UNIVERSITY of RWANDA

Thesis Title: ADHERENCE AND ASSOCIATED FACTORS TO TYPE 1 DIABETES MELLITUS CARE AMONG ADOLESCENTS AT RWANDA DIABETES ASSOCIATION

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DEDICATION

This research is dedicated to:

Almighty God for his exceptional protection and support

Lovely family for intimacy support,

Classmate ‘colleagues for their help

ACKNOWLEDGEMENTS

I acknowledge our Government of Rwanda for providing the opportunity to learn with security, the authorities of University of Rwanda and College of Medicine and Health Sciences for promoting nurses in their career development, the authorities of the Ministry of Health for allowing and supporting the program of Masters in Nursing, the entire faculty for providing knowledge and guidance, during this program. Special recognition is accorded to my supervisors; Dr. Godefrey KATENDE and Mr. Innocent NDATEBA for their kind and unceasing support during this research, their guidance, support and encouragement are unforgettable.

ABSTRACT

Background: Worldwide, many adolescents are suffering from type 1 diabetes. Greater adherence to the recommendations management is associated with better clinical outcomes. In Rwanda, the adherence of adolescents living with T1DM to diabetic care is not well known.

Objectives: The study had the purpose to assess the adherence of children suffering from T1DM to Diabetic care and its associated factors.

Methods: The quantitative cross-section study was conducted in Rwanda Diabetic Association Centre in Kigali, Rwanda among a convenient sample of 108. The study was conducted from February to April (precise date). A structured questionnaire was used to collect data. Ethical approval was sought and obtained from UR-CMHS-IRB (number of ethics). Participation was voluntary and other ethical principles were observed throughout the study. Descriptive data were entered into the Statistical Package of Social Sciences (SPSS) version 21, and then analyzed using Pearson Chi-square, to determine association between variables. The significance level was set at *p*-value of < 0.05

The Results: A total of 106 (98%) participants who consisted of 40.6% male and 59.4% female completed the survey. The majority of participants were aged between 15-19 (79.2%) years while 22(20.8%) were between 10-14 years old. 79.2% were adherent to diabetic care while 20.8% were not adherent. (72.6%) had schooling while (27.4%) did not attend school. The majority of the participants (79.2%) were in boarding school and (20.8%) were living out of school. Moreover (63.2%) children were living with both parents and (61.3%) of parents were married. There is no association between adherence and Age, gender **,** Child in boding school, Duration of medication, or if there are causes delayed respect of nurse' instructions but the others factors are associated with adherence: schooling child(p:0.001) , Relationship with guardian p:0.001) Parent status(p:<001) ,Guardian' occupation(p:<001), education level of guardian(p:0.017) (p:),Ubudehe category(p:<001), Health insurance(p:0.025) Complication (p:0.001) and Co-morbidities diseases (p:0.001).

Conclusion: Adherence to type 1 diabetes care is still low among the adolescent. The results suggest that reinforcing caretaker involvement could be vital in improving adherence to diabetes care recommendations in this population.

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LIST OF SYMBOLA AND ACRONYMS/ABBREVIATIONS

LMIC: Low and Middle Income Country

MOH: Ministry of Health

NCD: Non Communicable Diseases

RDA: Rwanda Diabetes Association

T1DM: Type one Diabetes Mellitus

WHO: World Health Organization

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CHAPTER I: INTRODUCTION

1.1. INTRODUCTION

Diabetes is a global epidemic with ~422 million people affected and the figures expected to rise in 2035 is 582 million. Therefore type 1 diabetes mellitus was attributable to 5%–10% of these cases ('Diabetes 2017 Report Card', 2017). Worldwide, diabetes is one of the most common chronic diseases in children and type 1 diabetes accounts for over 90% of the cases (Craig. *et al.*, 2014). Annually about 80 000 children (age <15 years) are estimated to develop type 1 diabetes worldwide// Medical expenditures, with diabetes affecting approximately 9% of the US population and accounting for US $174 billion in costs annually (Kyokunzire and Matovu, 2018). Early projections for the number of people with diagnosed diabetes in the United States in 2050 were calculated to be around 39 million (Honeycutt,2014).

Many of the children and adolescents with type 1 diabetes are from low- and middle-income countries (Della Manna,2016. An increasing prevalence of diabetes risk factors will only exacerbate the problem; therefore, population-based efforts that affect the modifiable diabetes risk factors, particularly obesity and physical inactivity, are needed to reduce the burden of diabetes. In addition, among people with diabetes, the rate of complications is high. These complications not only significantly affect the morbidity and mortality associated with diabetes, but also contribute to the ever-growing costs related to diabetes.

Adoption of appropriate diet and exercise behaviors and adherence to medication regimens will result in tighter glycemic control that, along with controlled blood pressure and blood lipids, will greatly reduce the burden of diabetes complications in the United States (Centers for Disease Control and Prevention, 2011) Furthermore, there is a lack of epidemiological information on type 1 diabetes (TIDM) in Rwanda, Furthermore; the challenges facing by adolescents in T1DM management have not been reliably evaluated in Rwanda.

1.2. BACKGROUND

The incidence of type 1 diabetes in children varies widely, and the incidence rates are correlated with the frequency of human leukocyte antigen (HLA) susceptibility genes in the general population(IDF, 2015). It is higher in Caucasian populations and in populations at a distance from the equator(Craig *et al.*, 2014). Countries with the highest annual incidence rates of type 1 diabetes in children are Finland, with 36.5 per 100 000, Sweden with 27.5 per 100 000, Canada (Prince Edward Island) with 24.5 per 100 000, and Norway (eight counties) with 21.2 per 100 000 (IDF, 2015). In Asia, the incidence of type 1 diabetes is low compared with Caucasians(Craig *et al.*, 2014). Likewise in Africa, the reported incidence is also low, even though diabetes overall is not rare in Africa, but there is limited information from the region(Noorani, Ramaiya and Manji, 2016). Generally a rise in type 1 diabetes incidence has been observed globally in recent decades(Sugihara, 2016). In some reports there has been a disproportionately greater increase in those under the age of five years(You and Henneberg, 2016) and in developing countries or those undergoing economic transition in recent decades (Della Manna,2016).

The disease is generally thought to be less common than in areas such as Europe or North America, but the high early mortality of the condition in Africa makes enumeration difficult. Researchers from the USA and Rwanda have recently reported a detailed survey of TIDM incidence in Rwanda (Noorani, Ramaiya and Manji, 2016). They studied seven districts, and collected data by visits to district hospitals, as well as using the 'Life for a Child' (LFAC) registry(Sl *et al.*, 2013). LFAC is a system run by the International Diabetes Federation (IDF) and other partners, and provides insulin for individual children in resource-poor areas. The prevalence of TIDM was found to be 16.4/100 000 in those <26 years, and 4.8/100 000 in those <15 years. Incidence figures were 2.7/100 000/ year for <26 years, and 1.2/100 000/year for <15 years (Sl *et al.*, 2013).

Widely Non -adherence to prescribed treatment schedule continues to be a major problem, and imposes a large economic burden on the global health care system (Kyokunzire and Matovu, 2018). 50% or more of patient are non adherent to treatment and additionally among children and adolescents 50%-70% are non adherent (Albuhairan *et al.*, 2016). Despite recent advances in

treatment strategies and technology, adolescents with Type 1diabetes (T1D) have poorer glycemic control and higher rates of acute complications than adults (Noorani, Ramaiya and Manji, 2016). Greater adherence to evidence-based management recommendations consistently relates to better clinical T1D outcomes (Riaz *et al.*, 2014). Non-adherence is tightly linked to suboptimal glycemic control, increasing morbidity, and risk for premature mortality (Kyokunzire and Matovu, 2018).

In LMIC, the different factors have been identified contributing to non-adherence including cost of insulin, occupation of caretaker, family history of diabetes, poor understanding of prescription, irregularity of follow up, and fear of insulin (Riaz *et al.*, 2014). Statically in Pakistan the factors associated with non-adherence to insulin in patient with types 1 diabetes in Pakistan 2014, 58.5% patients were non adherent to dietary advice, 42.3% non-adherent to physical activity while 88.1% were non adherent to their prescribed insulin (Serap and Bayram, 2015). while in Uganda ,the overall of prevalence to diabetes care was at 37% ,children and adolescents adhered to insulin at 52%,to blood glucose monitoring at 76.5% and 29.55 to dietary recommendation and anti-diabetic medication adherence and associated factors among patients in Botswana were over forty percent (41.8%) for patients were non-adherent to anti-diabetic (Noorani, Ramaiya and Manji, 2016).

The factors associated with non-adherence were family type, occupation and education level of respondent's parents, duration of type 1 diabetic medicine, family history of diabetes, frequency of visits to diabetic clinic, knowledge regarding diabetes, luck of family support and fear of hypoglycemia, type of diabetes, health belief and health literacy level (Noorani, Ramaiya and Manji, 2016) and (Serap and Bayram, 2015).

In Rwanda a little is known about adherence of adolescents with T1D on care, thus this study aims to assess adherence and associated factors to T1DM care among adolescents in Rwanda.

1.3. PROBLEM STATEMENT

Type 1diabetes (T1D) is the second most common chronic illness in teenagers, trailing only asthma. Many of the children and adolescents with type 1 diabetes are from low- and middle-income countries(Craig *et al.*, 2014). An estimated 50,600 children and adolescents under the age of 20 are living with type 1diabetes in Africa Federation, I.D., 2018. According to the Diabetes Atlas the prevalence of diabetes in Rwanda is about 3.16% of the population with 1,918 diabetes related deaths per year Federation, I.D., 2015.

The morbidity and premature mortality associated with diabetes is a major source of suffering (Sl *et al.*, 2013). Medical expenditures, with diabetes affecting approximately 9% of the US population and accounting for US $174 billion in costs annually (Kyokunzire and Matovu, 2018). Diabetes is a major challenge for health and development in the 21st century. This chronic and incurable disease is largely preventable but remains responsible for millions of deaths annually and many more life-threatening complications. No country, rich or poor, is immune to the epidemic (Sl *et al.*, 2013).

Greater adherence to evidence-based management recommendations consistently relates to better clinical T1D outcomes (Riaz *et al.*, 2014). Furthermore the studies indicated that adolescents suffering from T1D present more complications than adults (Noorani, 2016). The adolescence is a stage at which a young person faces physical, behavioral, and social changes that can be challenging to manage (WHO, 2016).These challenges are doubled, as they have to deal with their normal physical development and the management of type 1 diabetes and the disease may increasingly intrude into other aspects of the adolescent's life such as choice of foods,

relationship with parents, choice and relationships with peers, attendance to parties, as well as the academic life of the young person (Kyokunzire and Matovu, 2018).

Type 1diabetes patients need to adhere to several treatment parameters such as diet, insulin regimens, and blood glucose monitoring among others specifically because they all contribute to better disease outcomes (Kyokunzire and Matovu, 2018). However RDA realized that many of the children with type 1 diabetes are very poor and cannot even afford the recommended diet. Most them, they lost access to the program that covers 100% of the necessary treatments, medicine and regular education; they stopped their studies because of diabetes complications or poor family means and no future when they passed the age of 25. Factors that adversely affect the lives of people with diabetes in Rwanda include poverty, discrimination, food insecurity, lack of diabetes education and lack of organized and consistent care .Diabetes Voice. March 2014. Thus there is a need to assess the adherence of T1D and associated factors among adolescents. The study sought to answer the following questions:

1. What is the level of adherence to type 1 diabetes mellitus care among adolescents in Kigali?
2. What are the factors associated with adherence to T1DM care among adolescents in Kigali?

1.4. THE AIM OF STUDY

The study has the aim of to assess adherence and associated factors to T1DM care among adolescents in Kigali, Rwanda. This will help to provide recommendations on National diabetes management guideline used in T1D management in Rwanda.

1.4. RESEARCH OBJECTIVES

1. Determine the level of adherence to type 1 diabetes mellitus care among adolescents in Kigali
2. Establish factors associated with adherence to T1DM care among adolescents in Kigali, Rwanda

1.6. RESEARCH QUESTIONS

1. What is the level of adherence to type 1 diabetes mellitus care among adolescents in Kigali, Rwanda?
2. What are the factors associated with adherence to T1DM care among adolescents in Kigali, Rwanda?

1.7. SIGNIFICANCE OF THE STUDY

Adolescents with type 1 diabetes face numerous daily challenges associated with adherence to diabetes care recommendations due to the adolescent and family factors – including challenges in adhering to intensive therapeutic insulin regimes (daily injections or pump adjustments), dietary restrictions, regular exercise, and frequent monitoring of biochemical markers (Datye, Patel and Jaser, 2017). However, given that some of the previous studies have consistently shown an association between poor adherence and worsening glycemic control (Noorani, Ramaiya and Manji, 2016).

1.7.1. In Nursing Practice

This study will help the health care providers in nursing practice to prevent non adherence of diabetes care because they will able to identify the factors of adherence and the barriers of T1DM care in their working area which is an important step of preventing non adherence to T1DM care. The health care providers will consider the adolescents challenges in diabetes management which will help the adolescents to cope with theirs challenges.

1.7.2. In Nursing Education

Research helps nurses to determine effective best practices and improve patient care. The findings from studies can correct old misunderstandings, cover the way for new treatment protocols and create new methodology which improves patient outcomes. it also helps nursing respond to changes in the healthcare environment and patient populations As researchers make discoveries, the practice of nursing continues to change. The information students learn can

become quickly outdated, so being able to keep up with new developments in nursing helps graduates in their careers.

1.7.3. In Nursing Research

it is will help the researchers to use recently and truthful information for better research about type 1 diabetes mellitus and to identify the gaps in this research and it will motivate them to do other related study.

1.7.4. Nursing Administration

Findings from this study if integrated into regulatory and Public policy processes may improve the adherence of diabetic treatments among adolescents and this study will help to set the guidelines and policies which will be used for prevention of non adherence to T1DM care.

1.8. DEFINITION OF CONCEPT

Diabetes mellitus type 1: is an autoimmune disorder that is characterized by pancreatic beta cell destruction. The destruction of the beta cells in the pancreas causes a decrease in insulin, the hormone produced in the pancreas. Insulin helps the body convert glucose (sugar), starches, and other foods into energy needed for daily life. Without the insulin in the body, the blood glucose levels become elevated (hyperglycemia).(Sugihara, 2016)in this study Diabetes mellitus type 1 is non communicable disease which is very complicated to manage in adolescent's age.

Adherence: Preferred over 'compliance,' a term dating from a more paternalistic era of medicine in which people were expected to obey or accede to prescribers' directions(Henneberg, 2016). Adherence in this study is how a person respects all recommendations from health care providers about person's behavior while taking medication, following a diet, and/or executing lifestyle change.

Adolescent: according to WHO (2016) transitional phase of growth and development between childhood and adulthood in range of 10-19 years in my study adolescent is a child between 10 to 19 years old

1.9. STRUCTURE AND ORGANIZATION OF STUDY

The study illustrate firstly chapter one which contain introduction, background, problem statement, the aim of the study, research objectives, research questions, significance of the study, Definition of concepts, structure/organization of the study and the conclusion. Secondary, will illustrate chapter two which will contain introduction, theoretical literature, empirical literature, critical Review and Research gap identification and conceptual framework. Lastly, it will illustrate introduction. Research design, research approach, research setting, population, sampling, sample size, sampling strategy, validity and reliability of research instruments, data collection, data analysis, ethical considerations, data management, data dissemination, limitations and challenges and the conclusion of the chapter.

1.10. CONCLUSION

Type 1diabetes (T1D) is the second most common chronic illness in teenagers and Many of the children and adolescents with type 1 diabetes are from low- and middle-income countries. This study has the aims to assess adherence and associated factors to T1DM care among adolescents in Kigali. This is expected to promote Rwanda National diabetes management guideline utilization in relation with adolescents.

CHAPTER II: LITERATURE REVIEW

2.1. Introduction

The literature illustrates firstly, theoretical and empirical literature Secondly, critical review and research gap identification. Thirdly, conceptual framework and the last one will be conclusion. The citation use reference style of Harvard- cites. The sources of information were Google search, Google scholar, British medical center (BMC), Research gate and others. The terms used for searching is adherence level of type 1 diabetic. The citation use reference style of Harvard-cites.

2.2. Theoretical literature review

2.2.1 Global overview of type 1 diabetics mellitus

The incidence of type 1 diabetes in children varies widely, and the incidence rates are correlated with the frequency of human leukocyte antigen (HLA) susceptibility genes in the general population(IDF, 2015). It is higher in Caucasian populations and in populations at a distance from the equator(Craig Prof. *et al.*, 2014).

Countries with the highest annual incidence rates of type 1 diabetes in children are Finland, with 36.5 per 100 000, Sweden with 27.5 per 100 000, Canada (Prince Edward Island) with 24.5 per 100 000, and Norway (eight counties) with 21.2 per 100 000 (IDF, 2015). In Asia, the incidence of type 1 diabetes is low compared with Caucasians(Craig Prof. *et al.*, 2014). Likewise in Africa, the reported incidence is also low, even though diabetes overall is not rare in Africa, but there is limited information from the region(Noorani, Ramaiya and Manji, 2016).Generally a rise in type 1 diabetes incidence has been observed globally in recent decades(Sugihara, 2016).

In some reports there has been a disproportionately greater increase in those under the age of five years(You and Henneberg, 2016) and in developing countries or those undergoing economic transition in recent decades (Article, 2016).The disease is generally thought to be less common than in areas such as Europe or North America, but the high early mortality of the condition in Africa makes enumeration difficult. Researchers from the USA and Rwanda have recently reported a detailed survey of TIDM incidence in Rwanda (Noorani, Ramaiya and Manji, 2016).

They studied seven districts, and collected data by visits to district hospitals, as well as using the 'Life for a Child' (LFAC) registry(Sl *et al.*, 2013). LFAC is a system run by the International Diabetes Federation (IDF) and other partners, and provides insulin for individual children in resource-poor areas. The prevalence of TIDM was found to be 16.4/100 000 in those <26 years, and 4.8/100 000 in those <15 years. Incidence figures were 2.7/100 000/ year for <26 years, and 1.2/100 000/year for <15 years (Sl *et al.*, 2013).

2.2.2 Adherence

Adherence is Preferred over 'compliance,' a term dating from a more paternalistic era of medicine in which people were expected to obey or accede to prescribers' directions (You and Henneberg, 2016).Effective interventions build on teens' internal and external supports (family, technology, and internal motivation) in order to simplify their management of diabetes and provide opportunities for the teens to share the burdens of care. Although such strategies help to minimize the demands placed upon teens with diabetes, suboptimal glycemic control will likely persist for the majority of adolescents until technological breakthroughs allow for automated insulin delivery in closed loop systems(Datye, Patel and Jaser, 2017)

Medication adherence is defined by the World Health Organization as "the degree to which the person's behavior corresponds with the agreed recommendations from a health care provider (Cramer, 2014). Poor adherence to prescribed regimens can result in serious health consequences. For instance, a recent study found that the risk of hospitalization was more than double in patients with diabetes mellitus, hypercholesterolemia, hypertension, or congestive heart failure who were nonadherent to prescribed therapies compared with the general population (Berenson, 2018).From the study of adherence to treatments for diabetes, it is apparently important to assess the level of adherence to each component of the treatment regimen independently (i.e. self-monitoring of blood glucose, administration of insulin or oral hypoglycaemic agents, diet, physical activity, foot care and other self-care practices) instead of using a single measure to assess adherence to the overall treatment.(DiMatteo,2014)

2.3. Empirical literature review

2.3.1. Adherence percentage of T1 diabetic adolescent to care

From the study of adherence to treatments for diabetes, it is apparently important to assess the level of adherence to each component of the treatment regimen independently (i.e. self-monitoring of blood glucose, administration of insulin or oral hypoglycaemic agents, diet, physical activity, foot care and other self-care practices) instead of using a single measure to assess adherence to the overall treatment (Ritz, et al2015).

Other studies have assessed adherence based on incorrect performance (intentional or unintentional) of the component behaviors involved in glucose monitoring in urine or blood. One study reported that up to 80% of adolescents made significant mistakes when estimating glucose concentrations in urine (Johnson, 2016).

2.3.1.1. Adherence to Self-monitoring of glucose

The extent of adherence to prescribed self-monitoring of glucose levels in blood varies widely, depending on the frequency or aspect assessed in the study. For example, in a sample of children and adolescents with type 1 diabetes , only 26% of study participants reported monitoring glucose levels as recommended (3 - 4 times daily), compared to approximately 40% of the adults with type 1 diabetes (Renard, 2015).

Similar findings were reported in the study where (*n* = 213; patients aged 17 - 65 years), in which 20% of the study participants monitored their blood glucose as recommended, and 21% of respondents made daily or almost daily adjustments to their insulin dosage according to the results of self-monitoring of blood glucose. Only 6% reported never performing the prescribed blood glucose tests (Silverstein,2015).

A study conducted in the United States replicated the latter result in patients with type 1 diabetes (mean age = 30 years), of whom 7% reported *never* testing their glucose levels (Notkins,2014).

2.3.1.2. Adherence to administration of insulin.

The prevalence of adherence to insulin administration varies widely. In a study conducted in Finland (*35*) most of the respondents reported adhering to insulin injections as scheduled either

daily (84%) or almost daily (15%).Other studies have framed the adherence question differently. Rates for "never missing a shot" varied from 92% in a sample of young adults to 53% in a sample of children ; while 25% of adolescents reported "missing insulin shots within 10 days before a clinic visit" (Ahola, 2016) .

2.3.1.3. Adherence to Diet

The results of research on adherence to prescribed dietary recommendations have been inconsistent. In studies by Carvajal et al. in Cuba, and Wing et al. in the United States, 70 - 75% of study participants reported not adhering to dietary recommendations, but in a study in Finland by Toljamo et al., adherence to dietary recommendations was high: 70% of participants reported always or often having a regular main meal, while only 8% reported always having irregular mealtimes. In answer to questions regarding the foods prescribed, over half of the participants reported assessing both the content and amount of food that they ate daily (48%) while 14% of the respondents did not evaluate their food at all. Christensen et al. reported similar findings : 60% of study participants (n = 97) adhered to the number and timing of planned meals, while only 10% of patients adhered to planned exchanges, 90% of the time.

2.3.1.4. Adherence to Physical activity and other self-care measures

Literature on the extent of adherence to prescribed recommendations for physical activity among patients with type 1 diabetes is scarce. One study conducted in Kangas, et al.2015, indicated that two-thirds of study participants (n = 213) took regular daily exercise or almost daily exercise (30%), while 10% took no exercise at all. In the same study, only 25% of study participants reported taking care of their feet daily or almost daily, while 16% reported never taking care of their feet as recommended.

2.3.2. Associated factors associated with adherence

Type 1 diabetics in adolescents have been developed by many researchers and the level of treatments adherence varies from study to study but the similar information was that type 1 diabetics is seriously public health problem.

Study conducted in Pakistan about factors associated with non-adherence to insulin in patient with types 1 diabetes, showed that 58.5% patients were non adherent to dietary advice, 42.3%

non adherent to physical activity while 88.1% were non adherent to their prescribed insulin and factors associated with non adherence were family type, occupation and education level of respondent's parents, duration of type 1 diabetic medicine, family history of diabetes, frequency of visits to diabetic clinic, knowledge regarding diabetes, luck of family support and fear of hypoglycemia (Riaz *et al.*, 2014). While The study carried out in Uganda about factors associated with adherence treatment of type I diabetic among children and adolescents addressed that the adherence of type 1diabetes care recommendation is still low, the overall of prevalence to diabetes care was at 37% ,children and adolescents adhered to insulin at 52%,to blood glucose monitoring at 76.5% and 29.55 to dietary recommendation (Kyokunzire and Matovu, 2018).

In Botswana,anti-diabetic medication adherence and associated factors among patients in Botswana were over forty percent (41.8%) for patients were non-adherent to anti-diabetic. (Kyokunzire and Matovu, 2018).While in Turkey, Factors Influencing Adherence to Diabetes Medication in showed that education, type of diabetes, diabetes duration, health belief and health literacy level had a statistically significant association with levels of medication adherence (Serap and Bayram, 2015). Study done in seven District of Rwanda, it estimated 1.192 people which was suffering from type 1 diabetes among adolescent under 25 years and 239 among children under 15 years. Rubavu presented 7.5% case, Gakenke 13.5%, Rusizi 13.5%, Huye 15.3%, Rwamagana 15.4%, Muhanga 20.1% and Kigali 22.1% (Marshall and Marshall, 2013).

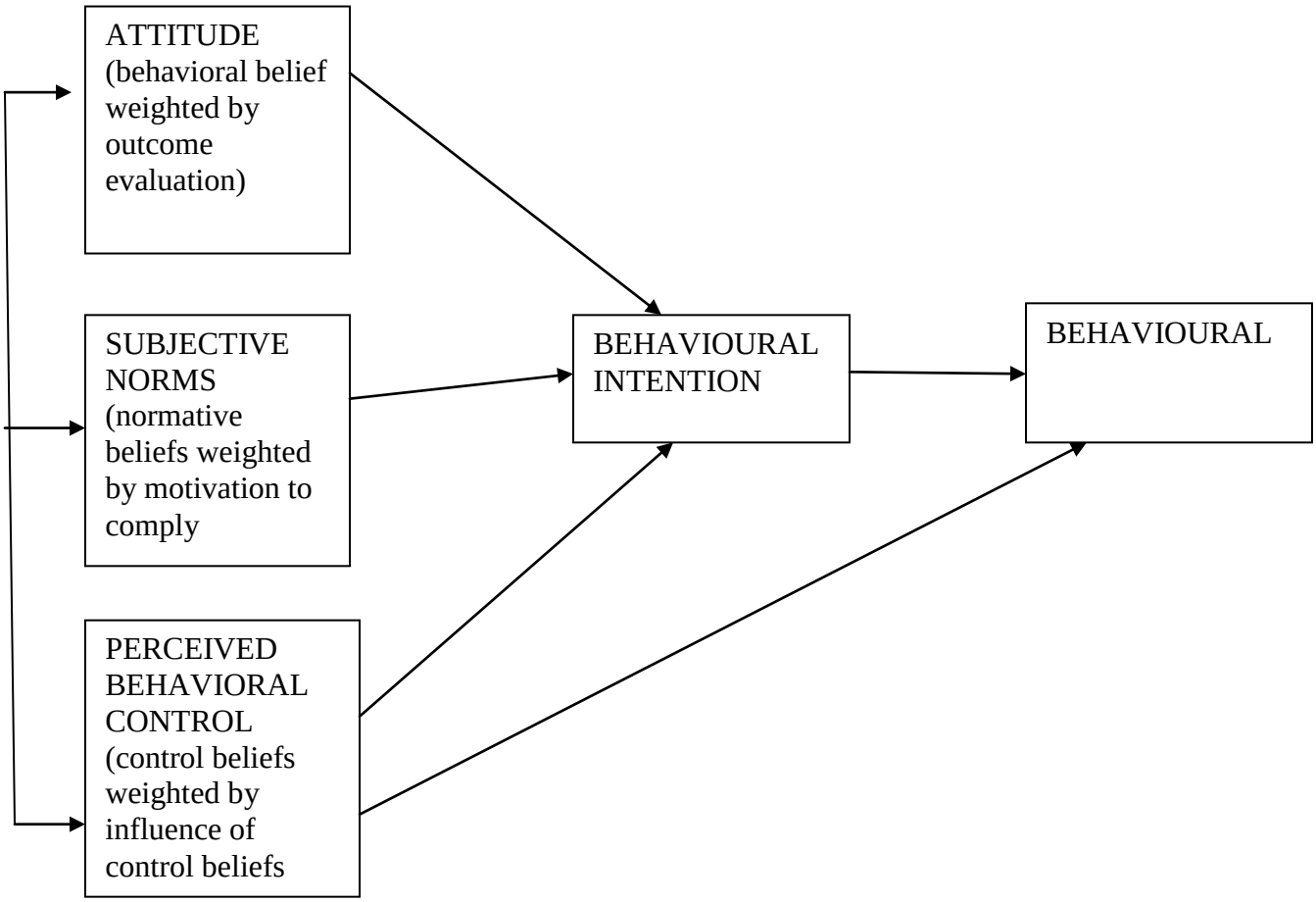
2.4 Critical review and research gap identification

Few studies have assessed adherence to type1 diabetes care. However, even studies that assessed adherence to individual treatment parameters used differing diabetes care recommendations compared with those used in this study; thus, literature comparisons across studies were daunting. In addition, adherence has been difficult to compare across studies because different studies used differing adherence assessment methods.

2.5 Conceptual framework

2.5.1. Theoretical Framework

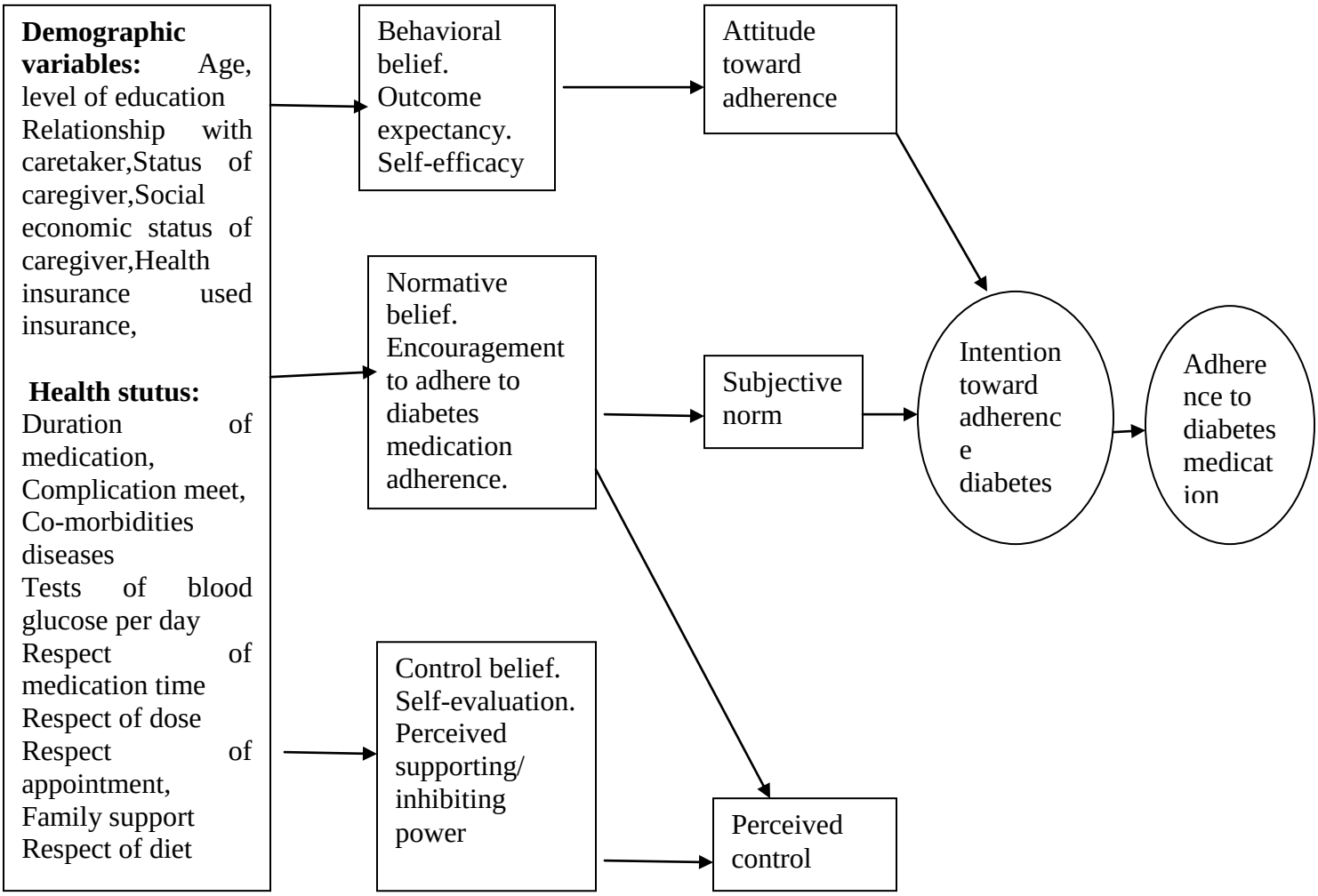
The study use theory of planned behavior. Ajzen's (1988) theory of planned behavior is similar to Fishbein's theory of reasoned action, but with the addition of perceived behavioral control—the extent to which a behavior is believed to be under the person's control. Therefore, instead of there being two causal pathways to behavior as in the theory of reasoned action, there are three. These are the attitudinal, normative, and control pathways. However, the way normative beliefs are used in the theories of reasoned action and planned behavior are similar



Model of the theory of planned behavior. From Ajzen (1991),"The Theory of Planned Behavior, " Organizational Behavior and Human Decision Processes, 50, p. 182.Copyright 1991 by I. Ajzen. Adapted from public domain with author permission

2.5.2 Relevance of the model to the study

The theory of planned behavior (TPB) developed by Ajzen (1991, 2005) was used in this study to provide the framework for a proper understanding of factors in relation to performing certain behaviors that promote adherence to prescribed diabetic treatments (Ajzen, 2001). As Ajzen (2001) explained, "The theory of planned behavior indicates that people act in accordance with their intentions and perceptions of control over the behavior, while intentions in turn are influenced by attitudes toward the behavior, subjective norms, and perceptions of behavioral control" (p. 43). Adhering to prescribed medications or management plans involves planned or intended behaviors. For instance, when an individual is prescribed one or more medications, some definite or specific behaviors are vital for the medication to be beneficial, such as taking the prescribed medication as directed(e.g., once daily in the morning, or every 8 or 12 hours with or without food). However, it is the duty of the patient to execute the required expected behavior and ensure adherence to medications. Individuals that have the ultimate goal of controlling their blood sugar or diabetes will routinely adhere to prescribers' directives of taking their medications and will follow other management plans strictly.



2.6 Conclusion

Type 1 diabetics in adolescents have been developed by many researchers and the level of treatments adherence and the factors influencing adherence varies from study to study but the similar information was that type 1 diabetics is seriously public health problem.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the study approach, study design, study area, sampling strategy and sample size data collection tools and procedures, the data analysis and management, the ethical considerations and study limitations.

3.2 Research Approach

Research approach is quantitative in nature. Quantitative Research is implemented in cases where it is important for a researcher to have statistical conclusions to collect actionable insights. Numbers provide a better perspective to make important business decisions. Quantitative research design is important for the growth of any organization because any conclusion drawn on the basis of numbers and analysis will only prove to be effective for the business (Ahuja, 2010).Descriptive research design was used. It is a theory-based research design which is created by gather, analyzes and presents collected data. By implementing an in-depth research design such as this, a researcher can provide insights into the why and how of research (Khanzode, 1995).

3.3 Research design

Research design is defined as a framework of methods and techniques chosen by a researcher to combine various components of research in a reasonably logical manner so that the research problem is efficiently handled. It provides insights about "how" to conduct research using a particular methodology (Ahuja ,2010). The current study used a cross-sectional study design to investigate into the adherence of T1D adolescents to care and associated factors in Kigali. Using a pre-tested questionnaire, interviews were conducted to collect information on socio-demographic characteristics and diabetic adolescent care/management from T1Diabetic children of 10-19 years cared from Rwanda Diabetic Association centre in Kigali. A descriptive study design was used in this process.

3.4 Research setting

The study carried out in Kigali City, Nyarugenge district at Kinamba.KN 8 Ave, No. 175 Kinamba, Kigali, Rwanda,P.O. Box 2238, Kigali, Rwanda.

3.4.1. History of Rwanda association

In 1996, François Gishoma was running a successful construction business in Rwanda when he suddenly fell very ill. He quickly went into a coma and was diagnosed with Type 2 diabetes at King Faisal Hospital, before spending 1.8 million Rwandan Francs to restore his health. After being discharged, he began to research the disease and connect with other diabetics living in Rwanda**.** While he had the means to pay for treatments, he recognized that the vast majority of Rwandans did not. As his complications increased, his construction business declined and he set out on a quest to start an association. In 1997, the Rwanda Diabetes Association was born**.** Initially, Francois was interested in exploring the realities of people who lived with diabetes during the genocide. Soon after, the activities of the association began to revolve around the opening of a clinic – the same one that we run today! Francois dedicated the rest of his life to serving people living with diabetes in Rwanda. The RDA became an official member of the International Diabetes Federation in 2003. https://rwandadiabetes.com/our-story/

3.4.2. Mission of Rwanda association center of diabetes

- Prevent and treat diabetes and its complications
- Educate and mobilize the population of Rwanda around diabetes awareness
- Research and promote the welfare of people living with diabetes and their families
- Advocate and partner with the Rwandan government, national and international organizations to fight against. https://rwandadiabetes.com/our-mission/

3.4.3. Vision of Rwanda association center of diabetes

An environment where by nobody is dying because of diabetes. https://rwandadiabetes.com/our-vision/

3.5. Population

The study participants for this research were the Adolescents with type 1diabetes attending

Rwanda Diabetic and who had 10 to 19 years old.

3.5.1. Inclusion criteria

The main inclusion criteria were adolescents who were diagnosed to type 1 diabetes mellitus, willing to participate in the study and attending the diabetes clinics during the study period and aged between 10-19 years.

3.5.2. Exclusion criteria

Patients, who were unwilling to participate in the study, below 10years old and above 19 years old

3.6. Sampling

3.6.1. Sample size

TaroYamane(1967) formula used for calculating sample size. Untended adolescents every 3mouths was 120 but attended adolescents the following 3mouths from November to December in 2018 was 108.

$n= N/1+N*(e)^2$ where: n= Sample size; N= the population size; e= the acceptable sampling error (e=0.05). $n=108/1+108*0.05^2=108$

3.6.2. Sample strategy

The Adolescents selected through convenience sampling .A convenience sample is a type of non-probability sampling method where the sample is taken from a group of people easy to contact or to reach. This type of sampling is also known as grab sampling or availability sampling. There are no other criteria to the sampling method except that people be available and willing to participate. In addition, this type of sampling method does not require that a simple Random sample is generated, since the only criteria are whether the participants agree to participate *(*Saunders, 2012*).*Data collection was done to all participants attended Rwanda association of Diabetes from January to March in working day. 10 adolescents was appointed weekly,

120adolescents was appointed in those 3months.I took 10persons every day up I get my sample unless 3 person denied to participate; the others participated.

3.7. Validity and reliability o research instrument

3.7.1. Validity

Sample selection bias may have arisen in this study as a result of the convenience sampling technique that was used. This potential internal validity issue was addressed by recruiting diverse adolescents at Rwanda Association Center. Threats to external validity may arise when there is incorrect generalization from study participants to other individuals or the general population (Creswell, 2009). This external validity threat was addressed by not generalizing the results of this study to other populations that are dissimilar to diabetes patients. Construct validity threat of measurement is related to the association between a study's theoretical framework and instruments used for measurement (Frankfort-Nachmias & Nachmias, 2008). The measuring instruments used in this study aligned closely with the selected theoretical framework.

Conceptual framework	Related objectives	Related questions numbers
Adherence	➢ To determine the level of adherence of T1DM care among adolescents in Kigali	Question 12
Factors associated with adherence	➢ To Determine the factors associated with adherence to T1DM care among adolescents in Kigali	Question 1 to 11

3.7.2. Reliability

Pretest of the questionnaire was carried out the ideas of participants about questionnaire used in the research and ensured that the questions was understood and helped to determine the response of the participants to the questionnaire. The pre-testing was done on ten respondents before going to the field for data collection, and the adjustments to the questionnaire was made.

3.8. Data collection

Data collection was done by researcher. The questionnaire collected information regarding age of adolescent, adolescent education situation (school boding or not), relationship with caretaker, take care status (married or not), social economic status of caretaker (Ubudehe), insurance, duration of medication, complication, co-morbidities diseases and tests of blood glucose per day in assessment of adherence challenges and the information regarding validity of self management was collected if person respects all recommendations from health care providers about person's behavior while taking medication, following a diet, and/or executing lifestyle change. Questionnaires were used to collect information from caretakers and adolescents (adolescents responded by themselves if they were not accompanied by their caretakers). The questionnaire had been pre-translated into the local language (Kinyarwanda) commonly used in Rwanda and data collection lasted approximately 10minutes.

3.9. Data analysis

Completed questionnaires were accessible only to the investigators and supervisors and kept safely in my computer.The data was entered into excel sheet and imported to SPSS for being analyzed with SPSS version. The data used to evaluate level of adherence was scored from 0 to 6 scores. If the participant answered "yes" to three or more questions is non adherent if less is adherent**.**

Note: Yes: 1, No: 0

Descriptive statistics was used to summarize the socio-demographic details of the study respondents. The categorical predictor variables such as gender, sex etc was summarized using

frequencies and percentages Chi –square test was used to analyze the factors associated with adherence and statistical significance was set to < 0.05.

3.10. Ethical considerations

The research using humans as study participants must ensure that human rights are conserved (Polit and Beck, 2008, p. 141). Grove and colleagues recommend that a research that is done ethically must protect rights of study participants, obtain informed consents from the study participants, get approval from the institutional review board after submitting a research proposal and balance benefits and risks in a study (Grove, Burns and Gray, 2013, p. 159).

3.10.1. Permission

The research proposal was approved by the UR-CMHS Institutional Review Board that issued an ethical clearance and the director of Rwanda Association Centre issued permission letters to conduct a study.

3.10.2. Beneficence and Right to self-determination

The participants were assured of the right to self-determination, explained that data obtained are for research purposes only and will be kept confidentially, fully explained to participants about questionnaire and procedure. The researcher assured that there is no potential risk from participation. In addition the contact information of the researcher, the Chairperson of UR-CMHS/IRB and Deputy Chairperson of UR-CMHS/IRB were provided to research participants.

3.10.3. Consent, anonymity and confidentiality

Participation was intentional, to sign consent and assent forms was a requirement, the information was collected in privacy place, with anonymity and the confidentiality was respected. Justice and beneficence/non malficence were ensured

3.11. Data management

Soft data were stored in computer with a password known by the researcher only, and hard data were kept in a locked cupboard at a place which is secure, and none could access the data, except the researcher and supervisors. In addition, those data will continue to be kept up to five years. The confidentiality of data was insured by not linking the data to the identification of the

participants. After data analysis, findings were communicated to the permitted authorities from the UR/CMHS.

3.12. Data dissemination

The findings were reported to UR/CMHS to be presented and submitted for further researches. The data will be disseminated trough publication and conferences.

3.13. Limitation and challenges

This study was quantitative approach and cross-sectional design that was best because the aim of the study was to identify level of adherence and factors that impact diabetes adherence status at Rwanda association diabetes center but did not explore the reasons why participants in the study behaved in the ways they did. It involved measurement of association, causation was not explored. The results from this investigation were limited to adolescent attend Rwanda association centre and should not be generalized to the adolescents that are dissimilar to that the Rwanda association centre.

3.14. Conclusion

The chapter describes the methods used to conduct the study. The quantitative cross-section approach was used at Rwanda association of diabetes centre, 108 adolescents was selected through convenience sampling. The questionnaire used for collecting information regarding socio-demographic and factors associated with adherence and the data was entered into excel sheet and imported to SPSS for being analyzed with SPSS version. In additional ethical aspect was respected.

CHAPTER FOUR: RESULTS

4.1. Introduction

The chapter four presents the findings of the study aimed at assessing the adherence and associated factors with Type I diabetes care among adolescents living with T1Diabetes. The results of this study include the socio-demographic characteristics of the participants, the adherence of the adolescents to T1 Diabetes care in percentage forms and associated factors. The findings are presented in tables displaying frequencies and percentages

4.2. Socio-demographic characteristics of participants

A total of 106 adolescent among 108 enrolled to care completed survey accounting 98% of response rate. The majority of the respondents, 84 (79.2%) were aged between 15-19 years old while 22(20.8%) were between 10-14 years old. It was found that the proportion of the female was slightly more than male (59.4% vs 40.6%). Furthermore, most of the respondents, 77 (72.6%) had schooling while 29 (27.4%) did not attend school. The majority of the participants 84 (79.2%) were in boarding school and 22 (20.8%) were living out of school. Moreover, 67(63.2%) children were living with both parents (mother and father) and 65 (61.3%) of children's guardians/parents were married.

Additionally, 63(59.4%) of parents had occupation vs 43 (41.6%) who did not have occupation. The majority of guardians/parents had completed secondary school, 50(47.2%) while 3(2.8%) have in informal level. It was also found that 86 (81.1%) were in Ubudehe category 3 and 70 (67%) used public health insurance. A big number of participants 71(67%) were on diabetic treatment between 5 -10 years. The majority of participants 94 (88.7 %) did not yet develop complications while 12 (11.3%) had already diabetic complications. The study showed that a big number of participants, 99 (93.4%) did not have co morbidities while 7(6.6%) presented co morbidities. Unfortunately 95(89.6%) had the causes that delayed respect of nurses' instructions vs 11(10.4%) who did not present the causes (**Table1)**

Table 1: Socio-demographic characteristics of the participants

Demographic characteristics (N=106)		**Frequency**	**Percentage**
Age	10-14	22	20.8
	15-19	84	79.2
Gender	Male	43	40.6
	Female	63	59.4
Child' schooling	No	29	27.4
	Yes	77	72.6
Child has boarding school	No	84	79.2
	Yes	22	20.8
Relation with guardian	Father	2	1.9
	Mother	12	11.3
	Mother and father	67	63.2
	Others	6	5.7
	Herself	19	17.9
Marital status of parents	Married	65	61.3
	Separated	9	8.5
	Divorced	1	0.9
	widow	7	6.6
	Not my parent	24	22.6
Parents/guardian' occupation	No	43	40.6
	Yes	63	59.4
Guardians/parents' educational level	informal	3	2.8
	primary	46	43.4
	secondary	50	47.2
	others	7	6.6
Ubudehe category	category 1	4	3.8
	category 2	14	13.2
	category 3	86	81.1

	category 4	2	1.9
Type of health insurance	Public Heath Insurance (Mutuelle de Santé)	70	66.0
	Others' health insurance(private)	34	32.1
	None	2	1.9
Duration of medication	0-1year	3	2.8
	>1-5years	27	25.5
	>5-10years	71	67.0
	>10-15years	5	4.7
Complication of diabetes	No	94	88.7
	Yes	12	11.3
Co-morbidities diseases	No	99	93.4
	Yes	7	6.6
If there are constraint disturbed respect of instruction from the nurse	No	11	10.4
	Yes	95	89.6
The important cause that delayed respect of instructions	Lack of support	18	17.0
	Food insecurity	61	57.5
	Anxiety	8	7.5
	Fear of discrimination	7	6.6
	Any cause	12	11.3

4.3. Adherence percentage

4.3. 1. Adherence of Type I diabetic adolescents to care/management

The findings of the current study showed that all respondents, 106 (100%) did not change prescribed dose. Additionally, the majority of the respondents, 101 (95.2%) did not stop taking medicine more than two weeks. Furthermore, it was indicated that 99(93.3%) of responded did not change schedule of medicine and 96(90.5%) did not forget to take medicine. Unfortunately,

only 42(39.6%) took Glycemia control regularly and 32(30.1%) respected dietary recommendations (**Table2).**

Table 2: Adherence distribution among participants

Parameters of adherence	**Attributes**	
	Yes (%)	**No (%)**
Did you sometimes forget to take medicine?	10 (9.4)	96 (90.5)
Did you stop taking medicine more than 2 weeks?	5 (4.7)	101 (95.2)
Did you ever change treatment schedule?	7(6.6)	99(93.3)
Did you sometime change treatment prescribed dose?	0 (0)	106 (100)
Did you forget to respect glycemic control?	64 (60.4)	42 (39.6)
Did you sometimes forget to respect diet regime?	74 (69.8)	32 (30.1)

4.3.2. Summary of adherence to Type I diabetes care among adolescents

The maximum score was 6 while minimum was 0 (zero). The participant scored 0-2 was classified in adherence category while the participant scored above 2 (>2) was classified in non-adherence category. The findings of the study showed that 84 (79.2%) of respondents were adherent to care/management while 22 (20.8%) were not adherent (**Table3).**

Table 3: Summary of adherence to T 1diabetes care among adolescents

Adherence status	**Frequency**	**Percentage**
Adherence	84	79.2%
Non adherence	22	20.8%

4.4. The factors associated with adherence to type 1 care/management

4.4.1. Age and adherence

It was found that 86.4% of participants of 10-14 years old were adherent to diabetic care compared with 77.4% of participants of 15-19 years old. But this difference was not significant (X^2 :0.855, df: 1, p=0.355).Thus, age was not associated with adherence to diabetic care/management **(Table 4)**

Table 4: Age and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		N	**%**	**n**	**%**	
Age	10-14	19	86.4	3	13.6	0.355
	15-19	65	77.4	19	22.6	

Note: P-Value less than 0.05 meant that association was statistically significant

4.4.2. Gender and adherence

It was found that 82.5% of female participants were adherent to diabetic care compared with 74.4% of male 'participant. But this difference was not significant (X^2 :1.025, df: 1, p=0.311).Thus, Gender was not associated with adherence to diabetic care/management. **(Table 5)**

Table 5: Gender and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		N	**%**	**N**	**%**	
Gender	Male	32	74.4%	11	25.6%	0.311
	Female	52	82.5%	11	17.5%	

4.4.3. Child's schooling and adherence

In this study, 87% of the participants who attended school were adherent compared with 58.6% of those without schooling (those who did not attend school) and this difference was statistically significant (X^2=10.325, df:1, p=0.001). Thus participant education was associated with adherence to diabetic care/management (**Table 6)**

Table 6: Child' schooling and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		0.001
		n	**%**	**n**	**%**	
Child' schooling	No	17	58.6	12	41.4	
	Yes	67	87.0	10	13.0	

4.4.4. Child's boarding school status and adherence

It was found that 90.9% of Child's boarding were adherent to diabetic care compared with 76.2% of Child without boarding school. But this difference was not significant (X^2 :296, df: 1, p=0.130).Thus, boarding school was not associated with adherence to diabetic care/management (**Table7).**

Table 7: Child 'boarding school and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		N	**%**	**n**	**%**	
Child has boarding school	No	64	76.2%	20	23.8%	0.130
	Yes	20	90.9%	2	9.1%	

4.4.5. Relation with guardian and adherence

In this study, 91% of the participants who were cared by both parents (mother and father) were adherent compared with 83.3% ,58.3%,52.6% and 50% respectively cared by others, mothers, their self and fathers and this difference was statistically significant (X2=146, df:4, p=<0.001). Thus relationship with guardian was associated with adherence to diabetic care/management (**Table 8)**

Table 8: Relation with guardian and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		n	**%**	**n**	**%**	
Relation with guardian	Father	1	50.0%	1	50.0%	<0.001
	Mother	7	58.3%	5	41.7%	
	Mother and father	61	91.0%	6	9.0%	
	Others	5	83.3%	1	16.7%	
	Herself	10	52.6%	9	47.4%	

4.4.6. Parents' marital status and adherence

In this study, 92.3% of the participants who cared by married parent adherent compared with 77.8% ,55%,42.9% and 0% respectively care by separated parent , other person, widow and divorced and this difference was statistically significant (X2=23.401, df:5, p=0.000). Thus marital status of parent was associated with adherence to diabetic care/management. (**Table 9)**

Table 9: Parent status and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		n	%	n	%	
Parent status	Married	60	92.3	5	7.7	<0.001
	Separated	7	77.8	2	22.2	
	Divorced	0	0.0	1	100	
	widow	3	42.9	4	57.1	
	Not my parent	14	55.0	10	45.0	

4.4.7. Guardian's occupation and adherence

In this study, 93.7% of the participants with Guardian who had occupation adherent compared with 58.1% of those without occupation and this difference was statistically significant (X2=19.595, df:1, p=<0.001). Thus guardian occupation was associated with adherence to diabetic care/management. (**Table 10)**

Table 10: Guardian's occupation and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		Adherence		Non adherence		
		N	%	n	%	
Guardian has occupation	No	25	58.1	18	41.9	<0.001
	Yes	59	93.7	4	6.3	

4.4.8. Education level of guardian and adherence

In this study, 90% of the participants who cared by secondary level adherent compared with 85.7% ,69.6% and 33.3% respectively care by above level ,primary, and informal level and this difference was statistically significant (X2=10.160, df:3, p=0.017). Thus level of guardian was associated with adherence to diabetic care/management. (**Table 11)**

Table 11: level of guardian and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		n	**%**	**n**	**%**	
Schooling level of guardian	informal	1	33.3%	2	66.7 %	0.017
	primary	32	69.6%	14	30.4%	
	secondary	45	90.0%	5	10%	
	others	6	85.7%	1	14.3%	

4.4.9. Ubudehe category and adherence

In this study, 100% of the participants who was in Category 1 adherent compared with 86.% ,50%, and 35.7% respectively category 3 , category 4, and category 2 and this difference was statistically significant (X2=20.636, df:3, p=<001). Thus Ubudehe category was associated with adherence to diabetic care/management (**Table 12).**

Table 12: Ubudehe category and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		n	%	n	%	
Ubudehe category	category 1	4	100.0%	0	0.0%	<0.001
	category 2	5	35.7%	9	64.3%	
	category 3	74	86.0%	12	14.0%	
	category 4	1	50.0%	1	50.0%	

4.4.10. Health insurance used and adherence

In this study, 94.1% of the participants used private health insurance adherent compared with 72.9% ,and 50% respectively public health insurance (Mutuelle de Santé), and who did have health insurance and this difference was statistically significant (X2=7.349, df:2, p=0.025).

Thus health insurance was associated with adherence to diabetic care/management (**Table 13).**

Table 13: Health insurance used and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		n	%	n	%	
Health insurance used	Public health insurance	51	72.9%	19	27.1 %	0.025
	Private(others)	32	94.1%	2	5.9%	
	None	1	50.0%	1	50.0%	

4.4.11. Duration of medication and adherence

It was found that 88.9% of participants of >1-5years years on treatment were adherent to diabetic care compared with 80%, 76.1% and 66.7% respectively >10-15years, >5-10years, and 0-1year. But this difference was not significant (X^2 :2.256, df: 3, p=0.521).Thus, duration of medication was not associated with adherence to diabetic care/management. (**Table 14)**

Table 14: Duration of medication and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		n	%	N	%	
Duration of medication	0-1year	2	66.7%	1	33.3%	0.521
	>1-5years	24	88.9%	3	11.1%	
	>5-10years	54	76.1%	17	23.9%	
	>10-15years	4	80.0%	1	20.0%	

4.4.12. Complication of diabetes and adherence

In this study, 84% of the participants without complication adherent compared with 58.3% of those without complications and this difference was statistically significant (X2=11.619, df:1, p=0.001). Thus complications were associated with adherence to diabetic care/management. (**Table 15)**

Table 15: Complication of diabetes and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		N	%	n	%	
Complication of diabetes	No	79	84.0%	15	16.0 %	0.001
	Yes	5	58.3%	7	41.7%	

4.4.13. Co-morbidities diseases and adherence

In this study, 82.8% of the participants without co-morbidities adherent compared with 28.6% of those with co-morbidities diseases and this difference was statistically significant (X2=11,619 df:1, p=0.001). Thus having co-morbidities diseases was associated with adherence to diabetic care/management. (**Table 16)**

Table 16: Co-morbidities diseases and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		n	%	n	%	
Co-morbidities diseases	No	82	82.8%	17	17.2 %	0.001
	Yes	2	28.6%	5	71.4%	

4.4.14. To have constraints that disturbed respect from the nurses' instructions and adherence

In this study, 81.8% of the participants without constraint in respecting instruction from the nurse adherent compared with 15.9% of those with constraint in respecting instruction from the nurse and this difference was statistically significant (X2=20,619 df:1, p=<0.001). Thus having constraint in respecting instruction from the nurse was associated with adherence to diabetic care/management (**Table 17)**

Table 17: Constraint disturbed respect of instruction from the nurse and adherence

Variables (N=106)		Adherence				Level of significance(P-value)
		adherence		Non adherence		
		N	%	n	%	
constraint disturbed respect of instruction from the nurse	No	9	81.8%	2	18.1 %	<0.001
	Yes	15	15.9%	80	84.4%	

4.4.14.1. lack of support and adherence

In this study, 65.9% of the participants with support adherent compared with 22.2% of those with without support and this difference was statistically significant (X2=12,732 df:1, p=0.001). Thus lack of support was associated with adherence to diabetic care/management (**Table 18).**

Table 18: lack of support and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		N	**%**	**n**	**%**	
lack of support	No	58	65.9%	30	34.1 %	0.001
	Yes	4	22.2%	14	77.7%	

4.4.14.2. Food insecurity and adherence

In this study, 66.6% of the participants without food insecurity adherent compared with 18.1% of those with food insecurity and this difference was statistically significant (X2=21,249 df:3, p=<0.001). Thus food insecurity was associated with adherence to diabetic care/management. (**Table 19)**

Table 19: Food insecurity and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		N	**%**	**n**	**%**	
Food insecurity	No	30	66.6%	15	33.3%	<0.001
	Yes	11	18.1%	50	81.9%	

4.4.14.3. Anxiety and adherence

In this study, 37.5% of the participant without anxiety adherent compared with 32.6% of those with anxiety and this difference was statistically significant (X2=10,294 df:1, p=0.001). Thus anxiety was associated with adherence to diabetic care/management (**Table 20).**

Table 20: Anxiety and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		adherence		**Non adherence**		
		n	**%**	**n**	**%**	
Anxiety	No	32	32.6%	66	87.3 %	0.001
	Yes	3	37.5.%	5	62.5%	

4.4.14.4. Fear of discrimination and adherence

In this study, 56.5% of the participants without fear of discrimination adherent compared with 28.5% of those with fear of discrimination and this difference was statistically significant (X2=11,619 df:1, p=0.001). Thus fear of discrimination was associated with adherence to diabetic care/management.(**Table 21)**

Table 21: Fear of discrimination and adherence

Variables (N=106)		**Adherence**				**Level of significance(P-value)**
		Adherence		**Non adherence**		
		N	**%**	**n**	**%**	
Fear of discrimination	No	56	56.5%	43	43.4%	0.001
	Yes	2	28.5%	5	71.4%	

CHAPTER FEVE: DISCUSSION

5.1. Introduction

The aim of the chapter six is to discuss findings from this study in line with study objectives. The results were compared with the literature reviews of studies conducted elsewhere.

The current study determined the level of adherence to diabetic care/management and associated factors among T1 diabetic patients at Kigali.

5.2. Adherence

The study showed that the 79.2% were adherent to the diabetic care while 20.8% were not adherent. These findings are incongruent with the results of the study conducted in Uganda which found the prevalence of adherence of 37% (Kyokunzire, 2018).

This difference might be due to the different tools used to measure adherence. Measurement of medication adherence is challenging because adherence is an individual patient behavior. The following are some of the approaches that have been used: (1) subjective measurements obtained by asking patients, family members, caregivers, and physicians about the patient's medication use; (2) objective measurements obtained by counting pills, examining pharmacy refill records, or using electronic medication event monitoring systems; and (3) biochemical measurements obtained by adding a nontoxic marker to the medication and detecting its presence in blood or urine or measurement of serum drug levels. Currently, a combination of these measures is used to assess adherence behavior. Along with the monitoring of outcome, these tools assist investigators in studying medication adherence (Winkler, 2002).

Furthermore, in the study by Kyokunzire (2018), patients used out pocket payment for medicine while our study, majority of patients had community health insurance which covered a big proportion of payment and may increase the access to medicine compared to the Ugandan study. High adherence in this study was noted to the respect of prescribed dose of insulin (100%) similar to the study conducted in Botswana. This similarity may explain by using the same scale for adherence assessment.

The difference was noted in the study conducted in Pakistan 69% (Riaz, et al. 2014). The reason for the differences seen may partly be explained by the different methodologies used to estimate adherence rates. Type 1 diabetes children are still reported to have a poor adherence to dietary recommendations. This study found low prevalence of adherence to diet recommendations (30.1%), but it was higher than that found among Pakistani adolescents which was at 7.2% (Riaz, et al 2014).

Certainly, the level of adherence to dietary recommendations in this study was comparable to that from Tanzanian type 1 diabetes children and adolescents which was 28% (Noorani, et al 2016).This could be explained by the similarity in setting (for instance, comparable food patterns and dietary trends) between these two sub-Saharan countries. In addition, the difference in diet adherence levels between the studies from the two sub-Saharan countries and that among Pakistani adolescents could be due to cultural and dietary patterns difference among these populations. This study reports lower adherence to blood glucose monitoring at 39.6.3% compared with that reported by Kyokunzire, et al 2018 at 76.5% although study on factors associated with adherence to diabetes care recommendations among children and adolescents with type 1 diabetes: a facility-based study in two urban diabetes clinics in Uganda.

In addition, Riaz, et al 2014 also reported the same prevalence (39%) of adherence to blood glucose monitoring recommendations among type 1 diabetes patients. The low testing rates among this population could probably be attributed to the lack of testing strips or fear of self-injection among the children and adolescents as it was reported by Silverste (2015) in Care of children and adolescents with type 1 diabetes: a statement of the American Diabetes Association study.

5.3. Factors associated with adherence to diabetic care.

Age, sex and duration of medication were not associated with adherence in this study. This is similar to the study conducted in Botswana which reported that socio-demographic characteristics and clinical variables did not affect adherence. This related may be to the gender balance in Rwanda, As of 2018, the African country Rwanda ranks in the top 5 countries for gender equality (Warner, 2018).Rwanda has made many changes to promote equity for all, with

one category that they have worked to improve in being healthcare (Naughton, 2018) and even the range of age is different but all are adolescents which must be cared by parents that why there is no significant association between (annon-Bonventure,1979).However, the results of this study are different from the study by Serap & Bayram, 2015 in Turkey which found that age, sex and duration of medications were associated with adherence.

Similarly to the study carried out in Uganda by Kyokunzire (2018), caretakers 'marital status was associated with adherence. The adolescents and children whose caretakers were married were more adherent compared to those whose caretakers were divorced (92.3%). It is believed that children and adolescents who are under the care of a married caretaker gain more support from both parents in terms of motivation for self-care. In addition, in such situations, there is usually a shared responsibility of diabetes management and self-care activities between both Parents and the child/adolescent, who may lead to improved adherence outcomes (Almeida, 2013). Among effects of divorce on children are negative emotions like bitterness, stress, emotional pain, anxiety, fear, feeling abandoned, feeling betrayed and loss of self-esteem (Patrick, 2000).those condition have an impact on treatment adherence.

Schooling Caretakers or adolescents, care taker with occupation and having health insurance had children who were more adherent (or were themselves more adherent) to diabetes recommendations in this study. Nonetheless, the authors cannot fully explain these relationships and thus encourage further research. But knowledgeable patients with chronic diseases are more likely to adhere to medication instructions. Many patients have difficulty acquiring medication information; thus, patients need increased access to education about their medication. Pharmacist services may be required to provide such information (Doggrell, 2010). In additional study done by Rahmathulla, (2014) on pharmacist 'knowledge and adherence shown an evidence that knowledge can indeed have an influence on the level of drug adherence. And the impact of non adherence on health care costs in several chronic diseases, such as diabetes and asthma was noted in study done by Kaiser Family Foundation (2013).

Children and adolescent presented complication(58.3%), co morbidities(28.6%) having lower adherence study done by Kronish(2013) shown a link between complication and adherence that Approximately 50% of patients with cardiovascular disease have poor adherence to their prescribed medications. and having constraint in respecting orders from providers like luck of support(22,2%), food insecurity(18.1%), fear of discrimination(28.5%) and anxiety(37.5%) many research was not point on few it was focused on luck of family support which was association with non adherent to medication.

5.4. Conclusion

This chapter discussed on the findings about adherence to type 1diabetes care. The difference was noted in Uganda and Pakistan due to different tools used**.** High adherence was noted to the respect of prescribed dose of insulin similar to the study conducted in Botswana, the similarity may explain by using the same scale for adherence assessment. The low prevalence of adherence to diet recommendations was noted in this study but it was higher than that found among Pakistani adolescents but the same to that from Tanzanian which could be explained by the similarity in setting between these two sub-Saharan countries.

In addition, the difference in diet adherence levels between the studies from the two sub-Saharan countries and that among Pakistani adolescents could be due to cultural and dietary patterns difference among these populations. Age, sex and duration of medication were not associated with adherence in this study. Caretakers 'marital status was associated with adherence due to more support. Schooling Caretakers or adolescents, care taker with occupation and having health insurance had children were more adherent due to the knowledge about diabetes diseases and cost reduction of health care. Children and adolescent presented complication, co morbidities having lower adherence and having constraint in respecting orders from providers like luck of support, food insecurity, fear of discrimination and anxiety.

CHAPTER SIX: CONCLUSION AND RECOMMANDATION

6.1. Introduction

The chapter six presents the conclusion and the recommendations from the study.

6.2. Conclusion

A cross-sectional study design was used to assess the adherence and associated factors. A total of 106 (98%) participants who consisted of 40.6% male and 59% female completed the survey. The majority of participants were aged between 15-19 (79.2%) years old while 22(20.8%) were between 10-14 years old. Furthermore, most of the respondents (72.6%) had schooling while (27.4%) did not attend school.

The majority of the participants (79.2%) were in boarding school and (20.8%) were living out of school. Moreover (63.2%) children were living with both parents (mother and father) and (61.3%) of children's guardians/parents were married. The 79.2% were adherent to the diabetic care while 20.8% were not adherent. It was found that there is no association between adherence and Age, gender **,** Child in boding school , Duration of medication, or if there are causes delayed respect of nurse' instructions but the others factors are associated with adherence respectively: schooling child(p:0.001) , Relationship with guardian p:0.001) Parent status for who cared by the parents(p:<001) ,Guardian has occupation(p:<001), Schooling level of guardian(p:0.017) (p:),Ubudehe category(p:<001), Health insurance used (p:0.025) Complication of diabetes(p:0.001)) Co-morbidities diseases (p:0.001).

6.3. Recommendations

In the light of the results of this study, the following recommendations are made:

6.3.1. Ministry of Health

- To provide support to the children, provide a home visit to ensure that the children are supported.
- To strengthen the adolescent management of type 1 diabetes mellitus including diet management and reduction of medication cost

6.3.2. Ministry of education

- To support children living with diabetes: As it was found that association diet is associated with adherence ,the availability of recommended diet at school can improve adherence to the schooling adolescents
- To ensure that all children are attending school, as the study shown the association between adherence and schooling meaning that the children who are not attending the school do not adhere to recommendations. This strategy can improve adherence among adolescent attend school. Also, Ministry of Education may include some lessons on diabetes prevention and importance of adherence to recommendations for those who are sick of T1DM.

6.3.1. Future Research

- To Conduct a large study at country level to study factors associated with adherence among adolescents

6.3.2. Rwanda association of diabetes

- To advocate to Adolescent with type 1 diabetes mellitus about diet management as it the first cause of non-adherence to the medications

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APPENDICES

APPENDIX A. APPROVAL TO USE THE QUESTIONNAIRE

Re: Re:Thanks

Expéditeur :ALPHONSINE UMUTONI UWASE (wasso2020@yahoo.fr)

À :godfreyrwegerera@gmail.com

Date :mercredi 9 mai 2018 à 13:15 UTC+2

Thank you a lot! I shall communicate you the evolution of my work!

Sent from Yahoo Mail on Android

On Wed, May 9, 2018 at 6:57, Godfrey Rwegerera
<godfreyrwegerera@gmail.com> wrote:

Dear Alphonsine,

Attached tool we used to assess adherence. The question on " Did you take all the medication yesterday? (We reversed the Yes/No); because it does not make sense to score higher for good adherence (similar to other similar tools). You can refer to our paper also attached as well.

You may count on me for any collaboration or assistance,

Best of luck!,

Godfrey.

On Tue, May 8, 2018 at 3:41 PM, ALPHONSINE UMUTONI UWASE <wasso2020@yahoo.fr> wrote:
Good afternoon.I m very happy for your good collaboration!
Be blessed

Le mardi 8 mai 2018 à 15:13:44 UTC+2, Godfrey Rwegerera <godfreyrwegerera@gmail.com> a écrit :

Good afternoon Alphonsine. Good to know about your research interest. I will send the tool later in the evening once i get hold of my laptop
Regards,
Godfrey.

On Tuesday, May 8, 2018, ALPHONSINE UMUTONI UWASE <wasso2020@yahoo.fr> wrote:
Hello!

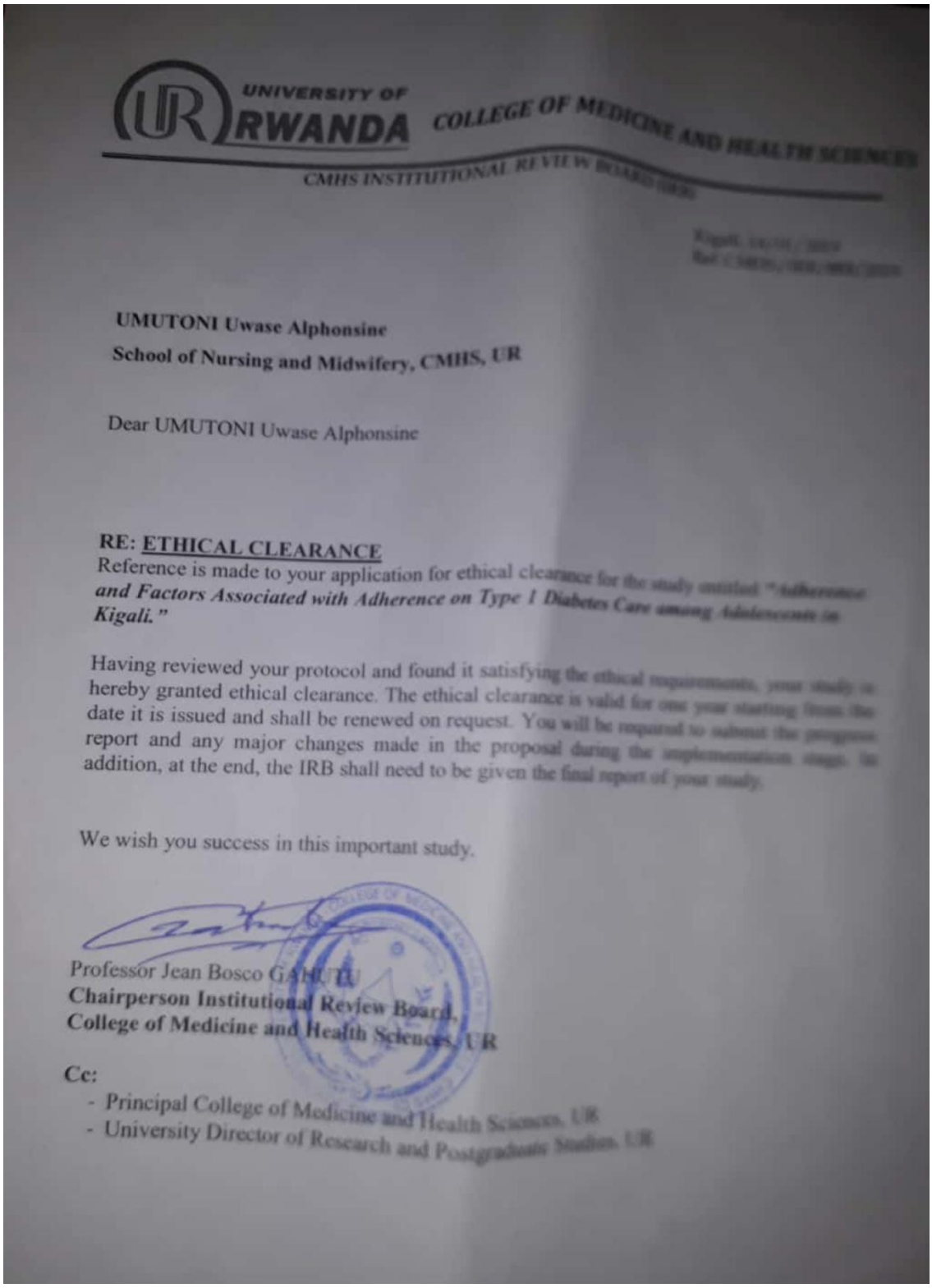
I am called UMUTONI UWASE Alphonsine ,I am a Rwandese, I'm Student in University of Rwanda/College of Medicine and Health Sciences/School of Nursing and Midwifery in Masters Program/Nursing Pediatrics Track.

I would like to conduct my research dissertation on "**ADHERENCE ASSESSMENT OF CHILDREN WITH TYPE 1 DIABETES ON DIABETIC TREATMENT**" the reason why i write this email for requesting the tool that you have used in your research aimed"ANTI-

DIABETIC MEDICATION ADHERENCE AND ASSOCIATED FACTORS AMONG PATIENTS IN BOTSWANA;IMPLICATION FOR THE FUTURE"

thank you for your collaboration

APPENDIX B. ETHICAL CLEARANCE FROM UR-CMHS



UNIVERSITY OF RWANDA COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, [illegible]
Ref: [illegible]

UMUTONI Uwase Alphonsine
School of Nursing and Midwifery, CMHS, UR

Dear UMUTONI Uwase Alphonsine

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Adherence and Factors Associated with Adherence on Type 1 Diabetes Care among Adolescents in Kigali."***

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.

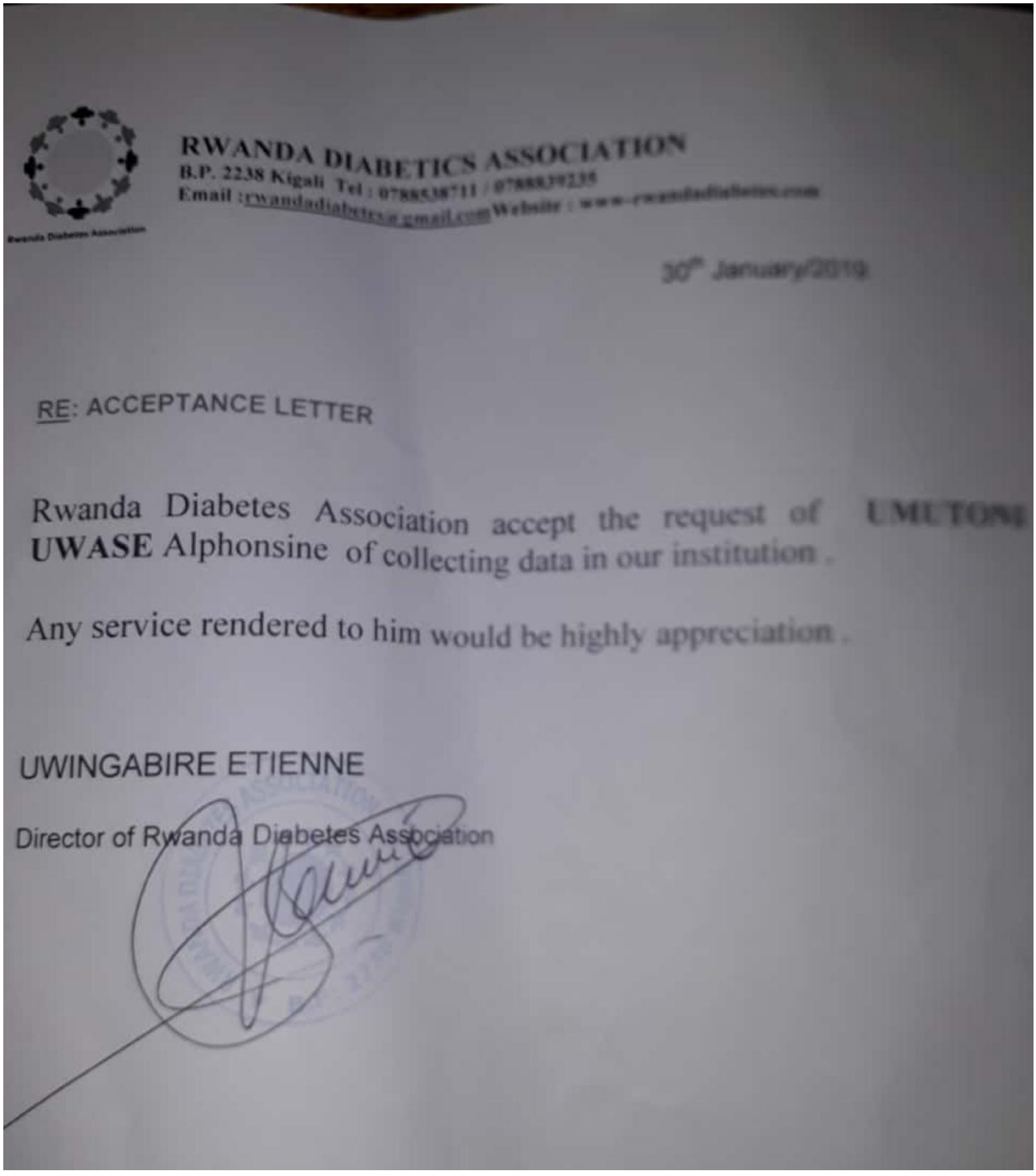
We wish you success in this important study.

Professor Jean Bosco GAHUTU
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

APPENDIX C. PERMISSION TO CONDUCT A STUD AT RWANDA ASSOCIATION OF DIABETES CENTRE



RWANDA DIABETICS ASSOCIATION
B.P. 2238 Kigali Tel : 0788538711 / 0788839235
Email :rwandadiabetes@gmail.com Website : www.rwandadiabetes.com

30th January/2019

RE: ACCEPTANCE LETTER

Rwanda Diabetes Association accept the request of UMUTONI **UWASE** Alphonsine of collecting data in our institution .

Any service rendered to him would be highly appreciation .

UWINGABIRE ETIENNE

Director of Rwanda Diabetes Association

THE FORM FOR SUBMISSION OF THE DISSERTATION

APPENDIX D. DECLARATION AND AUTHORITY TO SUBMIT THE DISSERTATION

UR-COLLEGE OF MEDICINE AND HEALTH SCIENCES
P.O.BOX 3286 KIGALI
DECLARATION AND AUTHORITY TO SUBMIT THE DISSERTATION

Surname and First Name of the Student
UMUTONI UWASE Alphonsine
Title of the project
ADHERENCE AND ASSOCIATED FACTORS TO TYPE 1 DIABETES MELLITUS CARE AMONG ADOLESCENTS IN KIGALI

a. *Declaration by the Student*

I do hereby declare that this ***dissertation*** submitted in partial fulfilment 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

……..

b. *Authority to Submit the dissertation*

Surname and First Name of the Supervisor: Innocent NDATEBA
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: June 10, 2019

APPENDIX E. ASSENT FORM (for student)

ASSENT FORM FOR PARTICIPATION IN THE STUDY

Project title: Adherence and factors associated with adherence on type 1 diabetes care among adolescent in Kigali

Investigator's Names: UMUTONI UWASE Alphonsine, a student in Masters of Science in Nursing Department at UR/CMHS.

I m doing a research study about **Adherence and factors associated with adherence on type 1 diabetes care among adolescent in Kigali.** A research study is a way to learn more about adherence. If you decide that you want to be part of this study, you will be asked to **sign, read and take 30min to fill the questionnaire.**

There are some things about this study you should know. These are no problems or other negative consequences following you after completing the tool.

Not everyone who takes part in this study will benefit. A benefit means that something good happens to you. We think these benefits might be **helping us knowing what is happening to Adherence and factors associated with adherence on type 1 diabetes care.**

When we are finished with this study we will write a report about what was learned. This report will not include your name or that you were in the study.

You do not have to be in this study if you do not want to be. If you decide to stop after we begin, that's okay too. Your parents/guardians know about the study too.

You have the right to ask questions about this research study and be answered by the researcher before, during or after the research. If you have any questions related to the study, at any time don't hesitate to contact the researcher UMUTONI UWASE Alphonsine, face to face or at email: ***wasso2020@yahoo.fr*** or by telephone at cell phone: **0788575332**

If you have any questions about your rights as a participants or conduct of this study that may have not been answered by the researcher, you may contact the Chairperson of the UR/CMHS IRB at phone number: **0788 490 522** and of the Deputy Chairperson phone number: **0783 340 040**.

If you decide, you want to be in this study, please sign your name.

I, _____, want to be in this research study.

_____ _____

(Sign your name here) (Date)

APPENDIX F. INFORMED CONSENT FORM (for parent/guardian)

I am UMUTONI UWASE Alphonsine;student in master's of Science in Nursing, department of General Nursing, Pediartric Track, school of nursing and midwifery in the college of medicine and health sciences/University of Rwanda. Under the supervision of Dr KATENDE Godfred and Mr NDATEBA Innocent, lecturers at college of medicine and health sciences, I am conducting a research dissertation on **"adherence and factors associated with adherence to Type 1 Diabetes Mellitus care among adolescents"** as partial fulfillment of my studies.

I am seeking your cooperation to participate in this study.

This study is important because it will help researchers learn more about adherence on diabetes care. With your permission, I kindly request you to give as much information as possible seek by responding to the questions in the questionnaire will be addressed to you.

There are no anticipated risks associated with this study. Your decision whether or not to participate in this study will not affect you at all.

The information you provide will be confidential and only used for the purpose of this research.

Your identity will not be disclosed in any published and written material resulting from the study.

The participation in this study is voluntary, I agree to participate in this study, and understand that I can decide at any time to stop my participation, I can ask questions later if I have them, or discuss any changes with me.

Date and Signature of Participant __/___/2018

APPENDIX G.QUESTIONNAIRE

QUESTION IN INGLISH

A. Child's Socio-demographic data

1. Date of Birth: _____
2. Age (years): _____
3. Gender:
   - ❖ Male
   - ❖ Female
4. Does child go to school?
   - ❖ Yes
   - ❖ No
5. Is in boding school area?
   - ❖ Yes
   - ❖ No
6. Type of Guardian:
   - ❖ Father
   - ❖ Mother
   - ❖ Both
   - ❖ other
7. If guardian is a parent:
   - ❖ Married
   - ❖ Separated
   - ❖ divorced
   - ❖ widow
8. Guardian's Occupation:
   - ❖ Have occupation
   - ❖ None occupation
9. Educational level of parent/guardian:
   - ❖ No formal Education
   - ❖ Primary

- ❖ Secondary
- ❖ others ,specify _____

10. Ubudehe category of Guardian:
    - ❖ category 1
    - ❖ category2
    - ❖ category 3
    - ❖ category4
11. insurance used
    - ❖ public health insurance
    - ❖ other, specify: _____

B. Variable on adherence and barriers

12.

Question	**Patient answers**		**Scores**
	Yes	**not**	
Did you sometimes forget to take medicine?			
Did you stop taking medicine more than 2 weeks?			
Did you ever changer treatment schedule?			
Did you sometime change treatment prescribed dose?			
Did you forget to respect glycemic control			
Did you some time forget to respect diet regim?			

13. Duration of medication: _____
14. Have you meet with complication?
    - ➢ Yes
    - ➢ No
15. Have you Co-morbidities diseases?
    - ➢ Yes
    - ➢ No
16. Which of the following important cause delayed respect of instructions from health care personnel?

a. Lack of family support
b. Lack of support from the school authority
c. Food insecurity
d. Anxiety
e. Cost of therapy
f. Fear of needle
g. Fear of discrimination
h. Overweight prevention
i. Others barriers(specify)

APPENDIX H. IBIBAZO MU KINYARWANDA

Ibintu bishobora gutuma umurwayi afata imiti neza

Ibimuranga

1. Itariki y'amavuko: _____
2. Imyaka: _____
3. Igitsina:
   - ❖ Gabo
   - ❖ Gore
4. Ariga?
   - ❖ Yego
   - ❖ Hoya
5. Yiga aba mu kigo?
   - ❖ Yego
   - ❖ Hoya
6. Isano afitanye n'umurwaza:
   - ❖ Papa
   - ❖ Mama
   - ❖ Mama na Papa
   - ❖ Abandi

7. Abarwaza niba ari ababyeyi be:
    - ❖ Babana byemewe n'amategeko
    - ❖ Batandukanye bidaciye mu mategeko
    - ❖ batandukanye byemewe namategeko
    - ❖ umupfakazi
8. Niba umurwaza afite akazi:
    - ❖ Afite akazi
    - ❖ Ntakazi afite
9. Niba umurwaza yarize:
    - ❖ Ntabwo yize
    - ❖ Yize amashuri abanza
    - ❖ Yize amashuri yisumbuye
    - ❖ ibindi _____
10. Ikiciro cy'ubudehe
    - ❖ Ikiciro cya1
    - ❖ Ikiciro cya 2
    - ❖ Ikiciro cya 3
    - ❖ Ikiciro cya4
11. Ubwishingizi bwo kwivuza
    - ❖ Ubwishingizi rusange
    - ❖ Ubundi bw'ishingizi: _____
12. Igihe amaze ku miti: _____
13. Niba apima isukari mu marazo mbere yo gufata imiti:
    - ❖ Yego
    - ❖ Hoya
14. **subiza yego cyangwa hoya**

ibibazo	**Ibisubizo by'umurwayi**		**amanota**
	Yego	**hoya**	
Hari igihe ujya wibagirwa gufata imiti?			
Wigeze guhagarika gufata imiti mu gihe kirenze ibyumweru			

bibiri?			
Wigeze uhindura gahunda yo gufata imiti?			
Wigeze uhindura igipimo k'imiti wandikiwe na muganga?			
Ujya upima ingano y'isukari ?			
Hari igihe wibagiwe kubahiriza imirire wagiriwemo inama na muganga?			

15. Muri ibi bikurikira niki gituma utubahiriza inama za muganga?

a) Kutitabwaho n'umuryango

b) Kutitabwaho n'ubuyobozi bw'ishuri

c) Kutarira igihe no kutabona ibikwiye

d) Guhorana agahinda

e) Guhenda kw'imiti

f) Gutinya urushinge

g) Kugira ubwoba bwo guhezwa n'abandi

h) Kwirinda ibiro byinshi

i) Izindi mpamvu

APPENDIX I. KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI

(Umunyeshuri)

Njyewe Alphonsine UMUTONI UWASE wiga mu kiciro cya gatatu cya kaminuza mu ishami ryiga ibijyane no gukurikirana abana muri Kaminuza y'u Rwanda nkaba nkurikiranwa na KATENDE Godfrey na NDATEBA Innocent bigisha muri iyo kaminuza bakaba banfasha mu bushakashatsi bugendanye no kureba uko abana bababana nindwara y'isukari mu mubiri bakunze kwita diyabete bafata neza imiti ndetse nikibafasha kuyifata neza ariyo mpamvu nsaba gufatanya namwe muri ubu bushakashatsi.

Ubu bushakashatsi ni ingirakamaro kuko buzamfasha kwiga neza uko iyi miti ifatwa. Nimubinyemerera muzampa amkuru ahagije twifashije ibibazo muzasubiza ku rupapuro nzabaha.

Nta ngaruka ubu bushakashatsi buzabagiraho ndetse ni myanzuro muzafata yose ntacyo izabahungabanyaho. Amakuru muzatanga azaba ari ibanga,intego yayo niyo gufasha gukorwa ububushakashatsi gusa. Ntabwo imyirondoro yanyu izajya ahagaragara ndetse no gufatanya muri ubu bushakashatsi ni ubushake.

Njyewe.....Nemeye gutanga amakuru muri ubu bushakashatsi,numvise kandi nemeye ko nshobora guhagarika ubufatanye mu gihe mbishatse nemerewe kubaza ikibazo cyose nagira cyangwa habayeho impinduka.

Italiki n'umukono __/___/2019

APPENDIX J. KWEMERA KUGIRA URUHARE MU BUSHAKASHATSI (Umubyeyi)

Ubushakashatsi:uko imiti ifatwa neza mu bana babana na diyabeti ndetse n'ibintu bibafasha kuyifata neza

Umushakashatsi:UMUTONI UWASE Alphonsine,umunyeshuri mu kiciro cya gatatu cya Kaminuza muri kaminuza y'u Rwanda mubijyanye no kwita ku bana.

Ndimo gukora ubushakashatsi mubijyanye nuko imiti ifatwa neza mu bana babana na diyabeti ndetse n'ibintu bibafasha kuyifata neza.ubu bushakashatse bugamije kureba neza uko imiti ifatwa neza.nuramuka ufashe umwanzuro wo gufatanya nanjye hari ahabugenewe uzashyira amazina ndetse n'umukono ukabanza ugasoma iminota mirongo itatu urupapuro rw'ibibazo mbere yo gusubiza.

Ntangaruka ubu bushakashatsi buzakugiraho.

Nta muntu uzakoresha aya makuru muzindi nyungu icyo agamije ni ukumenya neza uko iyi miti ifatwa neza ndetse nigisha mukuyifata neza.

Nyuma yubu bushakashatsi tuzakora inshamake yayo kandi hazagaragaramo amazina yawe.wemerewe guhagarika ubu bushakashatsi mu gihe ubishatse ndetse wemerewe no kubaza ikibazo cyose wagira yaba imbone nkubone mu nyandiko cyangwa kuri telefoni.

Mu gihe hari ikitashubijwe n'umushakashatsi wabaza uhagarariye ubushakashatsi muri kaminuza y'u Rwanda kuri iyi numero 0788 490 522

Njyewe……

Umukono…….