COLLEGE OF MEDICINE AND HEALTH SCIENCE

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DEPARTMENT OF EPIDEMIOLOGY AND BIOSTATISTICS

PREVALENCE AND ASSOCIATED FACTORS WITH HYPERTENSION AMONG PENSIONERS; A CROSS SECTIONAL STUDY IN KIGALI CITY, RWANDA, 2023.

A dissertation submitted in partial fulfilment of the requirements for the award of a Master of Science in Epidemiology.

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Kigali, October 2023

DECLARATION

This research study is my original work and has not been presented to any other Institution. No part of this study may be copied, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, by any information storage and recovery system without the prior written permission of the author.

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DEDICATION

To the almighty God

To my parents MUNYANKINDI Laurent and GASIGWA Suzanne.

To my beloved elder brother Father NSABANZIMA Emmanuel for his support and encouragement,

To friends and lovely friend who were always ready to listen to me and encourage me.

I dedicate this work.

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I extend my genuine gratitude to all lecturers who offered to provide their treasured knowledge to me, which has been used as a major tool of guidance to achieve this level.

I would like to thank the management of the Rwandese Association of Retired (ARR) who did whatever possible to link me with pensioners; I appreciate them for their kind support in this research. I appreciate all the people who assisted me in accomplishing this research as well as colleagues MSc in Epidemiology and MPH Class for the great moments shared.

May the almighty God guarantee a healthy life for all of you!

ABSTRACT

Background

Hypertension is a growing public health concern in Rwanda, and it is getting worse by the day. The prevalence and contributing factors of hypertension among pensioners has not yet been the subject of a limited study. According to NCDs risk factors study Rwanda, 2021-2022, the prevalence of hypertension among elderly aged between 60-69 years was 43.2% while general population aged between 18-69 years was 16.8%(1). This study determined the prevalence and associated factors with hypertension among pensioners in Kigali City, Rwanda.

Methods

The study employed a cross-sectional, Quantitative method design with multistage sampling methods. The sample included 220 participants from Kigali and the data were collected from 5th July to 20 August, 2023.The structured questionnaire was used to collect data and included socio-demographic and behavioural Information. The cross-tabulation Chi-square for statistical significance was performed and multivariable logistic regression analysis was used to demonstrate the associated factors with hypertension.

Results

Of the 220 participants, 53.18% had hypertension and the majority of them were males with 65.81%. Respondents with HIV/AIDS had 18.4 higher odds of developing HTN (adjusted OR: 18.405, 95% C.I =3.228-104.93) compared with respondents with no HIV/AIDs. Respondent with DM (diabetes mellitus) had 16.8 higher odds of developing HTN(adjusted OR: 16.873, 95%C.I=1.591-178.84) compared with respondents with no DM(diabetes mellitus) . Respondents who had had stress sometimes at work had 2.9 higher odds of developing HTN (adjusted OR: 2.902, 95% C.I=1.2000-7.021) compared with those who never had stress at work. Respondents who had had stress several times at work, had 13.5 higher odds of developing HTN (adjusted OR: 13.514, 95% C.I=2.205-82.825) compared with those who never had stress.

Conclusion

The study found the higher of hypertension among pensioners and the associated factors explored can be prevented. HIV/AIDS, diabetes mellitus and times respondents had stress at work, were significantly associated with hypertension. So**,** there are still a need for mass campaign for HIV prevention , stress management at workplace, regular exercise and life style modifications to prevent type II diabetes, not only for pensioners at retirement age but also current employees in different domains to be prevented before retirement.

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LIST OF ACRONYMS AND ABBREVIATIONS

ARR The Rwandese Association of Retired

BMI Body Mass Index

BP Blood Pressure.

COK City of Kigali.

CVDs Cardio Vascular Diseases.

DM Diabetes Mellitus

HBP High Blood Pressure.

HTN Hypertension

ISH Isolated systolic Hypertension.

LMICs Low and Middle Income Countries.

Mm HG Mille miter of Mercury

MOH Ministry of Health

NCDS Non- Communicable Diseases.

NGOs Non-Governmental Organisational

OR Odd Ratio

PR Prevalence Ratio

RBC Rwanda Biomedical Centre

RPHC4 Rwanda Population and Housing Census Fourth.

RSSB Rwanda Social Security Board

UR University of Rwanda

WHO World Health Organization

Definition of Key terms

Controlled hypertension is defined as having a systolic blood pressure less than 140 mmHg and a diastolic blood pressure less than 90 mmHg in people with hypertension (2).

Isolated systolic Hypertension**:** Isolated systolic hypertension is the predominant form of hypertension in the elderly population. Defined as systolic blood pressure (SBP) above 140 mmHg with diastolic blood pressure (DBP) of less than 90 mmHg(3).

Pensioner refers to a person who has saved money from insurance companies, especially the retirement pension ,in which ,early retirement age is 60 years while late retirement is 65 years (4).

CHAPTER I. INTRODUCTION

1.1. Background of the study

Hypertension affects nearly one billion people worldwide, with two-thirds living in developing countries(5). Hypertension-related diseases kill 7.5 million people worldwide accounting for approximately 12.8% of all deaths (5). By 2025, developing countries will house approximately 75% of the world's hypertensive population (6).

Furthermore, it is estimated that the global economic burden of hypertension is around 370 billion dollars, in which accounting for 10% of all healthcare expenditures (6). The economic impact of hypertension and its complications is significant because a significant proportion of the productive population becomes chronically ill or dies, leaving their families impoverished (5). An average retired couple 65 years old may need to save about $300,000 (after taxes) to cover health care costs in retirement, according to the 2021 Fidelity Retiree Health Care Cost Estimate(7). Growing numbers of elderly people with NCDs including hypertension, who frequently need expensive and complicated care, can have an impact on pensions and health systems(8) .Due to the high costs of treatment, on-going medical care, and lost productivity caused by premature death in productive age groups, NCDs like hypertension contribute to individual, family, and community poverty(9). Despite its asymptomatic nature and unidentified causes, hypertension is a worldwide burden and contributes to numerous fatalities. This implies that it requires serious prevention measures, and understanding its risk factors is crucial.

A growing body of research indicates that unemployment may contribute to the emergence and prevalence of cardiovascular diseases linked to hypertension(10).Significant correlations were found between the incidence of developing NCDs, including HTN, and the incidence of unemployment, job losses, and episodes of not working, according to data from the US Health and Retirement Study on the relationship between HTN status and retirement (10).

People are spending more time in retirement than ever before due to the ageing of the global population, and retirement may affect the development of HTN through behavioral pathways such as changes in smoking, alcohol consumption, physical activity, and diet (11).

Even if no clear research specifically talked to Pensioners ,many literature talked to elderly in which pensioners included and many researchers showed how adult cases are on the rise,

in which its complications kill 9.4 million people worldwide each year (5). With the migration of many people from rural to urban areas, hypertension has become an epidemic and is now more common in adults in Africa than in many high-income countries, bringing with it "the burden of civilization." (12). Another issue for its rise is the fact that some governments and development organizations pay little attention to hypertension and other related health issues (13). Between 2001 and 2008, less than 3% of global health aid was spent on NCDs(13).

One reason for this neglect for different governments is that these illnesses were frequently claimed to be uncommon among the poor, especially in low-income nations; however, new data reveal that hypertension affects the poor just as much as the rich as mentioned above for the cause, and that the poor are less likely to have access to effective treatment (13).

Ageing has been identified as the first of four major factors contributing to NCDs in developing nations, including hypertension. According to data from the World Health Organization, deaths from NCDs in the developing world affect more people over 60 than those under 60(14). In Africa ,the prevalence of hypertension was 60% on population aged 60 years and varied for men and women in which elderly aged 70 years, study revealed respectively prevalence of 65% for men and 75% for women(15). In Kenya ,the recent prevalence of hypertension among adults was 24.5% while in Nigeria, hypertension prevalence based occupation was 61.7% among civil servants and trading sector (16).

A population-based national estimate of the prevalence and risk factors associated with hypertension conducted in Rwanda showed that the overall prevalence of hypertension in Rwanda was 16.8%(1). Age itself was the main risk factor for vascular disease, involving macro vascular and micro vascular impairment and the interventions for achieving health vascular ageing are behavioral for prevention and pharmacological when affected (17).

As providing health services is a duty of the state in Rwanda, the country's current economic situation prevents it from funding all or even the majority of the country's health care expenditures from the general government budget due to factors such as rising costs and increased demand for high-quality services (18). The government of Rwanda has acknowledged the problem of hypertension and has developed a national strategy to address the problems of high demand for HTN services, including health insurance for both public and private employees(4).

Despite the growing body of evidence relating to how retired people had risks related to hypertension, there has been little published research on factors associated with hypertension in pensioners and its prevalence.

1.2. Problem statement

According to the Rwanda national health survey on NCDS in 2022, the prevalence of hypertension was 43.2% among elderly people aged 60 to 69 ,with 16.8% for the population aged between 18-69 years and female with the high prevalence (1). As a result, data on prevalence and associated factors on specific age groups, such as pensioners, who are at risk of hypertension, must be presented. There is no data available for retirees on the prevalence of hypertension and its associated factors. Although research on the prevalence of hypertension in the elderly has been conducted for pensioners, no specific research done. There are knowledge gaps that are beneficial to current employees and employers for prevention measures. There is also a gap in the most effective approach to control hypertension before retirement in different categories of the population according to their professions. Dietary and lifestyle modifications are the most effective ways to control hypertension. As hypertension is directly related to cardiovascular diseases, it's very important to study the prevalence and the factors that contribute in high blood pressure.

Hypertension is routinely screened in Rwandan healthcare facilities, but many cases are discovered when consulted with unrelated symptoms, particularly concerning retirees from various professions. Salary workers are more likely to develop HBP as they approach retirement age due to their busy work and higher risk behavior factors. Good health for pensioners can lead to independence, security, and productivity, but NCDs can worsen their quality of life, increase healthcare costs, and burden family members(8). This study focused on determining the prevalence and associated factors for hypertension among pensioners in Kigali City.

1.3. Justification of the study

Because hypertension is a significant risk factor for CVD, it is critical to raise awareness and HBP-related knowledge and practices to control hypertension, which can only be prevented from causing complications. The study contributes to a better understanding of the changing prevalence of hypertension among the elderly, with a focus on Kigali City pensioners. It is

critical to research hypertension and its associated practices because hypertension raises the risk of heart disease and stroke.

Its investigation is also necessary to generate useful data that can aid in the prevention of this health problem and the development of feasible health programs to control hypertension in those who are affected. Because hypertension is a serious health issue and one of the leading causes of cardiovascular death, its prevalence and associated factors must be prioritized in the fight against cardiovascular disease. It can only be prevented and treated through effective management and practices that promote healthier lifestyle choices.

Consume less salt, eat less fat, exercise regularly, and avoid using tobacco and alcohol, among other things. The findings of this study will aid in increasing understanding among pensioners from various work categories, as well as identifying gaps in knowledge and practices regarding pensioners, which will aid in the modification of prevention strategies to make people aware of their risk factors, not just pensioners but also the future pensioners. The prevalence and contributing factors of hypertension among pensioners in Kigali City has not yet been the subject of a limited study. Therefore, the research's findings will be a valuable resource for the scientific community and the body of knowledge as a whole when it comes to the epidemiology of hypertension and its risk factors among workers according to their professions or careers.This study has explored the prevalence of hypertension among retirees and the risk factors that need to be addressed. It had a significant impact on population life expectancy growth and quality of life.

1.4. Study objectives

1.4.1. General objective

- The study aimed to assess the prevalence and risk factors for hypertension among Kigali City pensioners.

1.4.2. Specific objectives

- To determine the prevalence of hypertension among Kigali city pensioners.
- To determine the factors associated with hypertension among Kigali city pensioners.

1.5. Research questions/Hypothesis

- What is the prevalence of hypertension among Kigali city pensioners?
- What are the risk factors for hypertension among Kigali city pensioners?

CHAPTER II. LITERATURE REVIEW

2.1. Empirical Literature

2.1.1. Prevalence of Hypertension

The prevalence of hypertension has increased globally, rising from 594 million in 1975 to 1.13 billion in 2015(19). One out of every four males has hypertension, and the prevalence is expected to increase by 60% until 2025, or about 1.56 billion people, according to a World Health Organization (WHO) report from 2015 (20).

9.4 million People die prematurely each year due to high blood pressure, which is one of the leading causes. The African region had the highest prevalence of raised blood pressure, at about 46% (21).

One of the main reasons people seek out primary healthcare is HTN. According to a study conducted in Mexico, the prevalence of hypertension rises with age and affects 68% of people over the age of 60. It is slightly higher in women (70%) than in men (66%) and may affect up to 50% of patients over the age of 65 (22). According to a study conducted in Argentina, hypertension affects 71% of people above the age of 65 (23).

36% of adults in South-East Asia have hypertension, with Nepal reporting the second-highest proportion after Afghanistan and in this area, one in three adults suffers from hypertension (21). In the United States, the prevalence of hypertension was 29.0% among adults overall, 30.2% among men and 27.7% among women. Among those 60 years of age and older, the prevalence was 63.1% (24). In Brazil, the estimated prevalence of hypertension among elderly people aged 65 and older in 2008 was 60.6%, with a significant gender difference (25).

According to several epidemiological studies carried out in the USA and Europe, the prevalence of hypertension in the elderly is between 53% and 72% (26). In India, a study with prevalence rates of 53.3% for women and 47.3% for men came to the conclusion that the prevalence of hypertension among the elderly in that nation is a serious public health issue (27).

There were more than 54.6 million cases of hypertension in 1990, 92.3 million cases in 2000, and 130.2 million cases in 2010, with an average prevalence of hypertension in Africa of 19.7% in 1990, 27.4% in 2000, and 30.8% in 2010. There are anticipated to be 216.8 million hypertensive patients in Africa by 2030 (19).Recent studies in Kenya found that the

prevalence of hypertension was 24.5% in adults nationwide and 29.4% in one of the country's slums (19).

Similar to other nations, in Rwanda there is limited research on pensioners but many literatures explored elderly which included and has shown an increase in cases of hypertension. Hypertension affects about 46% of all adults in the nation, resulting in 730 deaths annually (18). It is estimated that 1,188,142 people in Rwanda between the ages of 15 and 64 are affected by HTN, using the statistic of an average prevalence of 15.9 percent which is less among the ages above these categories (28). According to a study conducted at CHUK on the prevalence of common non-communicable diseases in adult people living with HIV, hypertension was the disease with the highest prevalence (22%), followed by newly diagnosed diseases (80%)(29).

It is difficult to determine the prevalence of hypertension and its risk factors in the elderly in low- and middle-income countries because many cases were previously undetected and others could be found through routine screening and consultation with medical professionals about unrelated illnesses (30).

2.2. Theoretical framework

2.2.1. Risk factors of Hypertension

Although the exact causes of high blood pressure are unknown, a number of conditions and factors may be involved in its development (5). Only 5% of cases of hypertension are secondary, which is systemic hypertension brought on by an underlying disorder (5).

According to a study conducted in India, the prevalence of hypertension among the elderly was 13.8%, 19.6% among men and 9.5 per cent among women. Married elderly were 3.5 times more likely to have high blood pressure compared to separated (divorced, widowed) elderly, and having poor health was 3.7 times more likely to have high blood pressure compared to having good health (21).

The prevalence of hypertension was found to be inversely correlated with marital status in Iraq, with ever-married people having a prevalence of 57.3% and the unmarried population having a prevalence of only 29.6%. This research has shown that married women have a lower risk of developing hypertension, where satisfaction may play a role in achieving better health (30).

Alcohol consumption, obesity, and heart rate (HR) > 75 beats/min were all found to be positively correlated to the incident of ISH in the Chinese study, but physical activity was found to be negatively correlated with the development of ISH (31).

Age has a significant impact on the prevalence of hypertension, which is extremely prevalent in Africa (32). In the Rwanda NCD survey, the age group 45-64 years had an adjusted odd ratio that was more than four times higher than the age group 15-24 years (33).

An avoidable condition, hypertension is linked to unhealthy lifestyle habits like smoking, inactivity, and drinking alcohol (32). Socio-demographic factors associated with hypertension include older age, female or male gender, lower education level, lower household income, urban residence, body weight status, health risk behaviour, and psychosocial stress (32).Age and obesity were linked to hypertension (adjusted OR = 3.20 and P 0.001) as well as being overweight (adjusted OR = 2.41 and P 0.001)(34).

In Malawi, research revealed a real link between hypertension and gender, but there was no clear difference in prevalence between women and men (35). Men and women have an equal chance of developing high blood pressure during their lifetimes; in the United States, approximately 77.9 million adults (or 1 in every 3 people) have BP. However, after the age of 65, women are more likely than men to be affected by the condition (25). Another study found that higher levels of salt and sugar consumption in older women, as well as older age and physical inactivity, were all significantly linked to hypertension (27).

Age, sex, race, socioeconomic status, psychosocial stress, family history, diet, smoking, alcohol consumption, physical inactivity, body weight, and awareness of hypertension were all risk factors for high blood pressure in Southern Taiwan (36).

In contrast to research from developed nations, where risk factors for hypertension are more common among less educated groups, higher educational levels are linked to an increased risk of hypertension in India and Bangladesh (37). An Ethiopian study found that education significantly affects the prevalence of hypertension, with postgraduate degree holders (54%) and grade eight graduates (17.6%) having a comparatively higher prevalence (38). In Iraq, 69% of the population is illiterate compared to 45.1% and 31.8% of participants with primary and secondary education, respectively (30).

The wealth index revealed an association between urban poor people in Kenya living less healthily than their rural counterparts due to their increased sedentary behaviour and

consumption of foods high in saturated fat, salt, and sugar, which puts them at risk for high blood pressure (39). According to a study from Kenya, urban poor people have less access to healthcare than wealthier urban dwellers due to their lower expenditure on a healthy diet, which puts them at an increased risk of complications from untreated hypertension. Age 70 years (OR: 1.91) low fruit intake (OR: 2.45) overweight/obese (OR: 4.29) and a family history of hypertension were found to be significantly associated with hypertension in the elderly, where the overall prevalence of hypertension was 41.9% (32).

2.2.2. Hypertension and age relation

No one wants to get older, but it's an inevitable part of life, and the world's population is aging quickly and by 2050, there will be about 2 billion people over the age of 60, 400 million of them over the age of 80, and about 80% of them will live in LMICs (low- and middle-income countries (40).

Rather than infectious and parasitic diseases, non-communicable diseases (NCDs) like hypertension, heart disease, cancer, and diabetes kill the majority of elderly people (41). According to a study done in the Islamic Republic of Iran, more than 57% of people above the age of 60 have hypertension, compared to 3.6% of people under the age of 30 and a study from Iraq found a connection between hypertension and ageing-related arterial stiffening in the elderly (30).

The highest prevalence of hypertension is found in the African Region. About 60% of the population has HTN by the age of 60, and by the age of 70, about 65% of men and 75% of women have high blood pressure (15).

In the United States, a study found that the prevalence of hypertension rose with age, reaching 33.2% among people in their 40s to 59s and 63.1% among people in their 60s and older. In Bangladesh, according to the STEPS Survey 2018, 25.2% of adults in Bangladesh have hypertension, which is in line with earlier studies from Bangladesh, India, and Pakistan that found age to be a significant predictor of hypertension (37).

2.2. 3.Hypertension and occupation relation.

Since the 1930s, social scientists have been examining the potential connections between the occurrence and prevalence of various chronic diseases and psychosocial stressors such as life events, minor inconveniences on a daily basis, behavioural traits, and stressful work environments (42).

In a variety of work environments, including job insecurity and the nature of the job, such as working long hours each week, occupational stress has been linked to elevated diastolic blood pressure. The association between occupational stress and hypertension was favourable, and it was brought on by a confluence of high workload demands and constrained decision-making authority (19).

In a case-control study of workers from various professions, job strain was discovered to be positively associated with elevated diastolic blood pressure and a higher left-ventricular mass index (odds ratio of 3.1), findings that support the conclusion that job stress is significantly related to hypertension (42).

According to a study conducted in Bangladesh, women who did not work were 1.176 times more likely to have hypertension than those who were physically active, suggesting that employment may be a helpful strategy for preventing hypertension (43). Some retirees may use alcohol to fill free time and deal with the pressures of retirement as a significant life event change. This idea that retirement raises alcohol consumption and the incidence of drinking issues, which cause hypertension, is supported by a number of studies(11).

Significant stress-related risk factors included working overtime, having a heavy workload, time constraints, challenging or complex tasks, not taking enough breaks, monotony, and poor physical health (43). On the other hand, depending on the workload of the population, they might encounter a number of challenges during treatment procedures, including extended standing, insomnia during night shifts, and dietary irregularities for a medical career (6).

The administrative staff had a higher prevalence of hypertension, according to a significant relationship between employee positions and the condition. In contrast, in a Japanese study of healthcare professionals, nurses and doctors reported feeling moderate stress, while administrative staff reported feeling less stress (19). The study found that noise exposure increased plasma noradrenaline and angiotensin II levels, causing endothelial dysfunction and

activation of the renin-angiotensin system, both of which increased blood pressure (BP), and that some jobs put employees at risk for diseases brought on by exposure to pollutants or chemicals (44).

In Ethiopia, the prevalence of hypertension ranged from 4.1% of adult workers in 1984 to 30% of a population sample in 2009 (45). The occupations with the strongest correlation to hypertension in Nigeria were those in the civil service and in the trading sector, which accounted for 61.7% of the hypertensive population. Civil servants received 46.7% of the votes (n = 60), while traders received 15.0% (n = 60) (16).

According to a study in SSA countries, prevalence varied significantly by population group defined by occupation and level of urbanization, from rural to peri-urban residents, and between school teachers and nurses from urban centres (46). When compared to nurses in other nations, Nigerian nurses had the highest prevalence of hypertension, with an adjusted prevalence ratio (PR) of 6.49 [95% CI = 2.26 - 18.7] and the highest prevalence of hypertension among rural Ugandans (46).

2.3. Conceptual Framework of hypertension

The conceptual framework represents the main study variables which serve as the backbone in this study. The conceptual framework outlines the various risk factors of hypertension. People over the age of 60 with hypertension and affected by a number of contributing factors. Non-modifiable risk factors like age, gender and marital status, are among the non-modifiable risk factors of hypertension. Modifiable risk factors like alcohol use, tobacco use, physical inactivity, job stress, unhealthy diet etc……are listed as risks to hypertension in participants.

The respondents' gender was determined by their sex organ, age is determined by their most recent birthday, highest educational level was determined by their qualifications, and occupation was determined by their primary work.

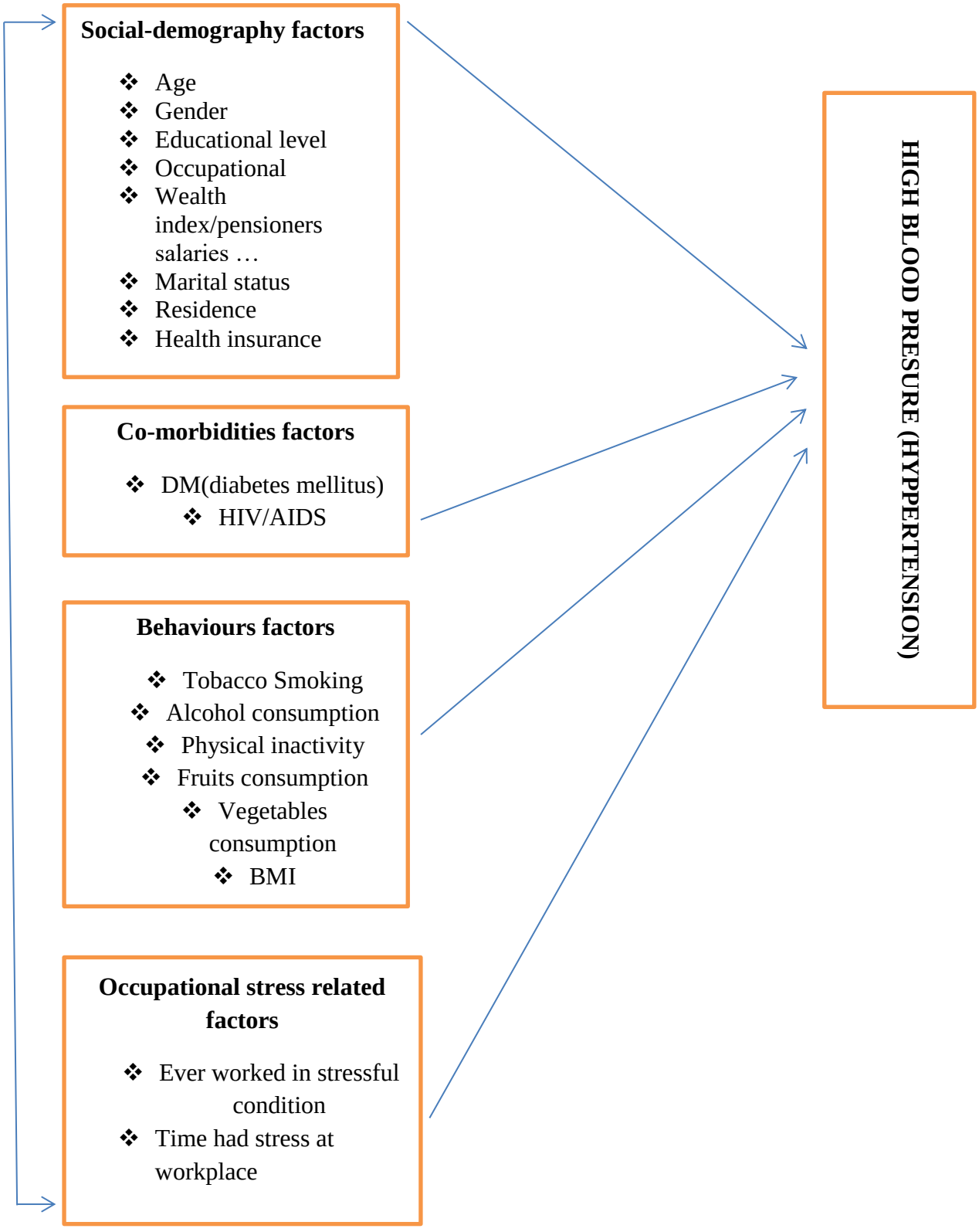

Figure 1. **Conceptual framework for factors of hypertensions in pensioners.**

CHAPTER III. METHODOLOGY

3.1. Study Design

This was a quantitative descriptive cross-sectional study design. A questionnaire-based survey was conducted in three districts of Kigali City at a single point in time to determine the prevalence and associated factors with hypertension among pensioners. Based on WHO criteria, a person was considered to be hypertensive if: 1. SBP>140mmHg and /or DBP>90mmHg.

3.2. Study setting

This study determined the prevalence of hypertension and associated factors among pensioners in Kigali City. Kigali City has 3 districts with 35 Sectors, 161 Cells and 1155 Villages. The study was limited to Kigali City and data collection was carried out from July to August 2023. The study participants were pensioners from Kigali City aged 60 years and above.

3.3. Study population

The study population was beneficiaries of RSSB who are living in Kigali City and having 60 years of age and above. The selected participants were in retirement during the survey. Early retirement for salaried employees begins at age 60, and late retirement at age of 65(2). Employees who have paid into the RSSB pension are eligible to receive their pension when they turn 60 years (60).

3.3.1. Inclusion criteria

All retired salaried men and women from Rwanda who had worked in private or public institutions with 60 years of age and above.

3.3.2. Exclusion criteria

People who worked in public and private institution aged between 60 and 65 years but not yet retired (still working) and those who had less of 60 years of age, Foreigners people and the population whose chronic physical and mental illnesses prevented them from providing information was excluded in the study.

3.4. Sample Size and sampling technics

The sample size was 220 participants who attended the research project in a study setting in a determined period of research. According to NCDs risk factors study Rwanda, 2021-2022, the prevalence of hypertension among elderly aged between 60-69 years was 43.2% while general population aged between 18-69 years was 16.8%(1).

The formula used to calculate the sample size:

$$\mathbf{n = \frac{z2P(1-P)}{e2} = \frac{1.962*0.168(1-0.168)}{0.052} = 215}$$

n: Sample size

z: Level of confidence

p= proportion of the baseline level of the indicator

e: Margin error

The sampling method was multistage sampling, whereby research participants were recruited from Villages by random sampling method in clustered cells. The participants were recruited from three Districts, 21 Sectors, 37 Cells and 45 Villages. To locate or find participants, whereby collaborating with RSSB and ARR, I obtained their locations and their lists. The information needed from RSSB and ARR was the names of pensioners, their Ages, the location of pensioners, and their phone numbers.

3.5. Study Variables

3.5.1 Dependent Variable

In this study, HBP has been defined as the use of antihypertensive medications within the previous two weeks of the study, confirmed high blood pressure by medical professionals throughout the study with an average systolic BP above 140 mmHg and an average diastolic BP above 90 mmHg. BP measurements were done in all participants to check high blood pressure. The high blood pressure has chosen for the study because of it is among public health issues in Rwanda.

Classification of blood pressure for adults

CATEGORY	SYSTOLIC BP (mmHg)	DIASTOLIC BP (mmHg)
Normal	90-140	60-90
High blood pressure	≥140	≥90

3.5.2 Independent Variables

The independent variables of the study were:

Social-demography factors

- **Age :** Age in years categorized in two groups,62-70 and 71-83
- **Gender** : Defined by sex organ, male and female
- **Educational level:** Educational level defined on whether participants had primary education, secondary and tertiary.
- **Occupational:** Defined whether the participants worked in health services, local and central government, teaching and others…
- **Wealth index/pensioners salaries:** pensioners salaries defined in monthly pension received.
- **Marital status:** Defined whether the participants was currently married, divorced or widowed
- **Residence:** Defined as resided districts of participants
- **Health insurance:** Defined as private or public insurance companies of participants

Co-morbidities factors

- **DM:** Have been defined whether participants had diabetes or not
- **HIV/AIDS :** Have been defined whether participants had HIV/AIDs or not

Behaviours factors

- **Tobacco Smoking:** Tobacco smoking was defined on whether participants currently smoke or had used to smoke on the past

- **Alcohol consumption**: Alcohol consumption was defined on whether participants currently consume alcohol or had used to consume alcohol on the past.

- **Physical inactivity and BMI:** Adults who are within the 25–29.9 BMI range are regarded as overweight. Obesity is defined as having a BMI of 30 or higher in an adult. Body mass index (BMI) was calculated by dividing a person's height by square meters (KG/M2). Based on the World Health Organization (WHO) classification, BMI categories have been created(47)**.**

- **Fruits consumption:** defined as number of days participants had eaten fruits
- **Vegetables consumption** : Defined as number of days participants had eaten vegetables

Occupational stress related factors

- **Ever worked in stressful condition:** Defined whether participants had worked in stressful condition or not
- **Time had stress at workplace:** Defined the time participants had stress at workplace by whether had it sometimes, several times or never had stress at work.

3.6. Data collection method

A structured interview questionnaire, physical measurements, and biochemical measurement (level of glucose in blood) were used to identify if it can be among factors of hypertension in participants. A questionnaire designed according to the “WHO Stepwise approach to chronic disease risk factor surveillance (STEPS)" to "STEP Survey developed by the country of Rwanda." The weight of the participants was measured by a digital scale. Stadio-meters have been used to measure height. Blood pressure was measured by using a standard sphygmomanometer BP cuff.

After outlining the objectives of the study, confidentiality, data security, and intended use of the data, the questionnaires have been filled out in private. Those who agreed to participate have been advised to seek clarification when needed. The participants received a call asking them to check their blood pressure and take other measurements at their nearest health center. For measuring blood pressure, participants were consented and blood pressure has taken twice in the interval of 30 min after the first measurement. To collect data needed in this research; the kobo toolbox has been used and facilitated the researcher to get the feedback in

this server for data management. The questionnaire was prepared in English and the investigator translated it into the local language (Kinyarwanda) to obtain the required information from the respondents.

3.7. Data analysis

For descriptive analysis, we used frequencies and percentages. First, we explored frequency distributors of socio-demographic and behavioral characteristics of participants, and finally, we did bivariate and multivariate logistic regression models to examine factors related to hypertension among pensioners. The variation among graphs was assessed using the Chi square test for statistical significance. Logistic regression analysis calculated odds. The level of significance was considered as P- a value less than 0.05. Analysis of data was performed by using the STATA version 15.1.

3.8. Ethical consideration

For considering the ethical clearance and scientific soundness, approvals confirmed and obtained from the Research Ethics Committee of the University of Rwanda –College of Medicine and Health Sciences, Institute Review Board (IRB), Rwanda National Ethical Committee (RNEC) was consulted in order to obtain information to beneficiaries or clients of RSSB. The written authorization for collecting data was obtained from Rwanda Social Security Board (RSSB) and City of Kigali. Participants were informed about the study and informed consent was obtained before collecting data. The information obtained from the participants was treated with respect, and high confidentiality.

CHAPTER 4: RESULTS

4.1. Description of socio-demographic and behavioral characteristics of participants.

Of a total of 220 participants, 142 (64.5%), were men and 78 (35.45) were women. Forty-four percent had their residence in Nyarugenge district; male aged 62-70 years were 51.82%. About Sixty three percent (63.64%) had a secondary level of education and 88.2% are legally married. A higher proportion for the occupation were pensioners from the local and central government (46.82%), see Table 1 for details.

Table 1**. Socio-demographic characteristics of participants (n=220).**

Variable	Frequency(n)	Percentage (%)
Names of residence		
Gasabo	61	27.73
Kicukiro	62	28.18
Nyarugenge	97	44.09
Gender		
Male	142	64.55
Female	78	35.45
Age (years)		
62-70	114	51.82
71-83	106	48.18
Health insurance		
RAMA and MMI	176	80
CBHI	44	20
Educational level		
Primary or less	16	7.27
Secondary	140	63.64
Tertiary	64	29.09
Occupation		
Health services	31	14.09
Local and central government	103	46.82
Teaching	61	27.73
Others	25	11.36

Marital status		
Current married	194	88.18
Divorced /widowed	26	11.82
Pensioners salaried per month /wealth index		
<100,000	44	20
100000 and above	176	80

4.2. Pensioners co-morbidities factors

Among respondents 20(9.09%) had HIV/AIDs while respondents with diabetes mellitus were 16(7.27%). (Table2).

Table 2**. Co-morbidities Factors of participants (n=220).**

Variables	Frequency(n)	Percentage (%)
Diabetes Mellitus		
Normal	204	92.73
High glucose	16	7.27
HIV/AIDS		
Positive	20	9.09
Negative	200	90.91

4.3. Pensioners behavioral characteristics

Fifty-six (56.36%) had a history of tobacco consummation while 12.39% had consumed tobacco products at the time of the survey. Also 83.64% of participants had drunk alcohol in the past. Out of 146 participants (66.36%) had BMI ≥25kg/m2 and 33.64% had normal BMI (Table3).

Table 3**. Behavioral characteristics of participants (n=220).**

Variables	Frequency(n)	Percentage (%)
BMI status		
Normal	74	33.64
Abnormal	146	66.36
History of tobacco consummation		
Yes	124	56.36
No	96	43.64
Current smoker		
Yes	27	12.39
No	193	87.73
History of alcohol drunk		
Yes	184	83.64
No	36	16.36
Current drunker		
Yes	83	37.73
No	137	62.27
Number of days ate fruits per week		
0 -2days	91	41.36
3 -5 days	112	50.91
6 – 7 days	17	7.73
Number of days ate vegetables per week		

0 – 2 days	9	4.09
3 -5 days	139	63.18
6 -7 days	72	32.73
Physical activity		
Yes	52	23.64
No	168	76

4.4. Occupational stress related factors of Participants

Out of 33 participants (15%) had worked in stressful conditions in the past while (85%) had not worked in stressful conditions. Among respondents, (58.18%) had sometime stress in the past, (14.55%) had stressed several times while (27.27%) never had stressed at workplace (Table4).

Occupation stress related factors

Variables	**Frequency(n)**	**Percentage (%)**
Ever worked in stressful condition		
Yes	33	15
No	187	85
Ever had stress at work		
Sometimes	128	58.18
Several times	32	14.55
Never	60	27.27

4.5. Proportion of Hypertension among participants

The mean of systolic and diastolic BP results were 139.83.8 mm Hg/89.43 mm Hg and respectively 140.11/89.90 mm Hg for males, and 139.32/88.58 mm Hg for females (figure 2).

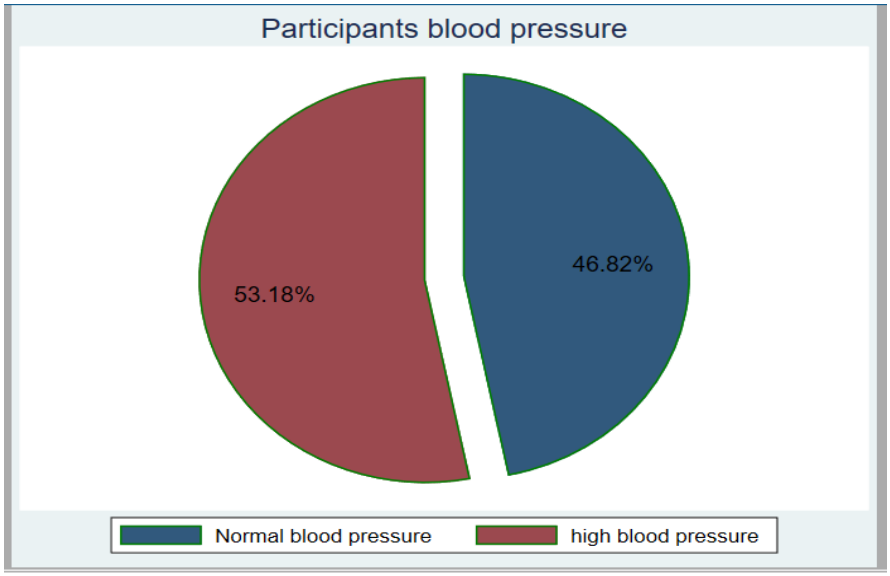

Figure 2**. The proportion of blood pressure among pensioners.**

4.6. Factors associated with hypertension

4.6.1. The socio-demographic factors with Hypertension

The results indicated the association between socio-demographic factors with HTN among respondents in this study. The respondents resided in Kicukiro district were statistically significant 2.4 times higher odds of developing HTN compared those resided in Gasabo (COR: 2.441, 95% C. I= 1.182-5.042). The respondents resided in Nyarugenge district were significantly 1.7 higher odds of developing HTN compared those resided in Gasabo (COR: 1.734, 95% C. I=0.907-3.3165). Pensioners who used CBHI had 57.6% less odds of developing hypertension (COR: 0.424, 95% C.I=0.214-0.840) compared with pensioners who had used RAMA and MMI. The BMI of respondents were 1.9 higher odds of HTN among respondents with abnormal BMI compared with respondents with normal BMI (COR: 1.988, 95% C.I=1.127-3.506). Occupation of respondents were 3.09 higher odds of developing HTN among respondents worked in local and central government (COR: 3.098, 95%, C. I=1.354-7.088) compared with respondents who had worked in health services (table3).

Table 4.**Bivariate analysis for the socio-demographic factors and hypertension (n=220)**.

Variables	HTN n (%)	Non-HTN n(%)	OR	95 %C.I)	P-value
Gender					
Male	77(65.81)	65(63.11)	(Ref)		
Female	40(34.19)	38(36.89)	0.88	0.510-1.545	0.676
Residences					
Gasabo	25(21.37)	36(34.95)	(Ref)		
Kicukiro	39(33.33)	23(22.33)	2.282	1.107-4.704	0.025
Nyarugenge	53(45.30)	44(42.72)	1.555	0.815-2.966	0.180
Health insurance					
RAMA &MMI	101(86.32)	75(72.82)	(Ref)		
CBHI	16(13.68)	28(27.18)	0.424	0.214-0.840	0.014
Age (years)					
62-70	59(50.43)	55(53.40)	(Ref)		
71-83	58(49.57)	48(46.60)	1.126	0.662-1.914	0.660
Level of education					
Primary	8(6.84)	8(7.77)	(Ref)		
Secondary	70(59.83)	70(67.96)	1	0.355-2.813	1.000
Tertiary	39(33.33)	25(24.27)	1.56	0.518-4.691	0.429
Occupation					
Health services	14(11.97)	17(16.50)	(Ref)		
Local and central government	74(63.25)	29(28.16)	3.098	1.354-7.088	0.007
Teaching	18(15.38)	43(41.75)	0.508	0.207-1.245	0.139
Others..	11(9.40)	14(13.59)	0.954	0.330-2.754	0.931
Marital status					
Current married	103(88.03)	91(88.35)	(Ref)		
Divorced/Widowed	14(11.97)	12(11.65)	1.030	0.453-2.342	0.942

Pensioners salaries/wealth index					
<100,000	18(15.38)	26(25.24)	(Ref)		
100000 and above	99(84.62)	77(74.76)	1.857	0.949-3.631	0.230
BMI status					
Normal	31(26.50)	43(41.75)	(Ref)		
Abnormal	86(73.50)	60(58.25)	1.988	1.127-3.506	0.018

4.6.2. Bivariate analysis: Lifestyle and co-morbidities factors with hypertension.

Pensioners who had consumed tobacco products had independently significant with 2.29 higher odds of developing HTN (COR: 2.293,95% C. I=1.33.3.952) compared with those who had not consumed tobacco products in their life. Respondents who had consumed alcohol had 2.65 higher odds of developing HTN (COR: 2.658, 95% C.I=1.253-5.638) compared with those who had not consumed alcohol in their life. Respondents with HIV/AIDs were 9.47 higher odds of developing HTN (COR: 9.473, 95% C.I=2.140-41.935) compared with no HIV/AIDs. Respondents with high blood glucose level were 15higher odds of developing HTN (COR: 15, 95% C. I =1.945-115.67) compared with pensioners with no diabetes mellitus (Table 4).

Table 5**.Bivariate analysis for behavioral and co-morbidities factors and hypertension (n=220)**.

Variables	**HTN n(%)**	**Non-HTN n(%)**	**OR**	**95 %C.I)**	**P-value**
History of tobacco consumption					
No	40(34.19)	56(54.37)	(Ref)		
Yes	77(65.81)	47(45.63)	2.293	1.330-3.952	0.003
Current smoker					
No	98(83.76)	93(92.08)	(Ref)		
Yes	19(16.24)	8(7.92)	2.253	0.941-5.398	0.068

History of alcohol drunker					
No	12(10.26)	24(23.30)	(Ref)		
Yes	105(89.74)	79(76.70)	2.658	1.253-5.638	0.011
Current alcohol drunker					
No	68(58.12)	69(66.99)	(Ref)		
Yes	49(41.88)	34(33.01)	1.462	0.842-2.537	0.176
Number of days ate vegetables per week					
6 - 7 days	6(5.13)	11(10.68)	(Ref)		
0 – 2 days	54(46.15)	37(35.92)	2.675	0.909-7.871	0.074
3 -5 days	57(48.72)	55(53.40)	1.9	0.657-5.492	0.236
Number of vegetable servings per days					
Twice or 3 times	2(1.71)	1(0.97)	(Ref)		
Never or once.	115(98.29)	102(99.03)	0.563	0.050-6.309	0.642
Number of days ate fruits per week					
6 - 7 days	6(5.13)	11(10.68)	(Ref)		
0 – 2 days	54(46.15)	37(35.92)	2.675	0.909-7.871	0.074
3 -5 days	57(48.72)	55(53.40)	1.9	0.657-5.492	0.236
Number of fruits servings per days					
Never or once	115(98.29)	102(99.03)			
Twice or 3 times	2(1.71)	1(0.97)	1.77	0.158-19.853	0.642
HIV/AIDS					
Negative	95(84.07)	100(98.04)	(Ref)		
Positive	18(15.93)	2(1.96)	9.473	2.140-41.935	0.003
DM					
Normal	102(87.18)	102(99.03)	(Ref)		
High glucose	15(12.82)	1(0.97)	15	1.945-115.67	0.009
Physical activity					
No	91(77.78)	77(74.76)	(Ref)		
Yes	26(22.22)	26(25.24)	0.0.936	0.502-1.744	0.835

4.6.3. Bivariate analysis for the occupation stress related factors and HTN

Respondents who had worked in stressful condition had 11.4 higher odds of developing HTN (COR: 11.494, 95% C.I = 3.389-38.973) compared with those who had not worked in stressful condition. Respondents who had had sometimes stress at work had 3.8 higher odds of HTN (COR: 3.857, 95% C.I = 1.952-7.619) while those with several times stress at work had 45 higher odds of developing HTN (COR: 45,95%=9.589-211.17) Compared to those who had never had stress at workplace (Table 5).

Table 6.**Bivariate analysis for the occupation stress related factors and HTN.**

Variables	**HTN n (%)**	**Non-HTN n(%)**	**OR**	**95 %C.I)**	**P-value**
Ever worked in stressful condition					
No	87(74.36)	100(97.09)	(Ref)		
Yes	30(25.64)	3(2.91)	11.494	3.389-38.973	<0.001
Times had stress at work					
Never	15(12.27)	45(43.69)	(Ref)		
sometimes	72(61.54)	56(54.37)	3.857	1.952-7.619	<0.001
Several times	30(25.64)	2(1.94)	45	9.589-211.17	<0.001

4.7. The factors associated with hypertension among pensioners.

The multivariate regression was performed to recognize factors associated with hypertension among the pensioners. After removing non-significant effects, the analysis identified three factors independently associated with hypertension. Respondents with HIV/AIDS had 18.4 higher odds of developing HTN (adjusted OR: 18.405, 95% C.I =3.228-104.93) compared with respondents with no HIV/AIDs. Respondent with DM (diabetes mellitus) had 16.8 higher odds of developing HTN(adjusted OR: 16.873, 95%C.I=1.591-178.84) compared with respondents with no DM(diabetes mellitus) . Respondents who had sometimes stress at work had 2.9 higher odds of developing HTN (adjusted OR: 2.902, 95% C.I=1.2000-7.021) compared with those who never had stress. Respondents who had had stress several times at work, had 13.5 higher odds of developing HTN (adjusted OR: 13.514, 95% C.I=1.2000-7.021) compared with those who never had stress (Table 6).

Table 7**. Multivariate Analysis for factors predictors of hypertension in pensioners.**

.

Variables	**HTN n (%)**	**Non-HTN n (%).**	**OR**	**95 %C.I)**	**P-value**
Residences					
Gasabo	25(21.37)	36(34.95)	(Ref)		
Kicukiro	39(33.33)	23(22.33)	1.117	0.330-3.781	0.858
Nyarugenge	53(45.30)	44(42.72)	0.986	0.345-2.813	0.979
Health insurance					
CBHI	16(13.68)	28(27.18)	(Ref)		
RAMA &MMI	101(86.32)	75(72.82)	1.753	0.680-4.519	0.245
Occupation					
Health services	14(11.97)	17(16.50)	(Ref)		
Local and central government	74(63.25)	29(28.16)	2.529	0.862-7.415	0.091
Teaching	18(15.38)	43(41.75)	0.826	0.260-2.617	0.746
Others..	11(9.40)	14(13.59)	1.425	0.347-5.847	0.623
Pensioners salaries/wealth index					
<100,000	18(15.38)	26(25.24)	(Ref)		
100000 and above	99(84.62)	77(74.76)	0.992	0.162-6.067	0.994
HIV/AIDS					
Negative	95(84.07)	100(98.04)	(Ref)		
Positive	18(15.93)	2(1.96)	18.405	3.228-104.93	0.001
DM					
Normal	102(87.18)	102(99.03)	(Ref)		
High glucose	15(12.82)	1(0.97)	16.873	1.591-178.84	0.019
History of tobacco consumption.					
No	40(34.19)	56(54.37)	(Ref)		
Yes	77(65.81)	47(45.63)	0.1326	0.568-3.097	0.514
History of alcohol drunker					
No	12(10.26)	24(23.30)	(Ref)		
Yes	105(89.74)	79(76.70)	2.514	0.744-8.488	0.138

BMI status					
Normal	31(26.50)	43(41.75)	(Ref)		
Abnormal	86(73.50)	60(58.25)	1.366	0.611-3.054	0.446
Ever worked in stressful condition					
No	87(74.36)	100(97.09)	(Ref)		
Yes	30(25.64)	3(2.91)	3.796	0.805-17.897	0.092
Times had stress at work					
Never	15(12.27)	45(43.69)	(Ref)		
sometimes	72(61.54)	56(54.37)	2.902	1.2000-7.021	0.018
Several times	30(25.64)	2(1.94)	13.514	2.205-82.825	0.005

CHAPTER 5: DISCUSSION

The study aimed to determine the prevalence and risk factors among pensioners in Kigali City. The study done on NCDs risk factors in 2021-2022, the prevalence of hypertension among elderly aged between 60-69 years was 43.2% while general population aged between 18-69 years , was 16.8% (1). The prevalence of hypertension in this study was 53.18%, which higher to the previous studies among elderly people.

In this study, most of participants were male's equals to 64.55% with a higher prevalence compared to female. The results from this study, was different with the previous report done on Non-Communicable Diseases risk factors study Rwanda, 2021-2022, where the half of cases of HTN were females aged between 60-69 years . The prevalence of hypertension among females aged between 18-69 years in previous study, were 17.9% while males were 15.7%. In Brazil, the study done in 2008 among people aged above 65 years, showed a prevalence of hypertension of 60.6% which also higher to the prevalence of the current study (25). In Argentine, the prevalence of hypertension among people aged 65 years and above was 71% (23).

In this study, gender, education level, marital status, time participants did physical activity, history of alcohol use, history of tobacco use and wealth index manifested by their monthly pensions were not significantly associated with hypertension.

Regarding the level of education the higher prevalence was in secondary level of education, equals to 55% of participants. The higher prevalence of hypertension also, was in the secondary school of education with 58.12%, followed by those who had tertiary with 33.33% and those with primary education were 8.55% hypertensive among respondents. In Ethiopia, the study found that the prevalence of hypertension among post graduates was 54% with 17.6% for those with a university degree (38). The study in developed nations showed how risk factors for hypertension are more common among less educated groups. In Bangladesh and India study done, showed how higher educational levels are linked to an increased risk of hypertension (37). For this study, it is not the same, because less prevalence was in primary school, and high prevalence of hypertension cases was among respondents in the secondary school.

In current study, the marital status of participants included current married with 88.03% while divorced and widowed were 11.97%.The prevalence of hypertension was found to be inversely correlated with marital status in Iraq. About gender and hypertension , males

(65.81%) were higher compared to females with 34.19%.In Malawi and the United States research revealed a real link between hypertension and gender, but there was no clear difference in prevalence between women and men (35).

Regarding occupational status, big number of respondents worked in local and central government (46.82%). Local and central government's employees had a high prevalence of hypertension at 46.82% followed by respondents who worked in education (teachers) at 27.73%, health service employees were 14.09% and other employees were 11.36%. The study revealed that noise exposure like those in industries, increased plasma noradrenaline and angiotensin II levels, causing endothelial dysfunction and activation of the renin-angiotensin system, both of which increased BP and recommend how certain jobs put employees at risk for diseases caused by exposure to pollutants or chemicals (44). In Nigeria, the civil services employees and those in trading sector accounted for 61.7% of hypertension population (16).

About 12.39% of respondents had currently consumed tobacco products. Regarding types of tobacco product consumption, all respondents (100%) consumed manufactured cigarettes. 56.36% had used tobacco products in their life. Out of a total of respondents 220, about 12.39% of respondents had currently consumed tobacco products. According to Rwanda NCDs risk factors report, among the participants aged 15-64 years, 19.1% of men and 7.1% of women were current tobacco smokers. Regarding types of tobacco product consumption, all respondents (100%) consumed manufactured cigarettes. 56.36% had used tobacco products in their life (22).

Among respondents 29.9% were females as alcohol consumer and 70.1% were males. According to Rwanda, NCDs risk factors reports, overall 55.3% of survey respondents had drunk alcohol and among them 65% were males and 46.7% were females. The study showed how retirees may use alcohol to fill free time and deal with the pressures of retirement as a significant life event change and raises alcohol consumption with incidence of drinking issues which lead to HBP (11)

Respondents with diabetes mellitus and HIV/AIDS had higher odds of high blood pressure compared with those who had no diabetes mellitus and HIV/AIDs. Its prevalence was respectively 7.27% and 9.09%. The study found that, the individuals with HIV/AIDS, diabetes mellitus, and stress at work had higher odds of developing HTN compared to those without these conditions (29). Recent study done in CHUK on common NCDS in adults

people living with HIV , hypertension was the disease with the highest prevalence (22%) (29).

Respondents who had experienced stress multiple times at work had higher odds of developing HTN compared with those who had never stress at work. The study in Japan showed how healthcare professionals; nurses and doctors feel moderate stress at work while their staff feel less stress (19).In Bangladesh , Significant stress-related risk factors included working overtime, having a heavy workload, time constraints, challenging or complex tasks, not taking enough breaks, monotony, and poor physical health (43).

Limitations

- The first major limitation was absence of the NCDs information on pensioners including hypertension in Rwanda Social Security Board which required the researcher to get all needed information to participants without basic or complementary information.
- This research accounted the important insights into the relationship between the sample size and student performance, which does not, integrated the impact of other potentially influential variables .The future research could benefit from a mixed method approach with case-control study design.
- Despite my best efforts to develop a comprehensive survey, there remained a risk of survey error, which was including measurements for hypertension and blood glucose, coverage to maximize the sample size, and the non-respondents.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

This study showed that the prevalence of hypertension among pensioners in Kigali City was 117 (53.18%). The analytical component of the study indicated that HIV/AIDS, DM (diabetes mellitus) and time pensioners had stress at the workplace were statistically significant predictors of hypertension among pensioners.

In particular, it is important to pay more attention on the teaching of hypertension related risk factors among different career professionals in order to reduce the future increases in prevalence of hypertension which complicated to cardiovascular diseases.

Therefore, there is a need of mass campaign for HIV prevention, mass screening of hypertension specifically workplace related profession, health education related to stress management at the workplace, regular exercise and lifestyle modifications to prevent the type II diabetes among but also focusing on the future pensioners.

6.2. Recommendations

1. The Ministry of Health should be recommended the public education and mass campaigns for HIV prevention, including high blood pressure screening to be effectively diagnosed and prevent hypertension among concerned population before retirement.
2. In the study, the prevalence of pensioners who did physical activity was 23.64% .So, I recommend Kigali City to mobilize pensioners on physical activity through car free day for example and being monitored the attendance in the Sectors , promote health education in primary healthcare, focus on weight loss, smoking restrictions, alcohol reduction in order to prevent type II diabetes.
3. Rwanda Social Security Board (RSSB) should address health issues related to NCDs, encourage research on primary prevention of high blood pressure, and introduce risks across various domains based on the data from pensioners.
4. I recommend the governments of Rwanda, to provide for a social protection related NCDs including hypertension and to include pensioners with socially life problems.
5. Sustainable community programs should encourage quitting smoking, reducing alcohol intake, consuming fruits and vegetables, weight loss, proper exercise, lifestyle modification, focusing hypertension prevalence reduction , active hobbies to manage stress and prevent future pensioners with high blood pressure related workplace stress.

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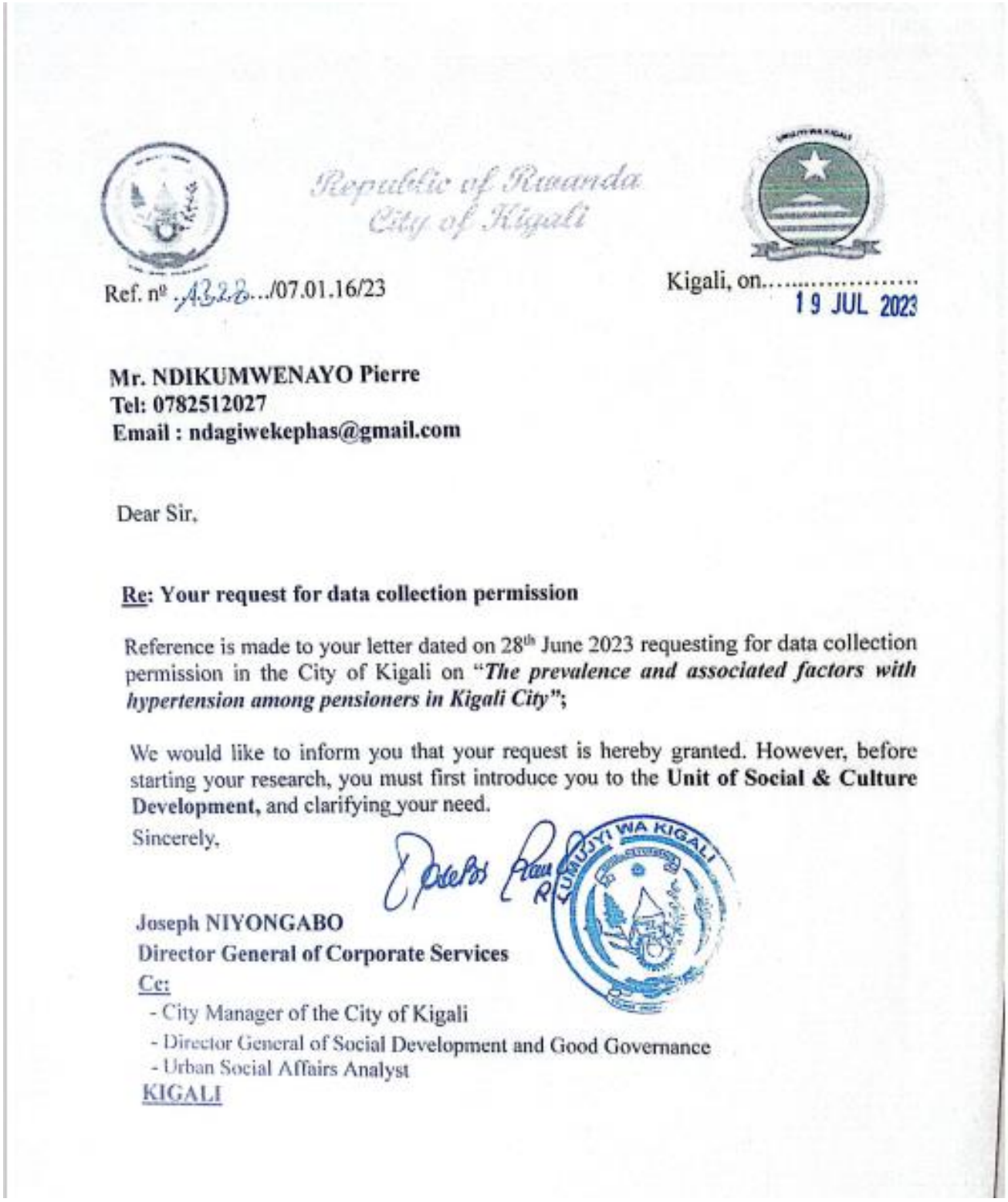
APPENDIX

Appendix 1: Recommendation letter from Kigali City



Republic of Rwanda
City of Kigali

Ref. nº 4328.../07.01.16/23

Kigali, on..... 19 JUL 2023

Mr. NDIKUMWENAYO Pierre
Tel: 0782512027
Email : ndagiwekephas@gmail.com

Dear Sir,

Re: Your request for data collection permission

Reference is made to your letter dated on 28th June 2023 requesting for data collection permission in the City of Kigali on ***"The prevalence and associated factors with hypertension among pensioners in Kigali City"***;

We would like to inform you that your request is hereby granted. However, before starting your research, you must first introduce you to the **Unit of Social & Culture Development,** and clarifying your need.

Sincerely,

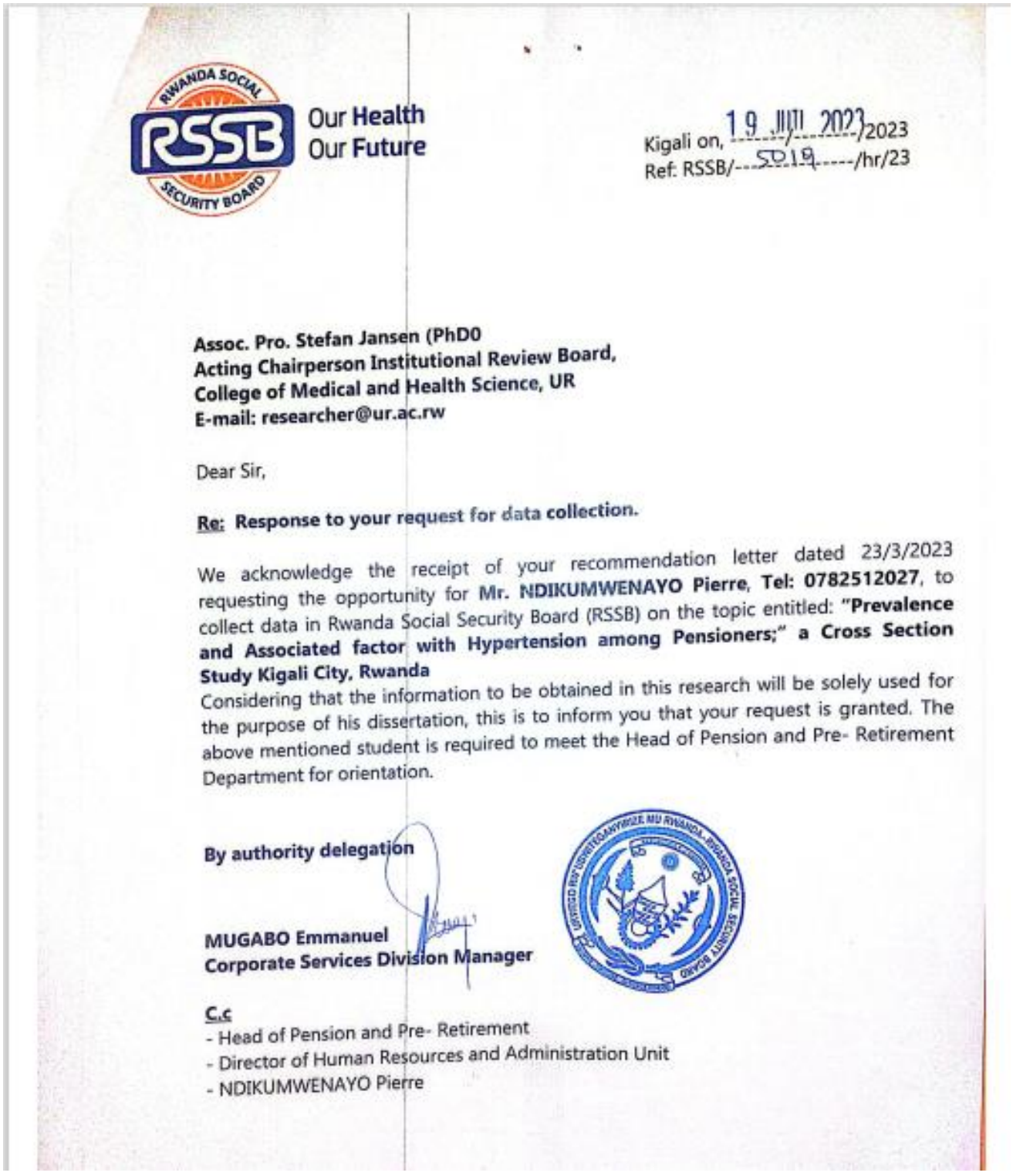
RUMUJYI WA KIGALI

Joseph NIYONGABO
Director General of Corporate Services

Cc:
- City Manager of the City of Kigali
- Director General of Social Development and Good Governance
- Urban Social Affairs Analyst

KIGALI

Appendix2:Recommandation letter from Rwanda Social Security Board (RSSB)



Our Health
Our Future

Kigali on, 19/07/2023
Ref: RSSB/---SD19---/hr/23

Assoc. Pro. Stefan Jansen (PhD0
Acting Chairperson Institutional Review Board,
College of Medical and Health Science, UR
E-mail: researcher@ur.ac.rw

Dear Sir,

Re: Response to your request for data collection.

We acknowledge the receipt of your recommendation letter dated 23/3/2023 requesting the opportunity for **Mr. NDIKUMWENAYO Pierre, Tel: 0782512027**, to collect data in Rwanda Social Security Board (RSSB) on the topic entitled: **"Prevalence and Associated factor with Hypertension among Pensioners;" a Cross Section Study Kigali City, Rwanda**
Considering that the information to be obtained in this research will be solely used for the purpose of his dissertation, this is to inform you that your request is granted. The above mentioned student is required to meet the Head of Pension and Pre- Retirement Department for orientation.

By authority delegation

MUGABO Emmanuel
Corporate Services Division Manager

C.c
- Head of Pension and Pre- Retirement
- Director of Human Resources and Administration Unit
- NDIKUMWENAYO Pierre

Appendix 3: Ethical clearance from UR-College of Medicine and Health Sciences.

UNIVERSITY of RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 23/06/2023
Ref: CMHS/IRB/**278**/2023

NDIKUMWENAYO Pierre
School of Public Health, CMHS, UR

Dear NDIKUMWENAYO Pierre,

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled ***"Prevalence and Associated Factors with Hypertension among Pensioners; A Cross Sectional Study in Kigali City, Rwanda".***

Having reviewed your application and been satisfied with your protocol, 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.

Assoc. Prof. Stefan Jansen (PhD)
Acting Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Ce:

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

Appendix4:Ethical clearance from Rwanda National Ethical Committee (RNEC)

REPUBLIC OF RWANDA/REPUBLIQUE DU RWANDA

RWANDA NATIONAL RESEARCH ETHICS COMMITTEE / COMITE NATIONAL D'ETHIQUE DE LA RECHERCHE

E-mail: info@rnecrwanda.org
Web site: www.rnecrwanda.org

Ministry of Health
P.O. Box. 84
Kigali, Rwanda.

FWA Assurance No. 00001973
IRB 00001497 of IORG0001100

28 July 2023

NDIKUMWENAYO Pierre
Registration number: 221028361
School of Public Health, CMHS, UR

RE: ETHICAL CLEARANCE

Your research protocol titled **"PREVALENCE AND ASSOCIATED FACTORS WITH HYPERTENSION AMONG PENSIONERS; A CROSS SECTIONAL STUDY IN KIGALI CITY, RWANDA"** has been approved by the Rwanda National Ethics Committee.

This decision is based on the attached IRB approval from UR Ethical Review Board dated 23 June 2023.

Sincerely,

R.N.E.C

Date of Approval: 23 June 2023

Expiration date: 22 June 2024

Dr. Jean-Baptiste MAZARATI
Chairperson, Rwanda National Research Ethics Committee.

The Rwanda National Research Ethics Committee, (RNEC), was established by Law N°. 015/2022 of 29/06/2022 Relating to Research on a Human Being in its Article 4.

Appendix 5:City of Kigali map

The following map was extracted from the Kigali City Master Plan for more details

Source: Kigali city administrative map,2013

Appendix6.Consent forms

We chose you as a purposive participant in this study because you are retirees from employment in Kigali City. Before accepting to participate in this research, it is better that you read the following explanations of this study. The following statements give details of the study.

Explanation of Procedures: This research study will assess the prevalence and associated factors with hypertension among pensioners in Kigali City.

To participate in this study you will answer some questions applicable to the research topic.

Risks or Discomforts: There are no risks or any discomforts in this study.

Benefits: The importance of participation is the chance to know more about Hypertension including his/her status during answering asked questions about the factors associated to the disease.

Confidentiality: The information that you will give will always be confidential. The researcher only will have access the information. Your names will not be required. I will publish results form of a paper and may be published in journal or be presented at expert meetings. The information is helpful to the country.

Names of the participant	Signature	Date
…… …….		…… ……

Names of researcher	Phone	Signature	Date
NDIKUMWENAYO Pierre	+250782512027	……...	……..

URUPAPURO RWO KWEMERERWA GUSUBIZA MU BUSHAKASHATSI

Ubushakashatsi: Uhawe ikaze mukugira uruhare mubushakashatsi bwo **"Kureba ubumenyi, imibare ndetse n'ibitera indwara y'umuvuduko ukabije mu bari mu kiruhuko cy'izabukuru mu mujyi wa Kigali.**".

Turakwinginze kuko ubufasha bwawe bukenewe cyane muri ubu bushakashatsi. Soma amakuru akurikira witonze mbere yuko wemera cyangwa uhakana kubugiramo uruhare.

Uko bikorwa: Uragira uruhare muri ubu bushakashatsi usubiza ibibazo byoroheje turi bukubaze habubiyemo ibijyanye n'uburwayi ndetse n'ibindi bijyanye n'ubushakashatsi. Birafata iminota mirongo itatu cg itagezeho.

Imbogamizi cyangwa ibyateza ingorane: Muri ubu bushakashatsi ntabyateza ingorane bigaragara ko byabaho. Ntambogamizi ziri mugusubiza ibi bibazo.

Akamaro k'ubu bushakashatsi: "Kureba ubumenyi, imibare ndetse n'ibitera indwara y'umuvuduko ukabije w'amaraso mu baturage bari mu kiruhuko cy'izabukuru mu mujyi wa Kigali.Ibizava muri ubu bushakashatsi bizagira icyo bihindura mu gukurikirana iyi ndwara ndetse no kuyirinda mu byiciro bitandukanye ,cyane cyane abakora ibikorwa bitandukanye,yaba abakorera Leta cg abikorera.

Ibijyanye n'ibanga mubushakashatsi: ibizava muri ubu bushakashatsi bizabikwa mu buryo bw'ibanga, bizemererwa gusa abashakashatsi. Ibyavuye mu bushakashatsi nibiramuka bishyizwe kumugaragaro, bizasohoka mu buryo bukomatanyije kuburyo umuntu kugiti cye adashobora kugaragaramo.

Gufasha mubushakashatsi kubushake bwawe: Gufasha ni ubushake bwawe. Niba wumva hari uburyo washyizwe mu bushakashatsi utabyemera, dufashe ubimenyeshe umushakashatsi; Ntugire impungenge kuko wemerewe kudasubiza ikibazo cyose kitakunyuze. Nanone ubu bushakashatsi bwagenzuwe na Kaminuza y'U Rwanda muri komite ishinzwe ubuziranenge bw'ubushakashatsi. Nasomye amakuru yose yanditse kuri iyi nyandiko. Ndemera gusubiza muri ubu bushakashatsi.

Umukono……. ……..…… Itariki…….

Umukono w'umushakashatsi…… Itariki…….

Appendix 7. Survey questionnaire

Participant Identification Number:……/……/……/……/……/

Survey information

No	Location and Date	Response
1	**Cluster/Village/ID** Nimero y'umudugudu	**……./……./……..**
2	**Cluster/Village name** /Izina ry'umudugudu	
3	**Interviewer Id** Nimero y'ubaza	……/……/……

	Consent ,Interview language and name	**Response……**
4	Consent has been read and obtained Yemeye ku bushake kubazwa	Yes 1 No 2 **if no, END**
5	Interview language (insert language) Ururimi rukoreshwa mu kubaza	Kinyarwanda 1 English 2
6	Contact Phone number where possible Nimero ya telefone abarizwaho(niba ihari)	

Step 1 Demographic information

	Questions	**Response**
7	Sex (Record Male / Female as observed) Igitsina (gabo/gore, uko ubibona)	Male 1 Female 2
8	What is your date of birth? Itariki y'amavuko Don't Know 77 77 7777 Ntabyo nzi	……/……/……../ DD MM YY If known ,go to C4
9	How old are you? Mufite imyaka ingahe? Don't Know 00	……../…….. Years

	Ntabizi	

10	What is the **highest level of education** you have completed? Niyihe mpamyabumenyi isumba izindi ufite?	❖ Primary 1 ❖ Secondary 2 ❖ Tertiary 3
11	What is your **marital status**? Irangamimerere ryawe ni rihe?	❖ **Currently married** 2 Yarashatse ❖ **Separated** 3 Ntabana n'uwo bashakanye ❖ **Divorced** 4 Yatandukanye n'uwo bashakanye byemewe n'amategeko ❖ **Widowed** 5 yarapfakaye ❖ **Refused** 88 Nta gisubizo
12	Which of the following best describes your **Occupation (main work)** over the past 12 months? Mu milimo ikurikira, Ni uwuhe murimo w'ingenzi wari ufite mu mezi 12 ashize?	❖ **Government employee** 1 Akorera leta ❖ Local and central government employee (Umukozi w'urwego rw'ubutegetsi). ❖ Teaching (Kwigisha) ❖ Health services (Ukora mu rwego rw'ubuvuzi) ❖ **Others…(Ibindi…)**
13	What the amount of money, can you give an estimate of the annual household income if I read some options to you? Is it	❖ <100,0000 1 ❖ 100,000 and above 2

	Amafaranga uhabwa ku kwezi ni angahe?	

Step1 Behavioural measurements

	Questions	Response
14	Have you ever smoked any tobacco products such as cigarettes, cigars or pipes? (USE SHOWCARD)	Yes 1 No 2
15	Do you currently smoke any tobacco products, such as cigarettes, cigars or pipes? (USE SHOWCARD) Waba unywa itabi nk'isigara, itabi ryo mu nkono, ubugoro, urumogi..…..?	Yes 1 No 2
16	On average, how many of the following do you smoke each day? Ugereranyije mu bwoko bw'itabi bukurikira unywa imiti ingahe burimunsi Don't Know 77 Ntabizi	Manufactured cigarettes ……./……. Hand-rolled cigarettes ……/…… Pipes full of tobacco ……./…… Cigars, cheroots, cigarillos ……../……..
17	During the past 12 months, have you	Yes 1

	tried to stop smoking?	No 2
22	During the past 7 days, on how many days did someone in your home smoke when you were present? Mu minsi irindwi ishize umuntu mubana mu nzu yaba yaranyweye itabi muri kumwe?	Number of days ……../…….

	Question	**Response**
23	Have you ever consumed an alcoholic drink such as beer, wine, spirits, and fermented local beer? Waba warigeze kunywa inzoga nka ikigage, divayi, wiski,urwagwa,byeli……?	Yes 1 No 2
24	Have you consumed an alcoholic drink within the past 12 months? Waba warigeze kunywa inzoga mumezi cumi nabiri ashize?	Yes 1 No 2

	Question	**Response**
28	In a typical week, on how many days do you eat fruit? Waba urya imbuto inshuro zingahe mu cyumweru?	Number of days ……../……
29	How many servings of fruit do you eat on one of those days? muri iyo minsi urya imboga, uzirya inshuro zingahe ku munsi?	Number of servings ……/…….
30	In a typical week, on how many days do you eat **vegetables**? Waba urya imboga mu minsi	Number of days ……../……. Don't Know 77 If Zero days, go to D5

	ingahe mu cyumweru?	
31	How many **servings** of vegetables do you eat on one of those days? Muri iyo minsiurya imboga,uzirya inshuro zingahe ku munsi?	Number of servings ……../……. Don't know 77

32	What type of oil or fat is most often used for meal preparation in your household? Mukunze gukoresha ayahe mavuta mu guteka?	Vegetable oil 1 Lard or suet 2 Butter or ghee 3 Margarine 4 Other 5 other None in particular 6 None used 7 Don't know 77 Other ……./……./……./……../….
33	On average, how many meals per week do you eat that were not prepared at a home? By meal, I mean breakfast, lunch and dinner. Ugereranyijye ni kangahe urya hanze ibitateguriwe murugo?	Number ……./……. Don't know 77

Question		**Response**
Question		**Response**
37	Do you do any vigorous-intensity sports, fitness or recreational (leisure) activities that cause large increases in	Yes 1

	breathing or heart rate like [running or football] for at least 10 minutes continuously? Waba ukora imyitozo ngorora mubiri ituma hababo guhumeka cyangwa umutima utera cyane?	No 2
38	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that cause a small increase in breathing or heart rate such as brisk walking, [cycling, swimming, volleyball] for at least 10 minutes continuously? Waba ukora imyitozo ngorora mubiri itera umutima gutera cyangwa guhumeka cyane?	Yes 1 No 2

39	How much time do you usually spend sitting or reclining on a typical day? Umara igihe kingana gute wicyaye?	Hours : ……./……./……. hrs mins

	Question	**Response**
40	Have you ever had your blood pressure measured by a doctor or other health worker? Wari wasuzumwa nu muganga umuvuduko wa maraso?	Yes 1 No 2
41	Have you ever been told by a doctor or other health worker that you have raised blood pressure or	Yes 1 No 2

	hypertension? Hari ubwo muganga yakubwiye ko ufite umuvuduko w'amaraso uri hejuru?	
42	Have you been told in the past 12 months? Wabibwigiwe mu mezi 12 ashize?	Yes 1 No 2

43		
	Drugs (medication) that you have taken in the past two weeks. Waba warafashe imiti mu byumweru 2 bishize ?	Yes 1 No 2

	Question	**Response**
46	Have you ever had your blood sugar measured by a doctor or other health worker? Wari wasuzumwa na muganga isukari mu maraso?	Yes 1 No 2
47	Have you ever been told by a doctor or other health worker that you have raised blood sugar or diabetes? Hari ubwo muganga yakubwiye ko ufite isukari mu maraso iri hejuru?	Yes 1 No 2
48	Have you been told in the past 12 months? Wabibwigiwe mu mezi 12 ashize?	Yes 1 No 2

53	Have you been told by a doctor or other health worker that you have asthma? Wari wasuzumwa na muganga ku bwo kubura umwuka?	Yes 1 No 2

59	Have you even been tested for HIV?	Yes 1 No 2 Refused to respond 88
60	If, Yes what was the result of the most recent test?	Positive 1 Negative 2 Refused to respond 88
61	Are you currently receiving care and treatment for your positivity to HIV (pre ART)?	Yes 1 No 2 Refused to respond 88

Step 2 Physical measurements

	Question	Response
63	Device IDs for height and weight	Height ……/…….. Weight ……../…….
64	Height	in Centimetres (cm) ……../……/……. /…….
65	Weight	in Kilograms (kg) ……./……/……/……
66	Interviewer ID	……../……/…….
69	Reading 1	Systolic (mmHg) ……../……

		Diastolic (mmHg) ……../……
70	Reading 2	Systolic (mmHg) ……../…… Diastolic (mmHg) ……../……

Step 3 Biochemical measurements

	Question	**Response**
72	During the past 12 hours have you had anything to eat or drink, other than water?Mu masaha 12 ashize, waba wariye cyangwa wanyoye ikinu uretse amazi?	Yes 1 No 2
76	Fasting blood glucose Choose accordingly: mmol/l or mg/dl	mmol/l ……../……./…… mg/dl ……../……./……