



**UNIVERSITY of
RWANDA**

SCHOOL OF PUBLIC HEALTH

FIELD EPIDEMIOLOGY AND LABORATORY TRAINING PROGRAMM

**Prevalence and factors associated with hypertension among HIV
positive patients on Antiretroviral therapy (ART)**

Case of Byumba District Hospital, 2018

A thesis submitted to the University of Rwanda in partial fulfilment of the requirements for the degree of Master of Science in Field Epidemiology and Laboratory Management.

By

Donatha UWANYIRIGIRA

Reg N^o: 217293166

Supervisor:

Associate Professor NZAYIRAMBAHO Manasse, PhD

August, 2019

ABSTRACT

Introduction

Hypertension is increasingly becoming a major public health challenge among HIV positive (HIV) people. Worldwide, 18.2 million people are on antiretroviral therapy and these antiretroviral therapies could be contributing to the increase of hypertension. The latest study done in Rwanda on hypertension in 2013 showed prevalence of 36.1% among civil servants and about 33% of them; were unaware that they live with hypertension. The aim of this study was to determine the prevalence and the factors associated with hypertension among HIV positive people on ART at Byumba District Hospital in 2018.

Methods

The study was a cross sectional one using primary data collected from HIV Patients on ART. The study was conducted on 406 people randomly selected among 669 HIV positive at Byumba District Hospital in 2018. Data was analyzed using SPSS V.16 and STATA. Descriptive statistics were generated, and then bivariate and multivariate analysis was done to determine the association between the factors associated with hypertension among HIV positive on ART. Odds ratios with a 95% confidence interval were calculated and statistical significance set at P-value <0.05.

Results

The result of the study showed that HIV positive on ART and Hypertension is a public health issue in Gicumbi District with 22.4% as the prevalence (approximately 1 in 5 people). Being older than 40 years old (OR=4.617, p=0.001); Smoking any tobacco products (OR=12.967, p=0.001), both Diabetic and Hypertension history in family (OR=12.064, p=0.001 and OR=4.300, p=0.049) and abnormal BMI ≥ 25 or BMI ≤ 18.5 compared to normal BMI (OR=2.545, p=0.001), were statistically significant associated with hypertension among HIV positive on ART.

Conclusion

The factors associated with hypertension among HIV positive on ART at Byumba District Hospital remains a public health challenge. The routine screening and Information Education Communication (IEC) to all health facilities (particularly for HIV patients) on different factors associated with hypertension which will help prevent or delay the hypertension onset.

Key words: Factors associated; Hypertension; HIV patients and ART

Table of Contents

ABSTRACT.....	i
Table of Contents.....	ii
List of Tables	iv
LIST OF ABBREVIATIONS AND ACRONYMS	v
Acknowledgements.....	vi
Dedication.....	vii
Declaration.....	viii
CHAPTER ONE: INTRODUCTION.....	1
1.0. Background.....	1
1.1 Problem statement.....	2
1.2 Study objectives	3
1.3 Research questions.....	3
1.4 Justification of the study.....	4
1.5 Scope of the study.....	4
CHAPTER TWO: LITERATURE REVIEW.....	5
2.1 Theoretical literature.....	5
2.1.1 Definition.....	5
2.1.2 Classification of hypertension.....	6
2.1.3 Most common risk factors associated with development of hypertension	6
2.1.4 Characteristics of risk factors of hypertension.....	7
2.1.5 Prevention of hypertension	7
2.1.6 Interactions between HIV and hypertension.....	7
2.1.7 Evidence of increased hypertension risk among people living with HIV on ART	8
2.1.8 Main Risk factors in relation to hypertension.....	8
2.2 Other related studies	9
2.3 Conceptual framework.....	11
CHAPTER THREE: METHODOLOGY	12
3.1 Study design.....	12
3.2 Research setting	12
3.3 Study Population.....	12
3.4 Sampling.....	12

3.4.1 Study sample	12
3.4.2 Inclusion criteria	13
3.4.3 Exclusion criteria	13
3.5 Sampling procedures and strategy	13
3.6 Data collection and different variable	13
3.7 Data collection process	14
3.8 Data analysis	15
3.9 Ethical consideration.....	16
3.10 Data dissemination.....	16
CHAPTER FOUR: RESULTS	17
4.1. Social-demographic characteristics of HIV positive patients on ART	17
4.2. Prevalence of hypertension among HIV positive patients on ART	18
4.3 Factors associated with hypertension among HIV positive on ART	20
4.3.1 Bivariate analysis	20
4.3.2 Multivariate logistic regression.....	21
CHAPTER FIVE: DISCUSSION.....	22
Study Limitations.....	24
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS	25
6.1 Conclusions.....	25
6.2 Recommendations.....	25
REFERENCES	26
APPENDICES	I
Appendix I. Data collection and analysis plan.....	I
Appendix II. Informed consent documents (English).....	II
Appendix III. Questionnaire (English)	III
Umugereka IV: KWEMERA KWINJIRA MUBUSHAKASHATSI (Ikinyarwanda)	VII
Umugereka V. Ibibazo by'ubushakashatsi	VIII
Appendix VI. IRB Approval letter.....	XII
Appendix VII. Byumba District Hospital Approval letter.....	XIV
Appendix VIII. DRI Plagiarism Approval.....	XV

List of Tables

Table 1: Social-demographic characteristics of HIV positive patients on ART.....	17
Table 2: Prevalence of hypertension by selected characteristics	18
Table 3: Bivariate analysis for association between variables and hypertension	20
Table 4: Multivariate analysis for association between variables and hypertension	21

LIST OF ABBREVIATIONS AND ACRONYMS

AIDS: Acquired Immunodeficiency Syndrome

ART: Antiretroviral-Therapy

BMI: Body Mass Index

BP: Blood Pressure

CD4: T-Cell Count

CI: Confidence Interval

CMHS: College of Medicine and Health Sciences

CVD: Cardio-Vascular Disease

DBP: Diastolic Blood Pressure

FELTP: Field Epidemiology laboratory training programme

HIV: Human Infectious Virus

HTN: Hypertension

JNC: Joint National Committee

NCDs: Non-Communicable Diseases

NCEP: National Cholesterol Education Program

OR: Odd Ratio

PLHIV: People Living with HIV

RBC: Rwanda Biomedical Center

SBP: Systolic Blood Pressure

SPH: School of Public Health

SPSS: Statistical Package for Social Sciences

UR: University of Rwanda

WHO: World Health Organization

Acknowledgements

The success of this work was the shared efforts of many people in both materials and moral, and we sincerely acknowledge them for their considerable support. Some of them deserve special thanks.

We have a great pleasure to express our wholehearted deep sense of gratitude to our FELTP management team; mostly senior collaborators:

- Associate professor NZAYIRAMBAHO Manasse/Supervisor
- Dr. MWIKARAGO Ivan/Mentor
- Dr. Omolo Jered/FELTP-CDC Advisor
- Mrs. KINANI Peace/FELTP Program Manager
- UZABAKIRIHO Innocent/Statistician at BYUMBA DH
- Lastly, we address our thanks to the Government of Rwanda for its considerable support for promoting education in different domains and set of the FELTP.

We wish you all the best and be blessed!

Dedication

The thesis is dedicated to my loving husband; Etienne NTAWIHEBA for his continuous unconditional love and understanding. The thesis is also dedicated to my children: IRAGUHA Patrick, NIYONZIMA Janvier, NIYONIZEYE Diane and NIYOBYOSE Nadine, relatives and friends for their encouragement and support. May Almighty God bless all of them and bring a hundredfold return.

Declaration

I hereby declare that this project: “**Prevalence and factors associated with hypertension among HIV positive patients on Antiretroviral therapy (ART)**”; Case of Byumba District Hospital, 2018; is a submitted thesis as my originality and has not been submitted previously elsewhere. Also, I declare that a list of complete references is provided for indicating all information sources that were quoted or cited.

Donatha UWANYIRIGIRA

.....

a. *Authorization to Submit the Thesis*

Supervisor: **Associate Professor NZAYIRAMBAHO Manasse, PHD**

In my competence as this student’s Supervisor; I do hereby authorize her to submit the thesis.

Date and Signature:

.....

CHAPTER ONE: INTRODUCTION

1.0. Background

HIV is a worldwide scenario that has led to a bigger incidence of hypertension. In June 2016, more than 18.2 million people had access to antiretroviral therapy and these antiretroviral therapies were linked to hypertension. These HIV infected patients had complications, including: vasculopathy, renal failure and stroke. Those related diseases led to 30% of deaths worldwide as hypertension was a poorly controlled attribute(1).

There were about 34 million people in 2017 infected with HIV (PLWH). The antiretroviral therapy (ART) results have increased the survivorship of people living with HIV (PLWH). With the increase in longevity of life, many of PLWH are challenged by other related colonic diseases. Among these diseases, hypertension is of particular significance, as ART may boost hypertension risks. Studies also indicated that HIV patients on ART were more likely to reduce the level of lipoprotein density cholesterol, and this increases hypertension risks(2).

Studies have indicated that once uncommon in routine African social orders, hypertension is rapidly becoming a noteworthy general medical problem. As individuals move from countryside to urban zones has hypertension has become a scourge and it has become "the burden for economic progress". The risk factors noted as associated with hypertension in many studies includes obesity, smoking, lower physical action and higher liquor utilization. All these things described have lowered life expectancy and its associated lifestyles changes as well the economic progress in developing countries(3).

Antiretroviral therapy (ART) boosts Non Communicable Diseases (cerebral-vascular and cardiovascular). Many adult HIV patients in sub-Saharan African countries have hypertension. Hypertension is a major threat that leads to these said non-communicable diseases (NCDs) and is a major cause of mortality and morbidity among people living with HIV(5),(6).

Hypertension among HIV positive people increases when they take ART because ART immediately affects the break of the endothelial vessels which are known to generate biological markers that control blood pressure known as hypertension. Given that antiretroviral exposure rates increase worldwide as many people for the most part are young, and adults live with HIV

globally. This ART-related change to blood pressure may signify considerable risk to HIV negative health(7).

As global economic development increases, the occurrence of obesity, consumption of alcohol and tobacco as well as physical inactivity also increases according to the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC 7). One of the most important ways to maintain or lower blood pressure in hypertension patients is to control their way of living in a healthy manner(8).

In general, African countries have people with a low level of alertness to hypertension. Due to this, the management and control of hypertension is low. This means that many people are naive of their hypertension status. Rwanda is among those countries in development transition that are concerned with hypertension epidemiology.

Hypertension is acknowledged as main cause of cardio-vascular disease (CVD). In Rwandan population in 2013, CVD prevalence was 36.1% among workers, and about 33% of them were unaware that they live with hypertension.

1.1 Problem statement

HIV infection has been aligned with indices of subclinical atherosclerosis, such as measures of endothelial dysfunction; increased arterial stiffness and atherosclerotic progression. This leads people to be at higher risk for hypertension along with other hypertension risk factors such as: age greater than 45 years, masculinity, smoking tobacco, consuming wine, obesity, diabetes, inactive lifestyle and hypertension in family history. Moreover, HIV infected individuals have increased relative risk of hypertension and deaths by cardio-vascular disease(10).

One of the major diseases that causes death and choked the world is cardiovascular disease (CVD) as identified by International Federation of Pharmaceutical Manufacturers & Associations (IFPMA) heart disease where about 80.5% of deaths are due to poor or weak community health systems. About US\$510 billion is annually lost related to management of non-communicable NCDs. Half of all NCDs deaths in 2012 was 17.6 million people was due to hypertension; i.e. there is impact of hypertension complications(11). Globally, hypertension

belongs in the top 10 major factors for death and principally contributes to CVD. As known, over 45% of diabetic people are frequently dying due to complications of hypertension(4).

Most mortality for Sub-Saharan African countries is caused by communicable diseases. The WHO estimates that NCDs (Non-Communicable Diseases) will increase and lead to 46% for all deaths by 2030. Many studies have found that NCDs are highly caused by hypertension which increases the occurrence of diabetes which can lead to stroke and ischemic heart diseases. Whereas, 16.2% of people in sub-Saharan Africa have hypertension are mostly comprised of HIV-positive patients. In Rwanda, the current documented hypertension status in the beginning of 2018/the last trimester of 2017, was 15.6% based on the adjusted estimate at national level, most of whom are older than 40 years old (12)(13).

Rwanda's non communicable disease risk factors are reported from a survey conducted in November 2012 to March 2013. The survey showed that some of the participants were within unhealthy weight range. Blood pressure was measured prior to the survey and around 15.0% of participants had raised hypertension and critical prevalence increased to 40% for those in the 55-64 year range(14).

1.2 Study objectives

General objective:

This study aimed to determine the prevalence and factors associated with hypertension among HIV patients on ART at Byumba District Hospital.

Specific objectives:

1. Describe Social-demographic characteristics of HIV positive patients on ART,
2. Determine hypertension prevalence among HIV positive patients on ART,
3. Determine factors associated with hypertension among HIV positive patients on ART.

1.3 Research questions

1. What are the Social-demographic characteristics of HIV positive patients on ART?
2. What is the prevalence of hypertension among HIV positive patients on ART?
3. What are the factors associated with hypertension among HIV positive patients on ART?

1.4 Justification of the study

In Rwanda uncontrolled hypertension, even among non HIV infected people, is a leading risk factor that affects complications such as cardio vascular diseases, heart failure and stroke is a significant cause of morbidity and mortality. Consequently, the initiation and utilization of antiretroviral therapy to HIV patients has increased, and in general for all hypertension has increased. More recent reports suggest that hypertension is increasingly noted among HIV infected patients. Since hypertension is an infamous threat among factors for cardiovascular disease, understanding its presence among PLWH is important for this study. In addition, there is no particular study carried out to determine the hypertension prevalence and its associated factors, specifically in Gicumbi District among HIV patients on ART. The reason why the hypertension prevalence in HIV patients on ART is not well-known is because hypertension screening and treatment is very limited in Gicumbi District. We conducted a study to determine the socio demographic data of the patients and some lifestyle and clinical/medical history factors associated with hypertension in Gicumbi District. The purpose of this study is to fill the researchers' gaps in Rwanda and in Gicumbi District particularly.

1.5 Scope of the study

The research was conducted in 2019 at Byumba District Hospital in Gicumbi district, Northern Province, Rwanda, on HIV positive patients on ART in 2018. Byumba District Hospital was chosen as case study due to the ART service offered to more than 600 HIV positive patients.

CHAPTER TWO: LITERATURE REVIEW

2.1 Theoretical literature

Hypertension (HTN), otherwise called Blood pressure (BP), effects a large number of individuals. Hypertension is characterized as BP \geq 140/90 millimetres of mercury (mmHg). The increase of hypertension is very significant and critical in many developing counties, especially in Africa. For those younger than 45 years of age, hypertension is more prevalent in men than women. For those of 65 years of age or more, hypertension has more prevalence in women than men. It is anticipated that by 2025 almost seventy five percent of individuals in developing countries will have hypertension (having raised pulse for example systolic blood pressure of $>$ 140) and additionally diastolic blood pressure of $>$ 90(15)(16).

2.1.1 Definition

2.1.1.1 Hypertension

Hypertension, or high blood pressure, is characterised as a pulse circulatory/systolic pressure at 140mmHg or more, 90mmHg with diastolic blood pressure. The greatest concern of high blood pressure is that it makes the heart have to work much harder than normal to push blood throughout the entire body. High blood pressure was represented by the commonness back to 2016 of HTN where 7.3% of people with HTN are between 18–39 years old whereas 32.4% of people with HTN are between 40–59 years old and 65% of people with HTN are more than 59 years old(16)(9)(17).

2.1.1.2 HIV

The human immunological virus (HIV) is one of the most fascinating and difficult viruses to ever exist. Evidence suggests that HIV 1st originated on the African continent around 1920–30 as a result of cross-species infection of humans by simian (ape and monkey) viruses. The US became aware that HIV causes anon-inheritable immune deficiency syndrome (AIDS) in 1981. HIV infects helper CD4 T-cells of the system and is the cause of their continued decline in numbers. Scientifically, HIV is an enigmatic challenge that's being deciphered, molecule by molecule, as scientists seek for any sort of immunization or cure. Sociologically, HIV

causes concerns and typically stigma; however is currently not a death condemnation, because it can be manageable for years with antiviral medications. However, around 1.5 million people around the world die every year from HIV/AIDS and this has become the sixth most common reason for death worldwide(18).

2.1.1.3 Other derivative definition

Body mass index (BMI) is the adjusted height and weight measurement, calculated as weight in kilograms divided by the square of height in meters (kg/m^2), also known as body fitness or fatness. Weight and height are measured and classified as low at <18.5 ; normal between 18.5-24.9; overweight between 25.0-29.9 and obese at $>30\text{kg}/\text{m}^2$ (10).

2.1.2 Classification of hypertension

The JNC 7 regulations grouped pulse/HTN as: ordinary (Systolic Blood Pressure (SBP) under 120 mm Hg and Diastolic Blood Pressure (DBP) under 80mmHg), pre-HTN (SBP 120–139mmHg or DBP 80–89mmHg), stage 1 HTN (SBP 140–159 mm Hg or DBP 90–99 mm Hg) and stage 2 HTN (SBP 160mmHg or higher or DBP 100 mmHg or higher)(19).

2.1.3 Most common risk factors associated with development of hypertension

An investigation done by Eduardo Rodriguez et al in Tanzania (2017) showed the factors for hypertension among HIV patients is due to numerous factors such as age, diet, BMI, presented to Workmanship, liquor utilization and being on ART. Those not exposed to ART had lower incident of hypertension(6).

Truth be told, the Rwanda NCDs overview results demonstrate that men are 34% bound to have hypertension contrasted with women. Numerous investigations have shown that as people's age increases, their risk for hypertension also increases. Weight record and height (BMI) is also used to predict some of the elements related with hypertension. In any case, the degree of awareness about the sickness is low and the NCDs study noted that: age, overweight and corpulence, liquor utilization, habitation in urban regions and being on ART as the risk elements related with hypertension(14)(15).

2.1.4 Characteristics of risk factors of hypertension

The greater part of the risk factors is modifiable in relation to hypertension and many are preventable. Such risk variables including organic (however this hazard elements were hard to director), natural, social, tobacco use, high liquor or alcohol utilization, overweight, heaviness, low physical movement, hyper glycaemia, urbanization and undesirable nourishment. The in danger gathering are old organization directors, college representatives, senior government authorities, particularly those living and working in urban areas. Gatherings at high chance for hypertension are the same include these: a family history of hypertension, African or American black, overweight or stoutness, a stationary way of life, abundance admission of dietary sodium as well as inadequate admission of potassium, or potentially overabundance utilization of alcohol(4)(20)(21).

2.1.5 Prevention of hypertension

Hypertension is extremely preventable by go well together application of ways that concentrate on the overall population and people and teams at higher risk for high blood pressure. Providing public health education on food to be provided for each meal, providing enticing, safe, and convenient opportunities for exercise are ideal population-based approaches for reduction of high blood pressure within the community. Whereas enhancing access to acceptable facilities (parks, walking trails, bike paths) and to effective behaviour amendment models may be a helpful strategy for increasing physical activity within the population (20).

2.1.6 Interactions between HIV and hypertension

HIV influences both the epidemiology and the clinical features of many infectious diseases, malignancies and other illnesses (e.g. renal disease). In HIV-infected patients, immunodeficiency increases the risk that atypical (opportunistic) pathogens those result in clinical illness. In addition, HIV-infected patients frequently present with multiple pathologic processes all together lead to make decisions regarding empiric treatment very challenging these as noted lead to hypertension by default. Individuals infected with human immunodeficiency virus (HIV) have a higher risk of hypertension as the study on the prevalence and determinants of hyper-tension in HIV infected patients compared with appropriate HIV-negative controls give the results suggested that changes in body composition, including both stomach stoutness/obesity and

stavudine actuated fringe lip decay, may add to the higher pervasiveness of hypertension in HIV-infected patients(14)(22).

2.1.7 Evidence of increased hypertension risk among people living with HIV on ART

The relationship between grade of hypertension and factors associated with human and HIV infection is poorly documented. In any case, patients with AIDS present a higher degree of hypertension than non-AIDS patients as hypertension associated with HIV seems with a cytokine-related incitement and multiplication of endothelium where Abnormal amounts of cytokines present in HIV patients and this can favour hypertension (pulmonary), from role of a host response to HIV that determined by one or more forms of immune complex disease associated with circulating immune complexes containing HIV antibodies subtypes that suspected to upgrade high cytokine generation levels(18).

2.1.8 Main Risk factors in relation to hypertension

2.1.8.1 Alcohol drinking and hypertension

Alcohol or liquor abuse is well known as the deleterious effect on liver, heart, pancreas, hypertension and other organism systems. The side effects of alcohol drinking on hypertension are depending on occasion of taking it; especially heavy drinking of alcohol has long been associated with augmented hypertension and a concrete association linking alcohol drinking, hypertension levels (both primary and secondary) and the prevalence of hypertension in population has been reported and it is more evident independently from variety of drink, whether red wine, white wine, beer or liquor at once(3).

2.1.8.2 Smoking and hypertension

The relationship of hypertension and smoking has been uncertain even though a few analysts have observed smoking to be a risk factor for hypertension (3). Different specialists have not discovered any relationship among smoking and hypertension. Indeed few of the analysts have announced lower circulatory strain levels in smokers than in non-smokers. In an across the country study including 33,860 people had the option to demonstrate a positive relationship among smoking and hypertension. In this study, this association was just seen in more men matured 45 years or more and

not in more youthful men or ladies. They along these lines inferred that autonomous ceaseless impact of smoking on hypertension is little(23).

2.1.8.3 Diabetes and Hypertension

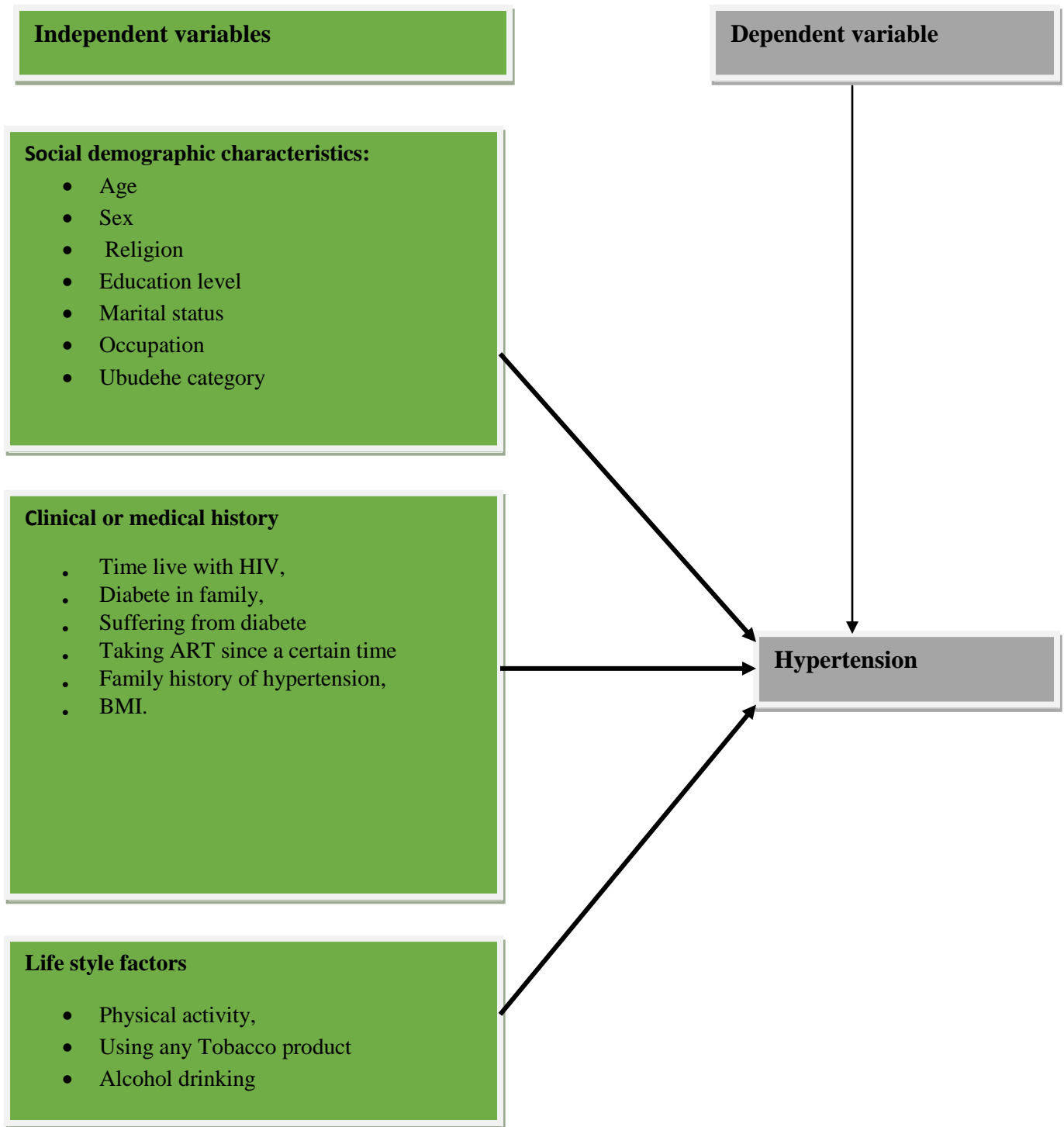
Diabetes and hypertension are probably going to occur together in light of the fact that they share certain physiological characters as hypertension is an unsafe infection that turns out to be considerably increasingly convoluted in the circumstance of diabetes. Tragically, numerous individuals with diabetes are additionally assaulted by hypertension while Hypertension (characterized as a blood pressure $\geq 140/90$ mmHg) is an amazingly regular condition in diabetes, as it may affecting about 60% of patients with diabetes, contingent upon heftiness, lifestyle, and age just as it very well may be brought about by heredity, diet and even working on pressure(24).

2.2 Other related studies

As per the across the nation STEPs review/study done in Malawi, the national burden of hypertension was 33% high in more than 60 years old. 94% of these hypertensive people are either not taking drug of hypertensive prescription or are basically uninformed that they have hypertension (undiscovered hypertension). While as restricted information exists, the burden of hypertension in Malawi among individuals living with HIV has all the earmarks of being hypertensive as high as the overall public. One mall research (N=174) from Blantyre assessed that 46% of individuals living with HIV had raised hypertension and other cardiovascular risk factors. Indeed, even STEPs review presume that in Malawi regularly, hypertension among individuals living with HIV is undiscovered and along these lines left untreated(25).

A research directed as a systematic and meta-investigation to test the impacts of ART on pulse levels and hypertension chance among HIV-contaminated population around the world, Patients with HIV-related sicknesses may create ventricular systolic brokenness both as a result of HIV-related maladies cause movement of the myocardial contribution from the HIV disease itself and attributable to antiretroviral sedate actuated endothelial brokenness, HIV-tainted patients on antiretroviral treatment (ART) may have raised circulatory strain as study speculation was affirmed and demonstrated that the introduction to ART is essentially connected with expanded systolic and diastolic circulatory strain levels, and expanded danger of hypertension, paying little heed to think about level socio-statistic differences(26).

Family parentage and hypertension research were directed with the utilization or eating vegetables and level of physical movement where related with the nearness of the metabolic attributes, BMI > 25, high waist circumference (NCEP criteria), level of cholesterol > 200 mg/dL, blood glucose levels > 100 mg/dL and the exhibited outcomes by multivariate strategic regression demonstrate that for age > 40 years Odd Ratio equivalent to 3.01, male sex Odd Ratio equivalent 1.8 and weight file >25 Odd Ratio equivalent 5.51 as freely and essentially connected with hypertension. As the study end, hypertension was related with variables, for example, age > 40 years, BMI >25 and male sex. Thusly, the control of the reversible variables related with hypertension, especially the fortification of dietary counsel direction and anticipation of over the top weight gain, may speak to a significant development in the avoidance of cardiovascular morbidity those include hypertension(19).



2.3 Conceptual framework

CHAPTER THREE: METHODOLOGY

3.1 Study design

A cross sectional study was conducted using primary data collected from HIV Patients on ART at Byumba District Hospital in Gicumbi District in 2018. It was descriptive as well as analytical study using quantitative methods.

3.2 Research setting

The study was conducted at Byumba District Hospital in Gicumbi District whereas this District is located in Northern Province of Rwanda. Byumba District Hospital has 25 health centers; this District Hospital has a population of 428,203 dispatched into 21 administrative Sectors. Community health workers are 1,922 including 638 in charge of maternal health (ASMs) and 1,284 in charge of child community case monitoring and management (Binomes).

3.3 Study Population

This study concerned with all HIV patients treated Byumba District Hospital. Data was collected using both questionnaire and hypertension & BMI screening.

3.4 Sampling

3.4.1 Study sample

A sample is subset of population elements. The HIV patients on ART at Byumba District Hospital in Gicumbi District who meet the inclusion criteria and accept voluntarily to participate were enrolled in the study. During this study the researcher used Kish Leslie's formula to calculate the sample size(27).

The sample size was calculated as:

$$n = \frac{(z_{1-\alpha/2})^2 p(1-p)}{d^2}$$
$$= \frac{1.96^2 0.50(0.50)}{0.05^2} = 384.16 \approx 384$$

z= standard error from the mean corresponding to 95% confidence interval which is 1.96
p=hypertension prevalence among HIV positive on ART and it is 0.50 because this prevalence is not known at Byumba District hospital.

d=the study margin error (0.05)

The sample size includes 384 HIV positive on ART at Byumba District Hospital in Gicumbi District. Adding 5% of possible non response, then the final sample size become 406; these were selected randomly from all 669 HIV positive on ART as treated at Byumba District Hospital.

3.4.2 Inclusion criteria

To be HIV patient on ART at Byumba District Hospital, present the day of data collection and to accept voluntarily to participate to the study.

3.4.3 Exclusion criteria

Not being a HIV patient on ART at Byumba District Hospital, being absent the day of data collection or to refuse to voluntarily participate to the study.

3.5 Sampling procedures and strategy

Generally; sampling is defined as the process of selecting a proportion to represent the entire population and random sampling was used. As we have 669 HIV positive in total, the researcher proceeded to chose 406 by assigning a number to each patient, then write these numbers on pieces of papers, put them into a basket and then picked randomly one by one (without replacement) until we have reached 406.

3.6 Data collection and different variable

Data were collected using structured questionnaire with multiple choices and closed ended question.

3.6.1 Independent variables:

Socio-demographic characteristic:

- Age
- Sex
- Religion
- Education level
- Marital status

- Occupation
- Ubudehe category

Clinical history:

- Time live with HIV,
- Diabetes in family,
- Suffering from diabetes
- Under ART since a certain time
- Family history of hypertension,
- BMI.

Life style:

- Physical activity
- Tobacco use
- Alcohol use

3.6.2 Dependent variables:

- Having hypertension

The questionnaire was designed in English and translated into Kinyarwanda version questionnaires administered by trained data collectors. Three clinicians were trained to facilitate data collection and performed all data needed to calculate BMI and hypertension. All data extracted were recorded on excel sheet.

3.7 Data collection process

The researcher trained data collectors/ three clinicians before data collection start. The researcher ensured that the questionnaire is reliable and valid by performing pilot study with 20 participants HIV positive on ART at Byumba Health Center as this is near the Hospital and these individuals share almost of characteristics with HIV positive on ART at Byumba District Hospital which is the case study. Any person selected randomly to be part of our sample who refused to be part of the study was replaced by other. Data collection was conducted in January - March, 2019 and each participant signed informed consent form to participate in the study.

3.8 Data analysis

The data from the field was entered into an excel sheet and analyzed using SPSS V.16.0 and STATA; these two software were used to measure dependent and independent variable.

The dependent variable is hypertension status (having hypertension according to the definition or not having hypertension).

Independent variables are:

- a) **Age:** Age of participants are categorized in two group less than 40 and greater than 41 and the age group categories less than 40 years old was considered as reference.
- b) **Sex:** Sex of the participant, a dichotomous variable: female or male.
- c) **Religion:** Religion was grouped into 3 categories: Christian, Muslim, none.
- d) **Education Level:** None, primary, secondary, tertiary.
- e) **Marital status** was categorized into 6 groups: single, married, divorced, widower, separated, cohabiting.
- f) **Occupation** was grouped into 4 categories: None, Business, Civil servant, farmer.
- g) **Ubudehe category** was grouped into 3 categories: the poorest are in ubudehe category I. the second in ubudehe category II and third in ubudehe category III(28).
- h) **Time living with HIV:** was grouped into 2 categories less than one year and more than one year.
- i) **Having diabetic in family:** a dichotomous variable (Yes or No)
- j) **Suffering from diabetes:** a dichotomous variable (Yes or No).
- k) **ART taken since a certain time:** was grouped into 2 categories less than one year and more than one year.
- l) **Family history of hypertension:** (Yes or No).
- m) **BMI:** was grouped into 2 categories (normal and abnormal)
- n) **Physical activity:** (Yes or No)
- o) **Tobacco use:** (Yes or No)
- p) **Alcohol use :**(Yes or No)

Descriptive statistics were used to summarize, organize sample characteristics, describe research variables and document response rate where frequency tables were presented. Cross tabulations, proportions with Chi-square tests between independent and dependent variables were performed. Chi-Square was also used to determine the association between hypertension

and identified associated risk factors. The Chi-square test help us to decide whether a difference or a consistency in proportions about findings is likely to reflect a real effect or only due to chance instabilities. The findings were presented in the form of tables.

The univariate descriptive analysis was performed for socio demographic characteristics variables to determine frequencies, proportion at 95% confidence interval. The univariate data such as socio demographic variables were presented using frequency distribution in the table 1. A bivariate analysis was computed for all independent variables, performing the odds ratio at p-value < 0.05 to determine the association of hypertension with identified risk factors. The significance of the findings were set at 95 % confidence interval and p-value <0.05 %. Multivariate analysis was used to analyze the hypertension associated factors.

3.9 Ethical consideration

Approval to conduct this study was obtained from the University of Rwanda, College of Medicine (Approval Notice: No 378/CMHS IRB /2018) and Health Sciences and from Byumba District Hospital. The head of ARV service at Byumba District Hospital was informed about this study before collecting data. The informed consent was given to the participants with a verbal explanation by their trusted witnesses for those who cannot read where participants were informed about their right to withdraw, reject or stop any time, if they have no willingness to continue. The questionnaire contains participants' code instead of their names and all contributors in the study were ensured of anonymity and confidentiality. They also assured that the results will be purely used for research purposes. Data collected was stored in computer with password to ensure confidentiality and questionnaires in a locked cupboard for minimizing access to them.

3.10 Data dissemination

The study findings have to be submitted and presented to the department of Field Epidemiology and Laboratory Training Program (FLTP), College of Medicine and Health Sciences, University of Rwanda and finally to Byumba District Hospital as well as to others interested and concerned institution/Program.

CHAPTER FOUR: RESULTS

4.1. Social-demographic characteristics of HIV positive patients on ART

Table 1 show that the majority of participants were aged ≤ 40 Years Old (50.5%) while their Occupation were Farmers were at 75.4% , Christian (84.5%) and 67.7% have primary education, and 49% were in Ubudehe category II.

The Social-demographic characteristics of 406 HIV positive patients on ART were presented in the table1below:

Table 1: Social-demographic characteristics of HIV positive patients on ART

Variable	Frequency(n = 406)	Proportion
<i>Variables</i>		
Sex		
Male	194	47.8
Female	212	52.2
Age		
≤ 40 Years Old	205	50.5
≥ 41 Years Old	201	49.5
Occupation		
None	25	6.2
Business	67	16.5
Civil servant	8	2
Farmer	306	75.4
Religion		
Christian	343	84.5
Muslim	23	5.7
None	40	9.9
Marital status		
Single	65	16
Married	231	56.9
Divorced	12	3
Widowed	41	10.1
Separated	9	2.2
Co habiting	48	11.8
Education level		
None	37	9.1
Primary	275	67.7
Secondary	85	20.9
Tertiary	9	2.2
Ubudehe Category		
I	111	27.3
II	199	49
III	96	23.6

4.2. Prevalence of hypertension among HIV positive patients on ART

The table 2 present show the prevalence of hypertension among HIV positive patients on ART where the following variables to be analysed according to the objective of the study and those are Age group (≤ 40 Years Old and ≥ 41 Years Old), Alcoholic use, using any tobacco products, Diabetes in family, Suffering from diabetes, Family history of hypertension and BMI (normal and abnormal).

Table 2: Prevalence of hypertension by selected characteristics

Independent variable	N(406)	Hypertension	
		Yes	
Social demographic characteristics			
	Frequency	Frequency	%
Sex			
Male	194	48	24.7
Female	212	43	20.3
Age			
≤ 40 Years Old	205	26	12.7
≥ 41 Years Old	201	65	32.3
Occupation			
None	25	6	24.0
Business	67	18	26.9
Civil servant	8	1	12.5
Farmer	306	66	21.5
Religion			
None	40	11	27.5
Christian	343	76	22.1
Muslim	23	4	17.3
Marital status			
Single	65	15	23.0
Married	231	52	22.5
Divorced	12	4	33.3
Widowed	41	11	26.8
Separated	9	1	11.1
Co habiting	48	8	16.6
Education level			
None	37	6	16.2
Primary	275	63	22.9
Secondary	85	21	24.7
Tertiary	9	1	11.1
Ubudehe Category			
I	111	29	26.1

II	199	45	22.6
III	96	17	17.7
Life style			
Alcoholic drinking			
No	260	44	16.9
Yes	146	47	32.9
Using any tobacco products			
No	376	69	18.3
Yes	30	22	73.3
Physical activity			
No	116	26	22.4
Yes	290	65	24.4
Clinical or medical history			
Diabetic in Family			
No	393	82	20.8
Yes	13	9	69.2
Suffering from diabetes			
No	400	86	21.2
Yes	6	5	83.3
Family history of hypertension			
No	395	85	21.5
Yes	11	6	54.5
Time live with HIV			
Less than 1 year	133	33	24.8
More than 1 year	273	58	21.2
Time under ART			
Less than 1 year	132	32	24.2
More than 1 year	274	59	21.5
BMI			
Normal(between 18.6-24.9)	232	40	17.2
Abnormal(≥ 25 and ≤ 18.5)	174	51	29.3

4.3 Factors associated with hypertension among HIV positive on ART

4.3.1 Bivariate analysis

Table 3 shows the bivariate analysis of the factors associated with hypertension among the HIV positive people on ART in Byumba. The factors included age 41 years and above, alcohol drinking, using tobacco products, having a diabetic or hypertensive in the family, being a diabetic and having abnormal BMI.

Table 3: Bivariate analysis for association between variables and hypertension

Variables in the Equation	OR(95%CI)	p value
Age grouped		
≤40 Years Old	1	
≥41 Years Old	3.3(1.98-5.46)	.001
Alcohol drinking		
No	1	
Yes	2.33(1.45-3.75)	.001
Using any tobacco products		
No	1	
Yes	12.24(5.23-28.63)	.001
Diabetic in Family		
No	1	
Yes	4.3(1.3-14.69)	.001
Suffering from diabetes		
No	1	
Yes	18.26(2.1-158.34)	.008
Family history of hypertension		
No	1	
Yes	8.53(2.56-28.41)	.017
BMI Results		
Normal(between 18.6-24.9)	1	
Abnormal(≥25 and ≤18.5)	2.0(1.24-3.20)	.004

4.3.2 Multivariate logistic regression

The results from the assumptions tests that have carried out; the results from the bivariate analysis in the table 3; was assumed by including which of the predictor variables these were statistically significant and with predictions that can be made based on the use of odds ratios with Multivariate Model.

Consuming an alcoholic drink and Suffering from diabetes had no explained association as they were with p-value >0.05 in the table 4 bellow:

Table 4: Multivariate analysis for association between variables and hypertension

Variables in the Equation	OR(95%CI)	p value
Age grouped		
≤40 Years Old	1	
≥41 Years Old	4.617 (2.495-8.543)	0.001
Alcoholic drinking		
No	1	
Yes	1.17(0.63-2.16)	0.604
Using any tobacco products		
No	1	
Yes	12.967(4.758-35.339)	0.001
Diabetic in Family		
No	1	
Yes	12.064(2.716-53.577)	0.001
Suffering from diabetes		
No	1	
Yes	6.59(0.57-75.17)	0.112
Family history of hypertension		
No	1	
Yes	4.300(1.001-18.484)	0.049
BMI Results		
Normal(between 18.6-24.9)	1	
Abnormal(≥25 and ≤18.5)	2.545 (1.456- 4.449)	0.001

CHAPTER FIVE: DISCUSSION

This study determined prevalence and factors associated with hypertension among HIV positive patient on ART

The study findings show that the prevalence of Hypertension is 22.4 among HIV positive patients on ART at Byumba District Hospital in 2018. Among 194 men responded 48(24.7%) had hypertension and female 212 responded 43(20.3%) had hypertension. Group age less than 40 among 205 responded 26(12.7%) had hypertension and great than 41 year old among 201 responded 65(32.3%) had hypertension. Those results are comparable at the level similar to other research done regarding the prevalence of hypertension among HIV positive patient in Florida, Uganda (2)(5).

Survey conducted in November 2012 to March 2013 showed that some of participants were within unhealthy weight range where blood pressure was measured prior to the survey and around 15.0% of participants had raised hypertension according to MoH Rwanda Non communicable: Risk, Factors Diseases 2015 Report(14). The hypertensive was high to 40 years older (p-value=0.001) with the risk of hypertension increasing with advanced age. These findings are in agreement with those of several other researchers such as one of Nahimana M.et.al.(2017) and Mcconnell et.al(2016) those have found increasing age to be a risk factor for hypertension in HIV infected patients. BMI Resulted equal 0.005 with 9.9% for Normal weight and 12.6% for Low and Over weigh & Obese among hypertensive people; hypertension was increased taking into consideration age group as 7.3% with HTN are people aged 18–39 while 32.4% with HTN are people aged 40–59 and 65% with HTN are those older than 59 years(16)(9). When different ages were analyzed for the cut-off age, the age of ≥ 40 years was found to be significantly associated with hypertension (OR: 4.617; 95% CI: 2.495-8.543; p-value=0.001). This means that people who were 41 years or older were more likely four times to be hypertensive than those who were younger as other researchers who have also found significant increase in blood pressure from the age of 40 years as by Banyangiriki J.et.al.(2013) and Olin BR et. al.(2018)(4)(20).

The association of smoking tobacco products and hypertension has been controversial by the study was found to be significantly associated with hypertension (OR: 12.967; 95% CI: 4.758-

35.339; p-value=0.001). This means that people who smoke were more than twelve times more likely to be hypertensive than those who did not smoke. Although some researchers such as Cadth(2013) and Mir K, Saeed I.(2013) have found smoking to be a risk factor for hypertension as in fact some of the researchers have reported high blood pressure levels in smokers than in non smokers(23)(29).

Diabetes in family is another associated factor with significantly associated with hypertension in this study (OR: 12.064; 95% CI=2.716-53.577; p-value=0.001). This indicates that those who had Diabetes in Family were twelve times more likely to have hypertension. Unfortunately, many people with diabetes also suffer from hypertension while Hypertension is an extremely common circumstance in diabetes; as well as it can be caused by heredity reference to Anwer Z. et. al.(2011) and Njeru JIW(2009) works(24)(30).

Hypertension in family is characterized as significantly associated with hypertension in this study (OR: 4.300; 95% CI=1.000-18.484; p-value=0.049). This indicates that those who had Hypertension in Family were four times more likely to have hypertension and this is imminent to Family history and hypertension study that was conducted with as independently and significantly associated with hypertension look like the same results of Banyangiriki J. et. al.(2013) and Evanizio Roque de Arruda J. et. al.(2017)(4)(19).

Being overweight obese or low weight ($BMI \geq 25 \text{ Kg/m}^2$ and $\leq 18.5 \text{ Kg/m}^2$) was significantly associated with hypertension in this study (OR: 2.545; 95% CI=1.456-4.449; p-value=0.001). This suggests that those who had a BMI of 25 or more and lower than 18.5 were two and half times more likely to have hypertension. These findings compare very well with other studies such as ones of Evanizio Roque de Arruda J. et. al.(2017) and Kaputjaza DM(2017) these have found an increased or reduced significantly (abnormal) of BMI, (NCEP criteria) to be a risk factor for hypertension in HIV people on ART(19)(31).

As the results from the assumptions tests that have carried out from multivariate Model Summary in Table 4 explain that the only five dependent variable/ associated factors are significant associated to hypertension were named with P-Value that was lower than 0.05 and explained associability in the tested model, therefore being Aged more than 40 years old;

Smoking any tobacco products, Diabetes in family and Hypertension in family and having BMI of 25 or more and lower than 18.5.

Study Limitations

The following are some limitation identified:

- The study results about factors associated to hypertension not reflect to all HIV positive.
- The study is a cross section study because it evaluates the expose and outcome at the same time.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Hypertension among HIV patients is common in Gicumbi District as the prevalence was found to be 22.4 % (Approximately 1 in 5 people). Being older than 40 years old; Smoking any tobacco products, Diabetes in family and Hypertension in family and having BMI of 25 or more and lower than 18.5 were factors statistically significant associated with hypertension among HIV infected patients. Some of these factors such as Diabetes in family and having BMI of 25 or more and lower than 18.5 are more complicated by HIV/AIDS therefore, frequently HIV positive present with diabetes and metabolic complaints that lead also to abnormal BMI. Overall of these study factors statistically significant associated with hypertension are similar to those found by other studies.

6.2 Recommendations

6.2.1 Routine screening of hypertension

There should be routine screening of hypertension in all Health facilities. This will enable early detection, control and treatment of these patients.

6.2.2 Health education

As in the general population, there is need to educate patients on the various the risk factors for hypertension so that they can prevent or delay the onset of hypertension. Basically, HIV patients need to be educated as all are more vulnerable to risk factors of hypertension so as how to deal with the all risk factors that were associated with hypertension in this study.

6.2.3 Further research

More studies should be done to compare the prevalence of hypertension in both the HIV positive and negative groups as this was not done in this study.

REFERENCES

1. Shakirat I. et.al. Hypertension and Related Risk Factors among Clients on Combined Antiretroviral Therapy in Nigeria. 2017;9(4).
2. Yunan X. et.al. A Global prevalence of hypertension among people living with HIV : a systematic review. Univ Florida, Gainesv. 2017;(June).
3. Cosimo M. et.al. Lifestyle and Hypertension: An Evidence-Based Review. J Hypertens Manag. 2018;4(1).
4. BanyangirikiJ.et.al. Prevalence of Hypertension among Working Adults in Rwanda. Iran J Publ Heal. 2013;42(8).
5. Semeere AS, et.al. Hypertension and associated risk factors in individuals infected with HIV on antiretroviral therapy at an urban HIV clinic in Uganda. Lancet Glob Heal. 2014;2(October 2015).
6. Rodriguez-Arbolı et. al. Incidence and risk factors for hypertension among HIV patients in rural Tanzania – A prospective cohort study. 2017;630.
7. Nduka C. et.al. Evidence of increased blood pressure and hypertension risk among people living with HIV on antiretroviral therapy : a systematic review with meta-analysis. J Hum Hypertens · Oct. 2015;
8. Yao L. et.al. Lifestyle and risk of hypertension: Follow-up of a young pre-hypertensive cohort. Int J Med Sci. 2015;12(7):605–12.
9. Nahimana M.et.al. A population-based national estimate of the prevalence and risk factors associated with hypertension in Rwanda : implications for prevention and control; July. 2017;
10. Manner IW. HIV infection and hypertension: PhD thesis. 2013.
11. IFPMA. HYPERTENSION : Putting the Pressure on the silent Killer; May. 2016;
12. Nahimana Marie-rosette et.al. A population-based national estimate of the prevalence and risk factors associated with hypertension in Rwanda : implications for prevention and control. 2018;1–11.
13. Sander L. et.al. Hypertension , cardiovascular risk factors and antihypertensive medication utilisation among HIV-infected individuals in Rakai , Uganda. 2015;20.
14. MoH. Rwanda Non communicable: Risk, Factors Diseases Report. 2015;(November).

15. Ndabarora et.al. Prevalence of hypertension and factors associated with screening uptake in Kanjongo , Nyamasheke District , Rwanda. 2018;1.
16. Mcconnell et. al. Blood Pressure Management. 2016;
17. Kofi JO. Prevention and Management of Hypertension: A study on knowledge and attitudes of women of childbearing age. September 2011. 2011;(September).
18. Castells, E. et. al. Impact of highly active antiretroviral therapy on blood pressure in HIV-infected patients . A prospective study in a cohort of naive patients. HIV Med. 2006;
19. Evanizio Roque de Arruda J. et. al. Risk factors related to hypertension among patients in a cohort living with HIV / AIDS. 2017;281–7.
20. Olin BR et. al. Hypertension : The Silent Killer : Updated JNC-8 Guideline Recommendations. 2018;
21. Pauline G. et.al. Diabetes and other cardiovascular risk factors. 2012;(July).
22. Glass TR et. al. Prevalence of risk factors for cardiovascular disease in HIV- infected patients over time : the Swiss HIV Cohort Study. 2006;
23. CADTH. Peer Support for Diabetes, Heart Disease and HIV/AIDS: A Review of the Clinical Effectiveness, Cost-effectiveness, and Guidelines. PubMed. 2013;(November).
24. Anwer Z et. a. Hypertension Management in Diabetic Datients. Eur Rev Med Pharmacol Sci. 2011;15(1).
25. Mitambo C.et.al. Improving the Screening and Treatment of Hypertension in People Living with HIV. 2015;
26. Sitbon O et. al. Prevalence of HIV-related Pulmonary Arterial Hypertension in the Current Antiretroviral Therapy Era. 2008;
27. Israel GD. Sampling The Evidence Of Extension Program Impact. Program Evaluation and Organizational Development, IFAS, University of Florida. PEOD-5. October. 1992;
28. Esiobu E The rise of homegrown ideas and grassroots voices: New directions in social policy in Rwanda. 2017;
29. Mir K, Saeed I. Prevalence of Risk Factors for Non-Communicable Diseases in the Adult Population of Urban Areas in Kabul City , Afghanistan Prevalence of Risk Factors for Non- Communicable Diseases in Adult Population of Urban Areas in Kabul City , Afghanistan. 2013;2(2).

30. Njeru JIW. Prevalence and Associated Risk Factors for Hypertension among HIV Positive Patients Attending Comprehensive Care Centre at Thika District Hospital , Kenya , 2008
James Ian Wathuta Njeru A Thesis Submitted in Partial Fulfillment for the Degree of Master of. 2009;
31. Kaputjaza DM. An epidemiological investigation of risk factors for hypertension in windhoek, khomas region, namibia dianah mukuture kaputjaza april 2017. 2017;(April).

APPENDICES

Appendix I. Data collection and analysis plan

Inputs	Created Excel sheet form
Data collected from	Byumba District Hospital ARV service
Reference document	Questionnaire sheets
Data type	Primary data
Data validation	Once data are entered
Analysis frequency	Once data are validated
Method used	Analytical(frequency, percentage and logistic regression model)
Analysis tool	SPSS V.16.0 and STATA

Appendix II. Informed consent documents (English)

My name is UWANYIRIGIRA Donatha; I am a FLTP resident in school of public health (KICUKIRO CUMPUS), I am carrying out a study entitled risk factors of hypertension among HIV patients on ART at Byumba District Hospital in Gicumbi District. This involves asking you a number of questions on the risk factors that raised blood pressure such as Tobacco, Alcohol consumption, Life style and behaviour etc. and taking some measurements of your blood pressure, weight, height, all the data collected will be treated with strict confidentiality and anonymity. If you feel that you cannot continue participating in the study, you are free to withdraw at any stage of the interview. The findings will give a better understanding of the hypertension situation among HIV patients on ART and also help in intervention of addressing the hypertension problem in our Gicumbi District; specifically, among PLWH.

For any queries or questions, contact me through the University of Rwanda, College of Medicine and Health sciences the Chairperson of the CMHS IRB (0788 490 522) and of the Deputy Chairperson (0783 340 040), contact the supervisor of this research on 0785255388 or use my cell phone 0788459752.

Will you please sign to your willingness to participate?

Participant’s Statement:

The study described above has been explained to me to my full understanding and I voluntarily give consent to participate in this study.

Participant Signature.....Date.....

Investigator’s Signature.....Date.....

Appendix III. Questionnaire (English)

A. Socio-Demographic Characteristic

1. What is your birth year?
2. Sex: Male Female
3. What is your religion?
 Christian Muslim Traditional None
4. What is your occupation?
 Civil servant Famers Business None
5. Education level:
 None
 Primary
 Secondary
 Tertiary
6. What is your marital status?
 Single
 Married
 Divorced
 Widowed
 Separated
 Co habiting
7. What is your Ubudehe category?
 1. I
 2. II
 3. III
 4. IV
8. Have you ever heard of hypertension? No Yes
9. What is your opinion about hypertension? Is it public health problem? No Yes

B. Life Style

B.1 Alcohol consumption

10. Have you ever consumed an alcoholic drink? No Yes

11. During the past week, how frequently have you had at least one alcoholic drink?

- Daily
- 3-6 days per week
- 1-3 day per week
- None

12. During the past week, how many different alcoholic drinks in a single drinking occasion?

- Two alcoholic drinks
- More than two alcoholic drinks

B.2. Smoking

13. Have you ever smoked any tobacco products? No Yes

14. Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes?

- No Yes

15. If stopped smoking, state how?

- Less than one month
- Between 1 to 3 months
- More than three months

16. If yes to question Q13, do you currently smoke tobacco products daily?

- No Yes

B.3 Physical activity

I am now going to ask you questions about your work and activities that you do.

17. Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like (sport, carrying or lifting heavy loads, digging or construction work)?

- No Yes

18. In a typical week, on how often do you do vigorous-intensity activities as part of your work?

- Daily
- 3-6 days per week
- 1-3 day per week

B.4 Diet

19. In a typical week, on how many days do you eat fruits?

- Daily
- 3-6 days per week
- 1-3 day per week

20. In a typical week, on how many days do you eat vegetables?

- Daily
- 3-6 days per week
- 1-3 day per week

21. In a typical week, how frequently (number) do you eat the following foods?

- Dried salted fish (fish, indagara, etc) _____
- Canned food (beef, beans, etc) _____
- Chips (if salt added) _____

22. In a typical week, how frequently do you use the following oil/fat for preparing meals?

- Vegetable oil _____
- Butter _____
- Animal fat _____

C. Family and individual history

23. Is there anyone from your family (siblings) who suffered or is suffering from diabetes?

- No
- Yes

24. Do you suffer from diabetes? No Yes

25. Have you ever taken drug for diabetes? No Yes

26. Is there anyone from your family (siblings) who suffered or is suffering from Hypertension?

- No
- Yes

27. Do you suffer from hypertension? No Yes

28. Have you ever taken drug for hypertension? No Yes

29. How long have you live with HIV?

- Less than 1 year
- 1 to 3 years
- More than 3 years

30. How long have you take ART?

Less than 1 year

1 to 3 years

More than 3 years

D. Measurement

31. Weightkg

32. Height.....cm

33. BMI.....kg/m² (to be calculated)

34. Systolic blood pressure 1st 2nd Average.....

35. Diastolic blood pressure 1st 2nd average

36. Waist circumferencescm

37. Hip circumferencecm

38. Waist/hip ratio(to be calculated)

Thank you for collaboration!!

Umugereka IV: KWEMERA KWINJIRA MUBUSHAKASHATSI (Ikinyarwanda)

Amazina yanjye nitwa UWANYIRIGIRA Donatha; umunyeshuri muri Kaminuza y'Urwanda, agashami ko kurwanya indwara z'ibyorezo no gukurikirana imikorere yaza Loboratwari nkaba ndigukora ubushakashatsi ku burwayi bw'umuvuduko w'amaraso nibituma yiyongera mu babana n'ubwandu bw'agakoko gatera SIDA bafatira imiti igabanya ubukana mu Bitaro by'akarere bya Byumba.

Ubushakashatsi bwibanda ku bibazo bijyanye ni ingano nu ubwoko bw'ibiribwa n'ibinyobwa(harimo itabi), uburyo ubayeho ndetse n'ibipimo byerekana uko umuvuduko w'amaraso uhagaze hiyongeraho iby'uburemere n'uberebure ku muntu wemera ubufatanye muri ubu bushakashatsi Gufatanya mu bushakashatsi ni ubushake kandi ufite uburenganzira bwo guhagarika ubu bushakashatsi igihe cyose ushatse ntazindi nkurikizi zibayeho kuko amakuru yose azabikwa mu ibanga kandi nta zina rizajyaho. Amakuru atangwa n'uwemeye ubufatanye mu bushakashatsi asubiza urutonde rw'ibibazo bibukubiyemo kandi hari uburenganzira ku muntu usubiza bwo kubaza ikibazo yaba ufite. Ibizava mubushakashatsi bizatuma humvikana uburemere kuburwayi bw'umuvuduko w'amaraso mu babana n'ubwandu bw'agakoko gatera SIDA kandi bizafasha gukemura ikibazo icyo aricyo cyose kuburwayi bw'umuvuduko w'amaraso no kongera serivisi nziza itangwa mu karere ka Gicumbi; hibandwa kubabana n'ubwandu.

Uramutse ugize ikibazo kubijyanye n'ubu bushakashatsi wahamagara ni mero zikurikira: Uhagarariye ubushakashatsi muri Kaminuza y'Urwanda (0788 490 522), umwungirije (0783 340 040), ukurikirana ubu bushakashatsi (0785255388) cyangwa uri kubukora ho (0788459752).

Nimwemera ko dufatanye muri ubu bushakashatsi, murasinya ku rupapuro ahabugenewe.

Kwemera gufatanya mu bushakashatsi

Numvise neza igikorwa cy'ubushakashatsi nasobanuriwe, nemeye kubushake gufatanya muri ubu bushakashatsi

Umukono waweitariki.....

Umukono wuri gukora ubushakashatsi.....itariki.....

Umugereka V. Ibibazo by'ubushakashatsi

A. Irangamimerere

1. Wavutse mu wuhe mwaka?

2. Igitsina Gabo Gore

3. Usengera mu rihe dini?

Rya Gikristu Islam Gakondo Ntaryo

4. Ukoraiki?

Umukozi wa Leta Umuhinzi Umucuruzi Ntacyo

5. Amashuli ufite:

Ntayo

Abanza

Ayisumbuye

Amakuru

6. Ni iriherangamimerere yawe?

Ingaragu

Narashatse

Naratandukanye

Umupfakazi

Naratandukanye bitemewe

Nabyariye iwacu

7. Uri mukihe cyiciro cy'Ubudehe?

1. I

2. II

3. III

4. IV

8. Wigeze wumva bavuga indwara y'umuvuduko w' amaraso? Oya Yego

9. Wumvauteindwaray'umuvuduko w' amaraso? Ni ikibazorusange? Oya Yego

B. Ubuzima rusange

B.1 Kunywa ibisindisha

10. Wigeze mu buzima unywa inzoga/ibisindisha? Oya Yego

10. Mu cyumweru gishize, waba waranyoye inzoga/ibisindisha kangaha?

Buri muni

Hagati y'iminsi 3-6

Hagati y'iminsi 1-3

Ntana rimwe

11. Mu cyumweru gishize; wafashe kubwoko bungahe, bw' inzoga/ibisindisha mu gihe kimwe?

Ubwoko bubiri

Birenze ubwoko bubiri

B.2. Kunywa itabi

12. Wigeze mu buzima unywa ibikomoka ku itabi? Oya Yego

13. Ubu waba unywa itabi urugero nk' isegereti, ubugoro, ...? Oya Yego

14. Niba warahagaritse kunywa itabi ni ryari?

Muni y'ukwezi 1

Hagati y'amezi

Hejuru y'amezi 3

15. Niba ari yego kuri 13, waba unywa ibikomoka ku itabi buri muni? Oya Yego

B.3 Imirimo y'ingufu

Ubu ngiye kukubaza imirimo ikoreshwa ingufu mukora.

16. Hari imirimo mukora ibasaba gukoresha ingufu nyinshi byatuma mubira ibyunzwe twavugaga nka (sport, guterura ibiremereye, guhanga cg kubaka)? Oya Yego

17. Mu cyumweru; mukora ibasaba gukoresha ingufu nyinshi mu buhe buryo?

Buri muni

Hagati y'iminsi 3-6

Hagati y'iminsi 1-3

B.4 Imirire

18. Mu cyumweru; ni gute murya imbuto?

Buri muni

Hagati y'iminsi 3-6

Hagati y'iminsi 1-3

19. Mu cyumweru; nigute murya imboga rwatsi?

Buri muni

Hagati y'iminsi 3-6

Hagati y'iminsi 1-3

20. Mu cyumweru, ni incuro zingaha urya ibibiribwa bikurikira?

Amafi yumutse(amafi, indagara, etc) _____

Ibiryo bifunze(mu bikombe) (saladine, ibishyimbo, etc) _____

Ifiriti (irimo umunyu) _____

21. Mu cyumweru, ni incuro zingaha utekesha amavuta?

Akomoka kubihingwa _____

Ay'inka _____

Akomoka ku nyamaswa _____

C. Amateka y'umuntu n'umuryango

22. Hari uwo mu muryango wanyu(wabugufi) warwaye cg urwaye diyabete?

Oya Yego

23. Waba urwaye diyabete? Oya Yego

24. WabaurikumitiyaDiyabete? Oya Yego

25. Hari uwo mu muryango wanyu(wa bugufi) warwaye cg urwaye umuvuduko w'amaraso?

Oya Yego

26. Waba urwaye umuvuduko w'amaraso? Oya Yego

27. Waba warafashe cg urikumiti y'umuvuduko w'amaraso? Oya Yego

28. Umaze igihe kingana iki ubana n'ubwandu bwa HIV?

Muni y'umwaka 1

Hagati y'imyaka 1-3

Hejuru y'imyaka 3

29. Umaze igihe kingana iki uri kumiti ya ARV?

Muni y'umwaka 1

Hagati y'imyaka 1-3

Hejuru y'imyaka 3

D. Iyipimo

30. Uburemerekg

31. Uburebere.....cm

32. BMI.....kg/m² (*ibazwe*)

33. Systolic blood pressure 1st 2nd Average.....

34. Diastolic blood pressure 1st 2nd average

35. Waist circumferencescm

36. Hip circumferencecm

37. Waist/hip ratio(*ibazwe*)

Murakoze ku bufatanye!!

Appendix VI. IRB Approval letter



UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 11th /12/2018

UWANYIRIGIRA Donatha
School of Public Health, CMHS, UR

Approval Notice: No 378/CMHS IRB/2018

Your Project Title *“Risk Factors Of Hypertension Among HIV Infected Sex Workers With Control Group Of Non HIV Infected Sex Workers. Case Of URUNGANO Cooperative Of Gicumbi District In 2018”* has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 14th November 2018, **Approval has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months.**

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 11th December 2018

Expiration date: The 11th December 2019



Professor GAHUTU Jean Bosco
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 VII. Byumba District Hospital Approval letter

REPUBLIC OF RWANDA

Gicumbi, 10.../...February.../2019



GICUMBI DISTRICT
BYUMBA DISTRICT HOSPITAL

BO. Box : 04 BYUMBA

E. mail: hopbyumbayahoo.fr

Dear Donatha Uwanyirigira,


RE: Approval of conducting research

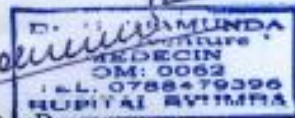
After review of your research protocol entitled "**hypertension among HIV positive patient on ART** attending Byumba District Hospital aiming to determine the prevalence and risk factors of hypotension among HIV positive patient on ART. The Byumba Hospital Ethics committee has decided to give you permission to conduct your research.

The Ethics Committee finally recommends you to ensure confidentiality of health information from patient and health professionals of the Byumba facilities to submit a final copy of your findings after completion of the research and finally to consult Byumba Hospital administration in case you need to publish the findings.

Wishing you all the best!

Sincerely,


DR HISHAMUNDA Bonaventure
Chair Person Of Ethic Committee



Approved by : DR NTIHABOSE Camicille Killy
Director General of BDH

Appendix VIII. DRI Plagiarism Approval

Note

The project entiteled "Prevalence and factors associated with hypertension among HIV positive patients on Antiretroviral therapy (ART) Case of Byumba District Hospital, 2018" is accepted by DRI to be submitted at UR-CMHS Library.

Sincerely

Emile Nisingizwe

Research and Innovation Officer

UR-CMHS

08/10/2019

A handwritten signature in blue ink, appearing to be 'EN', is written over a light green rectangular background.