degree in Medical Surgical Nursing, I am conducting a study entitled "**Prevalence of Risk Factors for Diabetes Mellitus in Rural Population of selected sector in Rwanda**". I would like to start data collection from13th February to 12th April 2017.The subject will be people aged 18-74 who will provide consent and without any disability that may compromise data collection . The people who will be available at different areas in this sector will be selected as Convenience sampling method will be used to selected people.

I hereby promise that research findings will be communicated to the leaders and population of Kibirizi sector. Find attached Ethical clearance of Institutional Review Board, the Recommendation letter from the school of Nursing and Midwifery Nyarugenge Campus, summary of the study and Consent from.

I am looking forward to hearing from you.

Yours sincerely,

YAMURAGIYE Priscille

APPENDIX 5: APPROVAL OF KIBIRIZI SECTOR FOR DATA COLLECTION

REPUBULIKA Y'U RWANDA

Kibilizi kuwa 05/02/2017.

INTARA Y'AMAJYEPFO

AKARERE KA GISAGARA

UMURENGE WA KIBILIZI

Madam YAMURAGIYE Priscille

Impamvu: Gusubiza ibaruwa watwandikiye

Usaba kwegeranya imibare mu baturage b'umurenge wa Kibilizi.

Madam,

Nkuko mwabisabye mu ibaruwa yanyumwatwandikiye yo kuwa 09/02/2017, aho mwasabaga ko mwakoroherezwa kubona abaturage bo mumurenge wa Kibilizi mwegeranya imibare n'amakuru y'ibigendanye n'indwara ya Diabete.

Nkwandikiye nkumenyesha ko ubusabe bwawe wabwemerewe mugukorana n'abaturage bafite hagati y'imyaka 18-79 y'ubukure. Nk'umunyeshuri wa Kaminuza nkuru y'U Rwanda tukaba twizeye ko muzabikorana ubushishozi kandi bikazagirira akamaro abaturage b'umurenge wa Kibilizi n'abanyarwanda muri rusange.

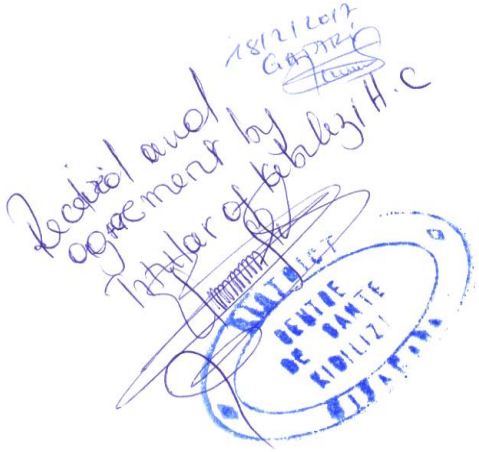
Mugire amahoro y'Imana

NDAYIZEYE Eric

Umunyamabanga nshingwabikorwa

w'umurenge wa Kibilizi w'Agateganyo

APPENDIX 6: APPROVAL OF KIBIRIZI HEALTH CENTER FOR DATA COLLECTION



YAMURAGIYE Priscille

University of Rwanda /College of Medicine and Health Sciences

School of Nursing and Midwifery Nyarugenge Campus

Masters Program

Medical Surgical Track

Contact 0788883676

February 16th 2017

To Head of Kibirizi Health Center

Re: Requesting permission for Data Collection

Dear Madam

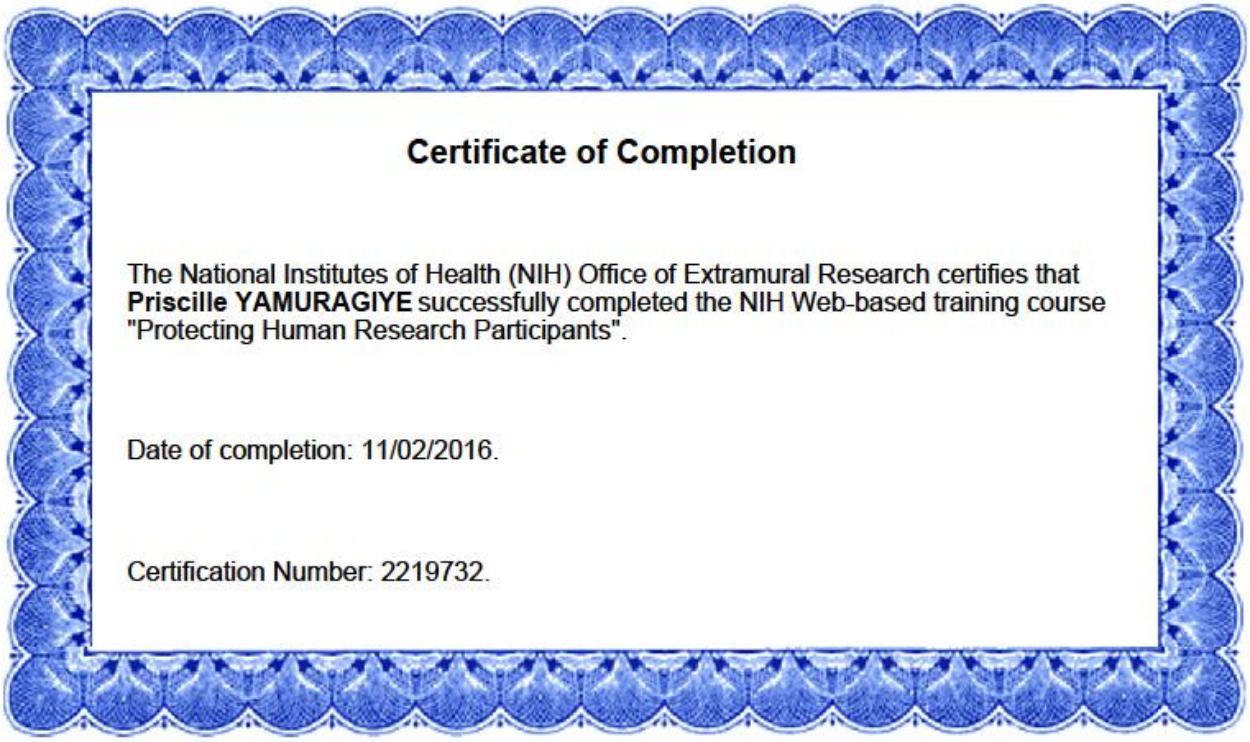
I humbly request for permission to collect data among Kibirizi population attending Kibirizi Health Center and Health posts.

In fact Madam I am a student at University of Rwanda /College of Medicine and Health sciences in School of Nursing and Midwfery.For fulfillment of requirement for the Masters degree in Medical Surgical nursing specialty I am conducting a research about **'' Prevalence of Risk Factors of Diabetes Mellitus in Rural Population of selected sector''**. As it is a conveniences sampling method that will be used during data collection, the different areas in this sector will be reached especially where many people are available, it is in that case your institution will be involved in this study . Therefore ,after getting the permission from Kibirizi sector I would like to get the permission from you .The study will be concern people aged 18-74, able to provide consent form and without any disability that may compromise data collection. You will find attached permission letter from Kibirizi sector, consent form and study related questionnaire.

I am looking forward to hearing from you.

YAMURAGIYE Priscille

APPENDIX 7: IRB CERTIFICATE



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Priscille YAMURAGIYE** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 11/02/2016.

Certification Number: 2219732.

APPENDIX 8: REQUEST OF RESARCH TOOL

6/6/16

BCIT Techhelp <BCIT_Techhelp@bcit.ca>
to me, Paul.Carless, Jennifer.Watson

Your request has been passed on to the appropriate person Priscille. You can expect a reply soon.

BCIT Technology Service Desk
tel: (604) 412-7444
toll-free: 1-800-351-5533
email: techhelp@bcit.ca
http://www.bcit.ca/techhelp

From: peacepriscille@gmail.com
Subject: Re: Ask Permission

Body:
Hello ,
I am Priscille YAMURAGIYE ,a Rwandan Masters student in Nursing.
As it required for accomplishment of Masters education to write a final Research Dissertation I am interested to conduct my research about PREVALENCE OF RISK FACTORS OF TYPE 2 DIABETES MELLITUS THE RURAL POPULATION in southern province of Rwanda . Kindly let me ask your permission to use your tools that have been established by you ,which is related to Diabetes RISKS done by Public Health Agency of Canada, 2011 .Forward you will found an attachment of that tool on which I am asking permission .

I look forward to hearing from you.

Priscille YAMURAGIYE
RN Nurse at CHUB
PHONE number + 250788883676 or +250722883676
MSC student at College of Medicine
and Health sciences at Kigali /RWANDA

APPENDIX 9: APPROVAL OF RESEACH TOOL

Jennifer Watson <Jennifer.Watson@phac-aspc.gc.ca> 6/7/16

to me, Paul, BCIT

Hello Priscille,

Thank you for your inquiry. To answer your question, yes you can use this resource as long as you reference the Public Health Agency of Canada appropriately. Please note also that it is available online directly as you will see in the screen shots below. There is also a button to share it electronically from there.

Thank you.

Jennifer Watson, MHA, BSc
Team Leader / Chef d'équipe
Skills Enhancement for Public Health /
L'amélioration des compétences en santé publique
Public Health Agency of Canada / Agence de santé publique du Canada
180 Queen Street West, 11th Floor / 180 rue Queen ouest, 11e étage
Toronto, ON M5V 3L7
Tel/ tél: (416) 952-2218 Fax/ téléc.: (416) 973-0009

APPENDIX 10: CONSENT FOR PARTICIPATION IN RESEARCH STUDY

Title of the study: PREVALENCE OF RISK FACTORS OF DIABETES TYPE 2 IN RURAL POPULATION OF SELECTED SECTOR IN RWANDA

Investigator: Yamuragiye Priscille a Master student in University of Rwanda in College of Medicine and Health Sciences in specialty of MEDICAL SURGICAL.

Contact of investigator 0788883676

Email: yamuprisci@yahoo.com

Cell numbers of Chairperson of college of Medicine and Health Sciences (CMHS): 0788490522

Institutional Research Board (IRB)

INTRODUCTION

Dear Mr., Miss, Mrs.

You are requested to participate in study of Assessment of Risk factors of Diabetes .to be selected it require to meet inclusion criteria for this study. This study is conducted among 18-74 population of Kibirizi Sector.

Before you agree to participate in this study you should read this form carefully .and ask any question that you have about this study for understanding.

Purpose of the study is to assess the Prevalence of Risk factors of type 2 Diabetes among population of Kibirizi. The result of this study will be communicated to local leaders and the population of Kibirizi.

I may informed the participant that participation is voluntary and there is no cost reserved for someone who will participate but there are advantages of study for participant because with anthropometrics measurements that will be in this study for data collection he/she will be screened for hypertension, overweight and obesity .

Before participating, participant will provide a consent and confirm it by putting a signature on the form or use a thumb for illiterate people after reading research tool for him or he and I may ensure you that the data collected during this study will be kept confidentially; no names or address will be used during publication of the study results even tough will be appear on questionnaire it is for collection of data and identification of the participant one to another.

The participant will fill 2 consent forms for one for a research another for the participant.

When you agree to participate in this study you will be requested to respond to some questions related to the study. Blood pressure, weight, and height; waist circumference will be measured and calculation of Body Mass INDEX (BMI) will be calculated .Blood pressure will be measured on non dominant arm but while it will be high the second arm will be used in order to get reliable results, the weight will be taken while participant stand on weight scale and you will be asked to remove shoes to measure really your weight.

Participant signature …….....

Date :……

Researcher's name and signature……

Date ……....

APPENDIX 11: QUESTIONNAIRE (ENGLISH VERSION)

PART 1: The demographic information of the respondents.

Please answer the questions by ticking the box that corresponds to your answer.

SCORE

1. Select your age group:

☐	18-44 years	0 points
☐	45-54 years	7 points
☐	55-64 years	13 points
☐	65-74years	15 points

2. Are you a male or female?

☐	Male	6 points
☐	Female	0 points

3. What is the level of education that you have completed?

☐	None	5 points
☐	Primary school	1 points
☐	High school diploma	0 points
☐	Some College or university degree	0 points

PART 2: Close questions on Risk factors.

4. Have you ever been found to have a high blood sugar either from a blood test, during an illness or during pregnancy?

☐	Yes	14 points
☐	No	0 points

5. Have you ever been told by a nurse, midwife, or physician that you have high blood pressure (hypertension) or have ever taken high blood pressure pills?

☐	Yes	4 points
☐	No	0 points

6. If you are a woman, have you ever given birth to a large baby weighing 4kg or more?

☐ Yes 1 points

☐ No 4 points

☐ Not applicable 0 points

7. Have you any of your relatives ever been diagnosed with diabetes?

(Maximum 8 points.)

☐ Father 2 points

☐ Mother 2 points

☐ Siblings 2 points

☐ Children 2 points

☐ Others 0 points

☐ None 0 points

8. Do you walk or do other physical activity at least 30 minutes every day?

☐ Yes 0 points

☐ No 1 point

9. How often do you eat fruits or vegetables per week?

☐ Every day 0 points

☐ Not every day 2 points

☐ Never 2 points

10. Have you ever been a smoker?

☐ Yes

☐ No

11. If yes are you still smoking?

☐ Yes

☐ No

12. If currently smoking, Levels of smoking:

☐ Level 1:1–19 cigarettes per day,

☐ Level 2: 20 cigarettes per day,

☐ Level 3:21–39 cigarettes per day

☐ Level 4:40 cigarettes or more per day

13. Do you drink alcohol?

☐ Yes

☐ No

PART 3: Anthropometric and blood pressure measurements completed by researcher:

14. Height _____cm Weight_____kg

15. BMI:

☐	Less than 18.5 (Underweight)	0 points	
☐	18.5-24.9 (Normal weight)	4 points	
☐	25.0-29.9 (Overweight)	9 points	
☐	≥ 30 (Obese)	14 points	

16. Waist circumference_____cm

Place tape measure around participant's waist at level of belly button.

Measure the waist after asking the participant to breathe out.

MEN	WOMEN		
Less than 94cm	Less than 80 cm	0 points	
Between 94-102 cm	between 80-88 cm	4 points	
Over 102 cm	Over 88 cm	6 points	

TOTAL POINTS

17. Arterial blood pressure_____MmHg

Classification of Blood pressure

	SPB (Mmhg)	DBP (Mmhg)
Normal	> 120	< 80
Pre-hypertension	120-139	80-89
Stage 1	140-159	90-99
Stage 2	≥ 160	≥ 100

o

APPENDIX 12: AMAKURU KUBUSHASHATSI

NUMERO.....

IZINA RY'UBUSHAKASHATSI: Impamvu zongera ibyago byo kurwara Indwara y'igisukari yo mu bwoko bwa 2 **(DIABETES TYPE 2**) mu baturage b'umurenge wa Kibirizi ya Gisagara

AMAZINA Y'UKORA UBUSHAKASHATSI: Yamuragiye Priscille umunyeshuri mu kiciro cya gatatu cya Kaminuza muri Kaminuza yigisha ibijyanye n'ubuzima mugashami ko kwita kubarwayi bafite indwara zo mu mubiri n'ababazwe(College of Medecine and Health sciences/ Medical Surgical Track)

ADERESE Z'UKORA UBUSHAKASHATSI: Numero za telefone 0788883676

Email: yamuprisci@yahoo.com

Telefone z 'uhagarariye ubushakatsi muri Kaminuza yigisha ibijyanye nubuzima 0788490522

INTANGIRIRO

Bwana,madamu,

Turagusaba kugira uruhare mubushakashatsi kubijyanye n'impamvu zishobora kongerea ibyago byo kurwara Indwara y'igisukari. Kugira ngo wemererwe kwinjira mubushakashatsi bisaba kuba wujuje ibisabwa, kuba uri umuturage w'umurenge wa Kibirizi ,ufite imyaka iri hagati ya cumi n'umunani na mirongo irindwi nine(18-74) kandi udafite uburwayi cg ubumuga bwatuma udasubiza neza ibibazo kurubu bushakashatsi. Mbere yo kwinjira mubushakatsi kandi turagusaba kubanza ugasoma neza cyangwa gusobanuza ibijyanye n'ubu bushakatsi kugira ngo ubisobanukirwe neza.

Impamvu y'ubu bushakatsi: Kureba impanvu za kongera ibyago byo kurwara Indwara y'igisukari (Diyabete) mu baturage batuye umurenge wa Kibirizi kugirango bizafashe mukuyirinda.

Twamenyesha kandi uwemeye kugira uruhare murubu bushakatsi ko bikorwa kubushake kandi nta kiguzi giteganyijwe kubemeye kugira uruhare mur 'ubu bushakashatsi cyokora hari inyungu

kumuntu wagize uruhare muburu bushakashatsi ,kuba azapimwa umuvuduko w'amaraso,ibiro,indeshyo ,umubyibuho ukabije, umuzenguruko wo w'inda ,kumenya uko abaturage butuye uyu murenge wavuzwe bahagaze kubijyanye no kuba barware Indwara y'igisukari.

Nyuma yo gusobanukirwa neza ibijyanye n'ubu bushakashatsi uwemeye kubugiramo uruhare azaza ashyira umukono ku maseserano y'ubushakatsi yemeza ko yasobanuriwe neza ibyubushakatsi kandi ko abwinjiyemo kubushake hazasinwa kopi ebyiri z'amasezerano kubushakatsi. Imwe izatwarwa nuwagize uruhare mubushakatsi indi nayo isigarane ukora ubushashatsi.

Ndabizeza kandi ko mugutangaza ibyavuye mubushakatsi nt'amazina y'umuntu azakoreseshwa mu rwego rw'umutekano k'uwagize uruhare mur'ubu bushakashatsi.

Muru bu bushakatsi hazabazwa ibibazo bijyanye nibyakongera ibyago byo kurwara indwara y'igisukari(Diabetes type 2), hazapimwa kandi umuvuduko w'amaraso ku kaboko k'ibumoso ndetse no kukaboko k'iburyo mugihe akaboko kibumoso gafite ikibazo cyabuza kugafatiraho umuvuuko w'amaraso,hazapimwa ibiro,uburebure,umuzenguruko w'inda hazarebwa kandi niba ibiro umuntu afite bijyanye uburebure bwe.

ICYEMEZO CYO KUGIRA URUHARE MUBUSHAKATSI

Ndemeza ko nabonye amakuru ahagije kubijyanye n'ubu bushakatsi ,nkaba nemeye kubushake kubugiramo uruhare nsubiza ibibazo mbazwaho pimwa n ibipimo byose bijyanye nubu bushakashatsi.

Umukono w'ukorerwaho ubushakashatsi……

Itariki…….

Umukonoby'ukora ubushakashatsi…… Itariki……

Appendix 13: QUESTIONNAIRE (KINYARWANDA VERSION)

APPENDIX 14: IBIBAZO MU BUSHAKASHATSI KU MPAMVU ZONGERA IBYAGO BYO KURWARA INDWARA Y'IGISUKARI UBWOKO BWA II

IGICE CYA 1 : Ibiranga ugira uruhare muri ubushakashatsi.

Subiza ibibazo ushyira akamenyetso ka «√» ku gisubizo uhisemo.

1. Hitamo ahajyanye n' imyaka yawe:

☐ imyaka 18-44	amanota 0	
☐ imyaka 45-54	amanota 7	
☐ imyaka 55-64	amanota 13	
☐ imyaka 65-74	amanota 15	

2. Igitsina :

Gabo ☐	amanota 6	
Gore ☐	amanota 0	

3. Amashuri wize

Ntayo ☐	amanota 5	
Abanza ☐	amanota 1	
Ayisumbuye ☐	amanota 0	
Kaminuza ☐	amanota 0	

IGICE CYA 2 : Ibibazo ku mpamvu zakongera amahirwe yo kurwara cyane igisukari.

4. Wigeze ubwirwa n' umuganga mu gihe wari urwaye, bagupimye cyangwa utwite ko ufite isukari nyinshi mumaraso.

Yego ☐	amanota 14	
Oya ☐	amanota 0	

5. Wigeze wipimisha umuvuduko w' amaraso bakubwirako wiyongereye cyangwa ngo wigere ufata imiti igabanya umuvuduko w'amaraso

Yego ☐	amanota 4	
Oya ☐	amanota 0	

6. Niba uri umugore waba warigeze kubyara umwana ufite cyangwa urengeje ibiro 4kg

Yego ☐	amanota 1	
Oya ☐	amanota 0	
Ntibindeba ☐	amanota 0	

7. Mu bavandimwe bawe har'uwigeze asuzumwa igisukari(Diabetes)

So	☐	amanota 2
Nyoko	☐	amanota 2
Abo muvukana	☐	amanota 2
Abana bawe	☐	amanota 2
Abandi bo mu muryango	☐	amanota 0
Ntanumwe	☐	amanita 0

8. Buri munsi ugenda n'amaguru cyangwa ukora imirimo y'amaboko nibura mu gihe kingana n'iminota 30

Yego	☐	amanota 0
Oya	☐	amanota 1

9. Nikangahe urya imbuto cyangwa imboga kumunsi?

☐	Buri munsi	amanota 0
☐	Si buri munsi,	amanota 2
☐	Ntanarimwe	amanota 2

10. Wigeze kunywa itabi ?

☐Yego

☐Oya

11. Uracyanywa itabi ?

☐ Yego

☐Oya

12. Niba ucyirinywa, unywa iringana rite?

☐1-19 imiti y 'itabi

☐20 imiti y 'itabi

☐21-39 imiti y 'itabi

☐40 imiti y 'itabi

13. Unywa inzoga?

☐Yego

☐Oya

IGICE CYA 3. IBIPIMO

14. Uburebure_____cm Ibiro _____ kg

15. Ibiro k'uburebure (BMI):

Munsi ya18.5 (ibiro bidakwiye)	amanota 0
18.5-24.9(ibiro bikwiye)	amanota 4
25-29.9(ibiro birenze)	amanota 9
Hejuru ya 30 (umubyibuho ukabije)	amanota 14

16. Umuzenguruko w'inda_____cm

Abagabo	**Abagore**	
Munsi 94 cm	munsi ya 80cm	amanota 0
Hagati ya 94 na 102 cm	hagati ya 80-88cm	amanota 4
Hejuru ya 102 cm	hejuru 88 cm	amanota 6

17. Umuvuduko w'amaraso _____ mmhg

AMANOTA YOSE

Murakoze .