

# Prevalence and Associated Factors of Hypertension among Adult Population aged between 40-75 Years Visiting Kibuye Referral Hospital

<sup>1</sup>UWIMANA Perpetue, <sup>2</sup>Dr. Amos HABIMANA

<sup>1,2</sup>School of Public Health, Mount Kenya University

DOI: <https://doi.org/10.5281/zenodo.17542080>

Published Date: 06-November-2025

---

**Abstract:** Despite ongoing health interventions and policy initiatives, hypertension awareness and control remained limited, highlighting the need for targeted health strategies across East Africa to address the growing incidence of hypertension. This gap in awareness contributed to complications such as stroke and ischemic heart disease, which emerged as leading causes of mortality in the region. This study investigated the prevalence and associated factors of hypertension among adults aged 40-75 years at Kibuye Referral Hospital. The specific objectives were to determine the prevalence of hypertension within this age group and to identify contributing factors among outpatients. Utilizing a descriptive research design with a quantitative approach, data were gathered through questionnaires and document analysis. The study targeted adult outpatients from November 2024 to January 2025, with a sample of 390 respondents selected through simple random sampling. Data were analyzed using SPSS, employing Chi-square and logistic regression to assess associations and risk factors. The overall prevalence of hypertension was 30% (117 out of 390). Hypertension was significantly higher among males ( $p = 0.001$ ), individuals aged 40–49 years ( $p = 0.001$ ), and those with no formal education or low monthly income ( $p = 0.001$ ). Dietary factors such as low fruit and vegetable intake, high salt consumption, and frequent intake of processed foods were significantly associated with hypertension. Behavioral factors including smoking, alcohol use, and physical inactivity, were also significantly linked to increased hypertension risk ( $p = 0.001$ ). The study revealed a high burden of hypertension among adults in Kibuye, with strong associations to modifiable risk factors. Effective community health interventions, public education on healthy lifestyles, regular screening, and integration of non-communicable disease prevention into primary health care are urgently needed to address this growing public health concern.

**Keywords:** (MeSH): Prevalence, Associated Factors of Hypertension, Adult Population.

---

## 1. INTRODUCTION

In this chapter, the study's background, problem statement, objectives, research questions, significance, limitations, scope, and organization were all covered. Nearly 39 percent of people worldwide suffer from hypertension, also referred to as high blood pressure, which is the most frequent cardiovascular risk factor (World Health Organization [WHO], 2023). This illness contributes significantly to the development of cardiovascular diseases (CVDs), which increase the global burden of non-communicable diseases (NCDs) by accounting for more than 45% of deaths from NCDs globally (WHO, 2023). Globally, the prevalence of hypertension is expected to increase from 972 million adults in 2000 to an estimated 1.56 billion by 2025, underscoring its growing impact (WHO, 2023). Each year, hypertension is responsible for approximately 7.5 million deaths, representing 12.8% of all global deaths (WHO, 2020).

This high mortality rate is particularly concerning in low- and middle-income countries, where nearly two-thirds of cardiovascular-related deaths occur (Cappuccio & Michelle, 2016). In these regions, the economic burden is also significant, with annual costs for hypertension management—including healthcare services, medication, and lost productivity—reaching approximately \$46 billion (Cappuccio & Michelle, 2016). Hypertension continues to be a serious health concern

in high-income nations like the United States and throughout Europe. About 70 million adults (29%) in the US have hypertension, yet only 52 percent of them have it under control (Nwankwo et al., 2023).

Similarly, Europe reports a prevalence rate ranging from 30% to 45%, with an upward trend expected as populations continue to age (ESC, 2023). In 2009, the global prevalence of hypertension among adults aged 25 and older was approximately 40%, with Africa recording the highest regional prevalence at 46%, compared to 35% in the Americas (WHO, 2019). By 2010, over 1.3 billion individuals were living with hypertension globally, resulting in 7.5 million deaths and 57 million disability-adjusted life years (DALYs) (WHO, 2023).

In Africa, hypertension has emerged as a significant and escalating public health issue. The continent faces the highest global prevalence of hypertension, driven by rapid demographic transitions, urbanization, and changing lifestyles. Many African countries are experiencing increased rates of hypertension, yet face limited healthcare resources, low levels of public awareness, and insufficient screening and treatment services. These challenges are further compounded by socioeconomic factors, which hinder effective hypertension control and prevention.

Sub-Saharan Africa, in particular, has witnessed a substantial rise in hypertension prevalence in recent years. Studies have attributed this trend to urbanization, sedentary lifestyles, dietary shifts, and limited access to quality healthcare. In countries such as Nigeria and Ghana, hypertension prevalence ranges between 25% and 30%, with many cases undiagnosed or inadequately managed due to healthcare system constraints. Similarly, within the East African Community (EAC)—including Kenya, Uganda, and Tanzania—urban populations are disproportionately affected, with contributing factors including unhealthy diets, low physical activity, and rising obesity rates. Adults over 35 years are especially vulnerable, and despite health policies and interventions, awareness and control of hypertension remain suboptimal, emphasizing the need for targeted strategies.

In Rwanda, hypertension is increasingly acknowledged as a pressing health concern. National estimates suggest a prevalence rate of 15% to 17%, with higher rates observed in urban areas due to dietary changes, increased intake of processed foods, and decreased physical activity. According to the WHO (2019), Rwanda has low levels of hypertension awareness and screening, which leads to a large number of untreated and undetected cases. These cases can progress to serious consequences like stroke and ischemic heart disease, which are currently among the leading causes of death.

Okesina et al. (2024) examined hypertension in Ndera Sector of Rwanda's Gasabo District, reporting a 15% prevalence, with all identified cases being newly diagnosed. Their findings revealed that men had higher mean systolic blood pressure than women, while women exhibited higher body mass index (BMI). Key risk factors included age, BMI, and lack of awareness. In a different study, Niyonkuru and Habtu (2021) found that the prevalence was 36% among Rwandan working individuals between the ages of 27 and 67. They identified risk variables that could be changed, such as age and family history, as well as those that couldn't be changed, such as obesity, alcohol consumption, and physical inactivity.

While studies have been conducted in several Rwandan regions, there remains a paucity of data specific to the Western Province, particularly at Kibuye Referral Hospital. Insights from adjacent areas, such as the Southern Province, provide some context. For example, Ruhinduka and Muvunyi (2020) found significant associations between hypertension and factors like obesity, high salt intake, and physical inactivity. Ndayisaba (2019) identified major gaps in public knowledge, attitudes, and practices related to hypertension control, while Munyandamutsa and Niyonsenga (2021) demonstrated the effectiveness of community-based prevention strategies in rural settings.

This study, conducted at Kibuye Referral Hospital in Rwanda's Western Province, seeks to fill the existing data gap by examining the prevalence of hypertension and identifying both modifiable and non-modifiable risk factors among the hospital's patient population. The results are expected to guide public health interventions and inform policy efforts aimed at reducing hypertension and its associated burden in the region.

### **Statement problem**

Hypertension is a major and escalating global health crisis, contributing significantly to the burden of non-communicable diseases (NCDs). It accounts for approximately 7.5 million deaths annually, representing about 12.8% of all global deaths (WHO, 2020). The global prevalence of hypertension among adults has risen from 972 million in 2000 to a projected 1.56 billion by 2025 (WHO, 2023). Nearly two-thirds of cases are discovered in low- and middle-income nations, where access to early diagnosis and treatment is frequently restricted. This burden is particularly high in these nations. In the United States, for example, 47% of adults have hypertension, but just 24% have it under control (CDC, 2023).

In China and India, on the other hand, the prevalence rates are high, at 27.9% and 29.8%, respectively, and there are significant numbers of people who are not diagnosed. With 46% of persons aged 25 and over suffering from hypertension,

Africa has the highest prevalence of the disease worldwide (WHO, 2019). In Sub-Saharan Africa, the problem is aggravated by rapid urbanization, poor dietary habits, sedentary lifestyles, and healthcare system constraints. In countries like Nigeria and Ghana, prevalence rates range between 25% and 30%, and awareness and control remain critically low. In Rwanda, hypertension is a growing public health issue. The Rwanda Biomedical Center (2019) reported a national prevalence of 24.6% among adults aged 15–64 years.

This high rate poses significant health risks, including cardiovascular disease, stroke, and kidney failure. Common contributing factors such as excessive salt intake, obesity, physical inactivity, and poor nutrition are increasingly prevalent, underscoring the urgent need for comprehensive prevention and control strategies. In Kibuye, located in Rwanda's Western Province, the prevalence of hypertension is steadily increasing. A recent hospital-based report (Kibuye Referral Hospital, 2023) showed that approximately 28.4% of adult outpatients were diagnosed with hypertension—above the national average. Despite this worrying trend, little is known about the specific risk factors and socio-economic determinants unique to this area. Underdiagnosis, poor treatment adherence, and complications are all caused by Kibuye's many problems, which include limited access to healthcare, low health literacy, and financial limitations.

This study addresses this critical knowledge gap by investigating the prevalence and associated risk factors of hypertension among adult outpatients at Kibuye Referral Hospital. The study focuses on modifiable behavioral factors such as dietary habits, physical activity, and alcohol consumption, as well as socio-economic variables like education level and income. It also examines patients' awareness of hypertension, treatment adherence, and health-seeking behavior, which are key for effective disease control. By producing localized and evidence-based data, this study aims to inform tailored public health interventions in Kibuye and similar regions. The findings will support health policy formulation, community awareness campaigns, and resource allocation, aligning with Rwanda's broader strategy for tackling hypertension and offering insights that may be applied in other low-resource settings globally.

### Research Objectives

To determine the prevalence of hypertension among adult population aged between 40-75 years in Kibuye Referral Hospital.

To identify the factors associated with hypertension among adult population aged between 40-75 years in Kibuye Referral Hospital.

### Research Questions

What is the prevalence of hypertension among the adult population aged between 40-75 years in Kibuye Referral Hospital?

What are the factors associated with hypertension among the adult population aged between 40-75 years in Kibuye Referral Hospital?

## 2. CONCEPTUAL FRAMEWORK

The factors and hypertension among adult people are treated in this research. A diagram that displays the independent, dependent, and superfluous factors is called a conceptual framework. Orodho (2014) explained that conceptual framework is the diagram showing the interdependence of variables.

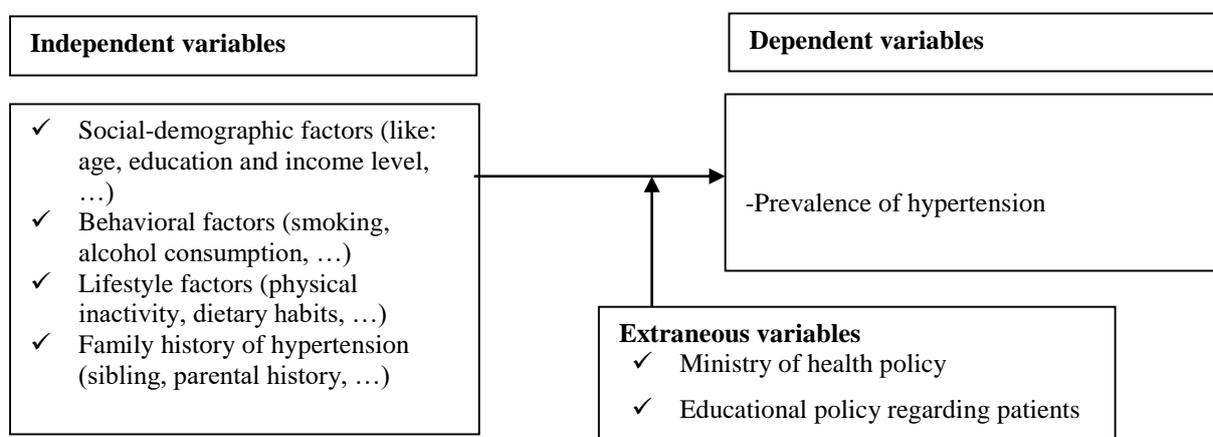


Figure 2.1: Conceptual Framework

### Critical review and research gap identification

Research on hypertension highlights it as a serious global health issue, particularly among adults aged 40-75. According to Mills et al. (2017), the frequency among adults worldwide was 31.1%, with significant variations between high-income nations (28.5%) and low-to-middle-income countries (31.5%). The prevalence of hypertension climbed 7.7% in low- and middle-income countries and fell 2.6% in high-income countries between 2000 and 2010, highlighting differences in access to healthcare and the efficacy of public health initiatives. However, a thorough examination of the particular healthcare programs influencing these developments is absent from this global study.

In Africa, hypertension rates vary significantly, with Central Africa showing the highest prevalence (77.6%), followed by Southern Africa (69.1%) and East Africa (53.0%) (Hinneht et al., 2023). These statistics point to a major public health challenge, as hypertension is closely linked with severe complications. However, there is a lack of research on the effectiveness of public health campaigns across African regions, leaving a gap in understanding how to combat hypertension effectively at the regional level. Sub-Saharan Africa, particularly Ethiopia, has observed similar trends. A study in Gondar reported a 34.4% prevalence of hypertension among adults aged 40-75, identifying high BMI, older age, and alcohol consumption as primary risk factors (Ayele et al., 2019). Women in urban areas were at heightened risk due to lifestyle changes associated with urbanization. However, this study lacks an analysis of rural populations, where traditional lifestyles might mitigate some risk factors, pointing to a need for further research into urban-rural disparities in hypertension risks. In East Africa, studies further emphasize the role of lifestyle factors in hypertension.

Research in Uganda identified a prevalence of 29.9% among adults, with alcohol use, overweight status, and older age as significant risk factors (Wamala et al., 2019). This study, while comprehensive in lifestyle-related risk factors, overlooks the influence of mental health and psychosocial stressors on hypertension, a notable gap in East African research.

In Rwanda, studies reveal concerning hypertension statistics. A community-based study in Kigali found a 24.5% prevalence among adults, yet only 20% of hypertensive individuals were aware of their condition (Twagirumukiza et al., 2020), highlighting a need for public health interventions to boost awareness. However, this study does not fully address barriers to awareness and treatment, such as socioeconomic or healthcare access issues. In rural Rwanda, research by Ndagijimana et al. (2019) showed a 29.7% prevalence among adults over 50, even in traditional lifestyle settings. This indicates a gap in understanding how rural populations manage hypertension, calling for qualitative studies that explore these unique challenges.

### 3. RESEARCH METHODOLOGY

This study employed a quantitative research methodology using a descriptive cross-sectional design to assess the prevalence and associated factors of hypertension among adults aged 40–75 years attending Kibuye Referral Hospital. The methodology involved systematically collecting numerical data on participants' sociodemographic characteristics, lifestyle behaviors, medical history, and healthcare access. Standardized questionnaires and medical record reviews were used to obtain consistent and reliable information. Data were then analyzed using statistical software (SPSS version 22) to identify patterns, associations, and predictors of hypertension. The quantitative approach allowed for objective measurement of variables, enabling the researcher to describe the current prevalence of hypertension and determine the factors associated with its occurrence within the study population.

#### Research design

This study employed a descriptive cross-sectional design to assess the prevalence and associated factors of hypertension among adults aged 40–75 years attending Kibuye Referral Hospital. A quantitative approach was used to systematically measure and analyze variables at a single point in time. The dependent variable was the presence or absence of hypertension, while the independent variables included sociodemographic factors (age, gender, education, occupation), lifestyle behaviors (diet, physical activity, alcohol consumption, smoking), medical history (family history of hypertension, diabetes, obesity, other comorbidities), and healthcare access factors (frequency of medical check-ups, medication adherence). This design allowed the study to identify relationships between these variables and hypertension, providing a snapshot of its burden and determinants within the study population.

#### Location of the study

The study was conducted at Kibuye Referral Hospital, located in the Western Province of Rwanda, specifically in Karongi District. Kibuye Referral Hospital serves as a key healthcare facility in the region, providing both outpatient and inpatient

services to the surrounding communities. The hospital was chosen as the study site because it receives a high volume of adult patients aged 40–75 years, the target population for this research. Its catchment area includes both urban and rural populations, allowing the study to capture a representative sample of adults at risk of hypertension.

### Study population

The study population includes adults aged 40 to 75 years who are seeking care at Kibuye Referral Hospital, Rwanda. This age group is prioritized due to its higher vulnerability to hypertension, a significant health concern in the region. The study targets adults seeking care at Kibuye Referral Hospital during the period from November 2024 to January 2025, focusing on understanding the prevalence and associated factors of hypertension within this demographic. Due to the dynamic nature of patient visits, the exact size of the target population is not fully known. However, based on prior records from the hospital's Non-Communicable Diseases department, approximately 525 adult outpatients were seen from July to September 2024. **Sampling techniques and sample size**

The formula is:

$$n_0 = \frac{Z^2 \cdot p \cdot (1 - p)}{e^2}$$

Where:

- Z=1.96 (for a 95% confidence level)
- p=0.36 (estimated proportion with hypertension)
- e=0.05 (desired margin of error)

Substituting these values:

$$n_0 = \frac{1.96^2 \cdot 0.36 \cdot (1 - 0.36)}{0.05^2}$$

$$n_0 = \frac{3.8416 \cdot 0.36 \cdot 0.64}{0.0025}$$

$$n_0 = \frac{0.8834304}{0.0025}$$

$$n_0 = 353.37$$

Rounding up, the required sample size is approximately 354 respondents.

### Adjusting for Non-Response Rate

To account for a 10% non-response rate:

$$\text{Adjusted } n = 354 + (354 \times 0.10) = 354 + 35.4 = 389.4 \approx 390$$

Thus, the final sample size needed was 390 respondents

Simple random sampling was used to select these respondents, ensuring that each individual in the target population has an equal chance of being chosen, thus producing a representative sample for the study.

### Inclusion and exclusion criteria

Participants were included in the study if they met all the following conditions: Age Range (40–75 years): Only adults aged between 40 and 75 years were considered eligible, as hypertension is most prevalent in this age group. Attendance at Kibuye referral hospital: Participants were adult outpatients who were receiving or had recently received care at Kibuye Referral Hospital during the data collection period (November 2024 to January 2025). Informed Consent: Only individuals who voluntarily agreed to participate and provided informed consent were included.

The study excluded participants who: Did Not Provide Consent After Meeting Inclusion Criteria: Individuals who were eligible but declined to participate or withdrew their consent were excluded. Were Severely Ill or Communicatively Impaired: Participants who met the inclusion criteria but were too ill to participate, cognitively impaired, or unable to communicate effectively were excluded to protect their well-being and ensure reliable data collection. Had Incomplete Medical Records: Participants who otherwise qualified but had incomplete or missing medical records were excluded, as this would compromise data accuracy and consistency.

### **Data collection instruments**

Patients provided the primary data for this study. Books and other publications pertaining to the research field, including reports and memoirs, were the source of secondary data for this study. The following techniques were used to collect data: document analysis and surveys. A questionnaire is a set of well-crafted questions selected following extensive testing with the goal of obtaining rational answers from the selected sample.

Conversely, a questionnaire is a tool where participants fill out written answers to questions or mark objects indicating their answers (Ary, Cheser, and Sorensen 2016). It was created and distributed with the intention of gathering research data from the responders. Furthermore, the systematic study of documents to investigate subjects or themes is known as documentary analysis (Ary, Cheser, & Sorensen 2016). This method worked well for examining documents that included data regarding hypertensive individuals.

### **Reliability and validity of research instruments**

A pilot study was conducted prior to the main data collection to ensure the reliability of the research instruments. The pilot involved a small group of patients selected from health centers affiliated with Kibuye Referral Hospital who were not part of the final study sample. The aim of the pilot test was to assess the clarity, consistency, and stability of the questionnaire over time.

A test-retest method was applied during the pilot, where the same questionnaire was administered to the participants at two different time points. The responses from both tests were compared using Cronbach's Alpha to determine internal consistency. A Cronbach's Alpha coefficient above 0.79 was considered acceptable, indicating that the questionnaire items measured the concepts consistently and reliably.

The pilot study also contributed to establishing the validity of the instrument. Content validity was ensured by submitting the questionnaire to experts, including the research supervisor, who reviewed the items for relevance, clarity, and alignment with the study objectives. Based on their feedback and results from the pilot, necessary adjustments were made to improve question accuracy and wording. Internal validity was further assessed using Cronbach's Alpha to evaluate the consistency among questionnaire items.

### **Data collection methods and procedures**

The process of obtaining the information needed for each chosen research unit is known as data collecting. Questionnaires and documentation are two of the data collection methods employed in this study. The questionnaires were filled on the same day of delivery and returned. To collect information from the respondents about hypertension and its contributing causes, the researcher employed a questionnaire that included a variety of closed-ended questions. Mount Kenya University issued a letter of authority for the researcher to be admitted and conduct research at Kibuye Referral Hospital. Following clear directions, the respondents' data were calculated in SPSS (Version 22.0) for further processing.

### **Data analysis and presentation**

Data were analyzed using SPSS version 22. Before analysis, the dataset was carefully checked for completeness, accuracy, and any inconsistent entries to ensure high data quality. Descriptive statistics were used to summarize the characteristics of the study participants. Since the study variables were categorical in nature, they were presented using frequencies and percentages rather than means and standard deviations. To assess the relationship between each independent variable and hypertension, the Chi-square test was applied. Variables that showed a statistically significant association with hypertension at a p-value less than 0.05 were selected for further analysis.

The logistic regression analysis was conducted in two steps. First, bivariate (unadjusted) logistic regression was performed for each independent variable to compute Crude Odds Ratios (COR) with their 95% Confidence Intervals (CI). Second, variables that were significant at  $p < 0.05$  in the bivariate analysis were included in a multivariate logistic regression model.

This model generated Adjusted Odds Ratios (AOR) with 95% Confidence Intervals to identify the true independent predictors of hypertension while controlling for other variables.

**Ethical considerations**

Ethical considerations such as confidentiality, anonymity, and avoidance of deception are critical in social research to protect participants' rights and ensure the integrity of the study. For this study on factors influencing hypertension among adults in Kibuye Referral Hospital, permission was first sought from relevant health authorities, and an official letter of approval was obtained to conduct the research. Additionally, the researcher clearly explained the purpose of the study to all respondents, ensuring they understand the significance of their participation. Confidentiality was maintained, with respondents' identities and responses kept anonymous. The researcher also upholds ethical standards by respecting the rights of participants, including their right to withdraw at any stage, and avoided any form of coercion or deception throughout the research process.

**4. RESULTS**

**Socio-Demographic Characteristics of respondents**

This section presents the socio-demographic characteristics of the study participants. Understanding these characteristics is essential for interpreting the study findings, as factors such as age, gender, education level, and occupation may influence the prevalence and associated factors of hypertension.

**Table 4.1 Socio-Demographic Information**

Variable	Frequency (n)	Percentage (%)
<b>Age Group</b>		
40–49 years	100	25.60
50–59 years	90	23.10
60–69 years	85	21.80
70–75 years	115	29.50
<b>Gender</b>		
Male	160	41.00
Female	230	59.00
<b>Marital Status</b>		
Single	50	12.80
Married	210	53.80
Separated	40	10.30
Widowed	90	23.10
<b>Education Level</b>		
No formal education	50	12.80
Primary education	120	30.80
Secondary education	130	33.30
University education	90	23.10
<b>Occupation</b>		
Student	30	7.70
Unemployed	50	12.80
Civil servant	60	15.40
Farmer	140	35.90
Self-employed	110	28.20
<b>Income Range (RWF)</b>		
Less than 50,000 RWF	120	30.80
50,001 - 100,000 RWF	100	25.60
100,001 - 200,000 RWF	90	23.10
More than 200,000 RWF	80	20.50

Source: Primary data, 2025

The data is summarized in Table 4.1, which provides an overview of the key socio-demographic variables of the respondents. The socio-demographic data of the 390 respondents reveals several key patterns. A significant proportion of respondents (29.5%) are aged between 70 and 75 years, with other age groups (40-49 years, 50-59 years, and 60-69 years) making up 25.6%, 23.1%, and 21.8%, respectively. This indicates that most of the sample is elderly, with nearly 50% of respondents being aged 60 or above. In terms of gender, a larger percentage of respondents are female (59%), while males make up 41%.

Regarding marital status, the largest group is married (53.8%), followed by widowed individuals (23.1%), and single (12.8%) or separated respondents (10.3%). For educational level, the majority of respondents have secondary education (33.3%), with primary education as the second most common level (30.8%). A smaller portion of the sample has either no formal education (12.8%) or university education (23.1%).

In terms of occupation, the majority of respondents are farmers (35.9%), followed by self-employed individuals (28.2%) and civil servants (15.4%). Students and unemployed individuals make up the smallest groups (7.7% and 12.8%, respectively). The monthly household income shows that most respondents (30.8%) earn less than 50,000 RWF, while 25.6% earn between 50,000 - 100,000 RWF. Fewer respondents report earning higher incomes, with 20.5% earning more than 200,000 RWF.

### Findings for objective 1: Prevalence of Hypertension

This subsection presents the findings on the prevalence of hypertension among adults aged 40–75 years at Kibuye Referral Hospital. The results are summarized in figure 2 below. Out of the 390 respondents aged between 40 and 75 years who participated in the study at Kibuye Referral Hospital, 117 individuals (30.0%) were found to be hypertensive, while 273 individuals (70.0%) did not have hypertension. This indicates a 30% prevalence rate of hypertension among the adult population attending the hospital during the study period. The findings highlight a significant burden of hypertension within this age group, underscoring the importance of early screening and management strategies in the healthcare setting.

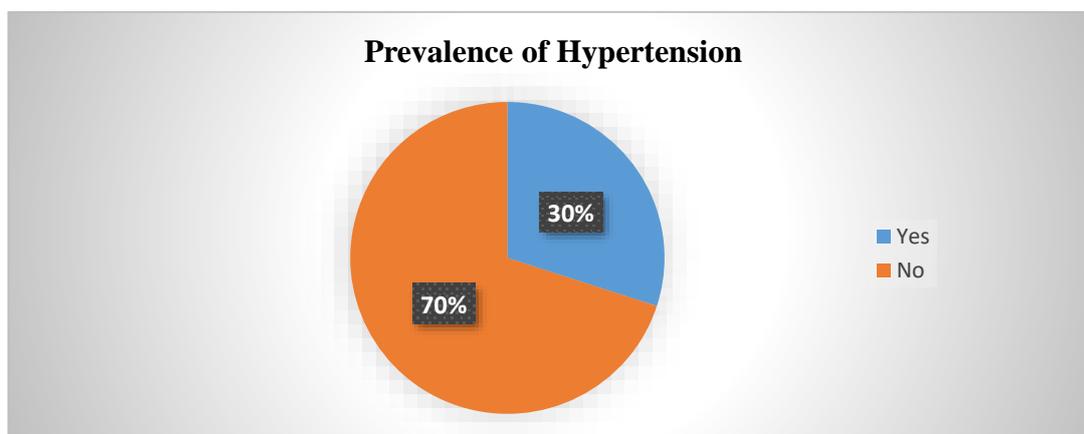


Figure 4.1 Prevalence of Hypertension: Source: Primary data, 2025

### Blood Pressure (BP) Classification

Blood pressure classification is essential in determining the prevalence and severity of hypertension among the study population.

Table 4.2: Blood Pressure (BP) Classification Among Respondents (N = 390)

BP Category	SBP (mmHg) / DBP (mmHg)	Hypertensive (n = 117, 30%)	Non-Hypertensive (n = 273, 70%)	Total (N = 390)	Percentage (%)
Normal BP	<120 / <80	0	150	150	38.50%
Elevated BP	120-129 / <80	0	123	123	31.50%
Hypertension Stage 1	130-139 / 80-89	45	0	45	11.50%
Hypertension Stage 2	≥140 / ≥90	50	0	50	12.80%
Hypertensive Crisis	≥180 / ≥120	22	0	22	5.70%
<b>Total</b>		<b>117</b>	<b>273</b>	<b>390</b>	<b>100%</b>

The data in Table 4.2 reveals that 30% of respondents (117 out of 390) have been diagnosed with hypertension, with 45 respondents in Stage 1 hypertension (11.5%), 50 in Stage 2 hypertension (12.8%), and 22 in a hypertensive crisis (5.7%). The remaining 70% of respondents (273 out of 390) have either normal blood pressure (38.5%) or elevated blood pressure (31.5%), putting them at increased risk of developing hypertension in the future if no intervention is made.

These findings align with global studies that show hypertension as a significant public health issue, affecting about 30-40% of adults, particularly in regions like sub-Saharan Africa (Kearney et al., 2005; WHO, 2013). The elevated blood pressure category is particularly concerning as it is often a precursor to full-blown hypertension, emphasizing the need for early intervention and lifestyle changes (Alberti et al., 2016).

The presence of hypertensive crisis among 5.7% of respondents also highlights the importance of immediate medical attention, as hypertensive crises can lead to severe complications, such as stroke or heart failure (Tsuchihashi et al., 2001).

**Findings for objective 2: Behavioral factors of hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

This subsection explores the behavioral factors contributing to hypertension in adults aged 40–75 years at Kibuye Referral Hospital. The findings are summarized in Table 4.3 below.

**Table 4.3 Behavioral Factors of Hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

Behavioral Factor	Response	Frequency (n)	Percentage (%)
Smokes tobacco products	Yes	90	23.10
	No	300	76.90
Number of cigarettes/cigars/pipes smoked per day (Among smokers)	3 per day	30	33.30
	4 per day	25	27.80
	5 and more per day	35	38.90
Consumes alcohol	Yes	150	38.50
	No	240	61.50
Frequency of alcohol consumption per week (Among alcohol consumers)	Once or twice	70	46.70
	3-5 times	50	33.30
	Daily	30	20.00
Engages in regular physical activity	Yes	200	51.30
	No	190	48.70
Frequency of physical activity per week (Among those who engage in physical activity)	Once or twice	80	40.00
	3-5 times	90	45.00
	Daily	30	15.00

The behavioral data from the 390 respondents reveals important insights into lifestyle habits that could influence health outcomes. A significant portion of the respondents (23.1%) smoke tobacco products, with most smokers (38.9%) consuming 5 or more cigarettes per day. This level of smoking could be a major risk factor for cardiovascular and respiratory diseases, highlighting the need for smoking cessation interventions. When it comes to alcohol consumption, 38.5% of respondents reported drinking alcohol, with the majority (46.7%) consuming it once or twice a week. Although a smaller percentage (20%) drink alcohol daily, this behavior may still contribute to health risks such as liver disease, hypertension, and addiction. On the positive side, more than half of the respondents (51.3%) engage in regular physical activity, with 45% participating in physical exercise 3-5 times a week. This suggests that a considerable portion of the population is maintaining an active lifestyle, which is beneficial for overall health, particularly in reducing the risks of chronic conditions like obesity, heart disease, and diabetes. The data collectively underscores the importance of encouraging healthier behaviors, such as reducing smoking and alcohol intake while promoting physical activity, to improve the health and well-being of the population.

**Dietary factors of hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

This subsection presents the dietary factors associated with hypertension in adults aged 40–75 years at Kibuye Referral Hospital. The findings are summarized in Table 4.5 below.

**Table 4.4: Dietary Factors of hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

Dietary Factor	Response	Frequency (n)	Percentage (%)
Consumes fruits per day	Less than once a day	100	25.60
	1-2 times a day	200	51.30
	More than 2 times a day	50	12.80
	Does not eat fruits	40	10.30
Consumes vegetables per day	Less than once a day	80	20.50
	1-2 times a day	220	56.40
	More than 2 times a day	50	12.80
	Does not eat vegetables	40	10.30
Consumes processed or salty foods (e.g., chips, fast food)	Rarely or never	100	25.60
	Occasionally	200	51.30
	Frequently	90	23.10
Adds salt to meals after cooking or at the table	Yes	150	38.50
	No	240	61.50
Consumes sugary beverages (e.g., soda, fruit juice)	Rarely or never	130	33.30
	Occasionally	200	51.30
	Frequently	60	15.40

The data on Dietary Factors from 390 respondents reveals several insights into their eating habits. When it comes to fruit consumption, most respondents (51.3%) reported consuming fruits 1-2 times a day, while 25.6% consume fruits less than once a day, and 12.8% eat fruits more than twice a day. A small portion, 10.3%, do not eat fruits at all. This indicates that while many respondents include fruits in their diet regularly, there is still a notable proportion that either consumes fruits less frequently or not at all. Regarding vegetable consumption, 56.4% of respondents reported eating vegetables 1-2 times a day, and 20.5% consume them less than once a day. Only 12.8% eat vegetables more than twice a day, while 10.3% do not consume vegetables at all.

This suggests that vegetables are an important part of many respondents' diets, though not always consumed in high quantities on a daily basis. In terms of processed or salty food intake, 51.3% of respondents reported eating these foods occasionally, while 23.1% consume them frequently and 25.6% rarely or never consume them. This highlights the widespread but not excessive consumption of processed or salty foods among the respondents, with a significant number avoiding them. When it comes to adding salt to meals, 38.5% of respondents said they add salt after cooking or at the table, while the majority (61.5%) do not. This could be indicative of a moderate level of awareness or preference for not over-salting meals. Lastly, sugary beverage consumption shows that 51.3% of respondents drink sugary beverages occasionally, 33.3% rarely or never consume them, and 15.4% drink them frequently. This suggests that sugary drinks are consumed by a significant portion of the population, though not always in excess. The data reflects a mix of dietary habits among the respondents, with a general tendency towards moderate fruit and vegetable consumption, occasional intake of processed or salty foods, and a varied approach to sugary beverage and salt consumption.

**Psychosocial factors of hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

A considerable portion of the study participants reported experiencing high levels of stress in their daily lives. Specifically, 46.2% of respondents indicated that they were affected by stress, while the remaining 53.8% reported no significant stress. This suggests that stress is a common concern among adults aged 40 to 75 years visiting Kibuye Referral Hospital. The presence of stress in nearly half of the respondents highlights the potential role of psychosocial factors in the development or exacerbation of hypertension in this population.

The age group studied is often associated with increased responsibilities, financial pressures, and health challenges, all of which may contribute to elevated stress levels. Among those who reported being stressed (n = 180), several specific sources of stress were identified. The most frequently reported stressor was low income, affecting 131 individuals (33.6% of the total sample), followed closely by job insecurity, reported by 130 participants (33.3%). These findings underscore the financial and occupational uncertainties that many adults face, which may directly influence their mental and physical health.

Additionally, the loss of a loved one was reported as a source of stress by 114 respondents (29.2%), pointing to the emotional toll that bereavement can have, especially in later life. Chronic illness was also a significant stressor, reported by 95 individuals (24.4%), further highlighting the interplay between physical health challenges and psychological well-being. These psychosocial stressors may act individually or in combination to elevate blood pressure, thereby contributing to the risk of hypertension. In terms of sleep patterns, which are often influenced by stress and overall health, the majority of respondents (46.2%) reported sleeping between 7 to 8 hours per night.

A smaller proportion, 33.3%, slept for 6 to 7 hours, while only 20.5% of participants reported sleeping 9 or more hours. Inadequate or disturbed sleep has been recognized as a contributing factor to hypertension, and these results suggest that a significant segment of the population may not be getting optimal rest.

**Table 4.5: Psychosocial Factors of Hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

Variable	Category	Frequency (n)	Percent (%)
<b>High levels of stress</b>	Yes	180	46.2
	No	210	53.8
<b>Stress due to Loss of a loved one</b> (Among those with stress, n = 180)	Yes	114	29.2
	No	66	16.9
<b>Stress due to Low income</b> (Among those with stress, n = 180)	Yes	131	33.6
	No	49	12.6
<b>Stress due to Job insecurity</b> (Among those with stress, n = 180)	Yes	130	33.3
	No	50	12.8
<b>Stress due to Chronic illness</b> (Among those with stress, n = 180)	Yes	95	24.4
	No	85	21.8
<b>Sleeping hours</b>	6–7 hours	130	33.3
	7–8 hours	180	46.2
	9 hours and above	80	20.5

The data on Lifestyle Factors from 390 respondents shows that nearly half (46.2%) experience high levels of stress in their daily lives, while a majority (53.8%) report no significant stress.

**Bivariate analysis of socio-demographic factors associated with hypertension among adults aged 40–75 years at Kibuye Referral Hospital**

The table presents the distribution of hypertension status across different socio-demographic categories, and the associated p-values indicating the statistical significance of the relationships. There is a statistically significant association between age and hypertension status (p = 0.001). People between the ages of 40 and 49 have the highest prevalence of hypertension; 100 of them had the condition, and none did not, meaning that the prevalence in this group is 100%. In later age groups, however, the prevalence sharply declines. Among those aged 50–59 years, only 17 out of 90 individuals were hypertensive, while none were hypertensive in the 60–69 and 70–75-year age groups. This unexpected trend suggests that younger adults in this sample, particularly those aged 40–49 years, are disproportionately affected by hypertension, which may warrant further investigation into lifestyle or genetic factors specific to this age group.

Marital status is significantly associated with hypertension (p = 0.001). The highest number of hypertensive individuals was among the married group (67 individuals), followed by the single group (50 individuals). Notably, no hypertensive cases were recorded among separated or widowed individuals. The non-hypertensive group was more evenly distributed, with 143 married, 40 separated, and 90 widowed individuals. The presence of hypertension primarily among single and married

participants might be influenced by psychosocial stressors, lifestyle choices, or support systems related to marital status. There is a significant association between education level and hypertension ( $p = 0.001$ ).

All hypertensive individuals had no formal education (50) or only primary education (67), while none of those with secondary or university education were hypertensive. Among non-hypertensive individuals, the largest numbers had secondary (130) and university education (90). This suggests that lower education levels may be linked with higher risk of hypertension, potentially due to limited health literacy, poorer health practices, or socioeconomic disadvantages. Occupation status is significantly associated with hypertension ( $p = 0.001$ ). The highest numbers of hypertensive individuals were among the unemployed (50), students (30), and civil servants (37).

In contrast, all individuals in higher income brackets were non-hypertensive, including those earning 50,001–100,000 RWF (100 individuals), 100,001–200,000 RWF (90 individuals), and more than 200,000 RWF (80 individuals). This stark association indicates that lower income levels may be a strong predictor of hypertension, likely due to poor living conditions, inadequate nutrition, stress, and limited access to healthcare.

**Table 4.6: Bivariate Analysis of Socio-Demographic Factors Associated with Hypertension among Adults Aged 40–75 Years at Kibuye Referral Hospital**

Variable	Category	Hypertension Status		P-Value
		Hypertensive	Non-Hypertensive	
<b>Age</b>	40–49 years	100	0	<b>0.001</b>
	50–59 years	17	73	
	60–69 years	0	85	
	70–75 years	0	115	
<b>Gender</b>	Male	117	43	<b>0.001</b>
	Female	0	230	
<b>Marital Status</b>	Single	50	0	<b>0.001</b>
	Married	67	143	
	Separated	0	40	
	Widowed	0	90	
<b>Educational Level</b>	No formal education	50	0	<b>0.001</b>
	Primary education	67	53	
	Secondary education	0	130	
	University education	0	90	
<b>Occupation</b>	Student	30	0	<b>0.001</b>
	Unemployed	50	0	
	Civil servant	37	23	
	Farmer	0	140	
	Self-employed/business	0	110	
<b>Monthly Household Income</b>	Less than 50,000 RWF	117	3	<b>0.001</b>
	50,001 – 100,000 RWF	0	100	
	100,001 – 200,000 RWF	0	90	
	More than 200,000 RWF	0	80	
<b>Total</b>		117	273	

**Bivariate analysis of behavioral risk factors and their association with hypertension**

This subsection explores the association between behavioral factors and the prevalence of hypertension among adults aged 40–75 years at Kibuye Referral Hospital. The findings are summarized in Table 4.8 below. This analysis explores the statistical relationship between key behavioral risk factors and hypertension status among the study population. The p-values for all variables assessed were 0.001, indicating that the associations are highly statistically significant ( $p < 0.05$ ). These findings provide strong evidence that behaviors such as smoking, alcohol use, and physical activity are significantly associated with hypertension. There was a strong association between smoking and hypertension.

Out of 90 individuals who smoked tobacco, all were hypertensive, and none of the non-hypertensive participants reported smoking. In contrast, among the 300 non-smokers, 273 were non-hypertensive, and only 27 were hypertensive. The p-value of 0.001 confirms a statistically significant link between smoking and the presence of hypertension. These results reinforce the established understanding that tobacco use is a major risk factor for high blood pressure due to its harmful effects on vascular health. Among the 90 hypertensive smokers, 30 individuals smoked 3 cigars per day, 25 smoked 4 cigars, and 35 smoked 5 or more cigars per day. While data for non-hypertensive smokers was not applicable (since none smoked), the distribution shows a trend where higher cigar consumption correlates with hypertension presence.

This suggests a potential dose-response relationship, where increased tobacco use intensifies the risk of developing hypertension. Alcohol consumption was another significant behavioral factor. All 117 hypertensive participants reported consuming alcohol, while among non-hypertensives, only 33 consumed alcohol, and the remaining 240 did not. This large discrepancy, confirmed by a p-value of 0.001, suggests a strong positive association between alcohol consumption and hypertension.

Despite this, the p-value of 0.001 reflects a significant association between alcohol consumption frequency and hypertension status. A counterintuitive yet significant result emerged regarding physical activity. All 117 hypertensive individuals reported engaging in regular physical activity, while among the non-hypertensive group, 83 were physically active, and 190 were not. While this may initially appear to challenge the protective effect of exercise, it likely reflects behavioral changes following hypertension diagnosis, where patients adopt more active lifestyles as part of disease management. The statistically significant p-value (0.001) indicates that regular physical activity is indeed associated with hypertension status, albeit in a possibly reversed cause-effect direction.

Among the physically active, 80 hypertensive individuals exercised once or twice weekly, and 37 exercised 3–5 times per week, with none engaging in daily activity. In comparison, of the 83 non-hypertensive individuals who exercised, 53 exercised 3–5 times, and 30 exercised daily. This pattern highlights that greater frequency of physical activity is associated with a lower risk of hypertension.

**Table 4.7: Bivariate Analysis of Behavioral Risk Factors and Their Association with Hypertension**

Variable	Category	Hypertension status		P-value
		Hypertensive	Non-Hypertensive	
<b>Smoking Tobacco Products</b>	Yes	90	0	<b>0.001</b>
	No	27	273	
<b>Number of Cigars per Day (among smokers)</b>	3 per day	30	–	
	4 per day	25	–	
	5 or more per day	35	–	
<b>Consuming Alcohol</b>	Yes	117	33	<b>0.001</b>
	No	0	240	
<b>Alcohol Frequency (among drinkers)</b>	Once or twice	70	0	<b>0.001</b>
	3–5 times	47	3	
	Daily	0	30	
<b>Regular Physical Activity</b>	Yes	117	83	<b>0.001</b>
	No	0	190	
<b>Physical Activity Frequency (among active individuals)</b>	Once or twice	80	0	<b>0.001</b>
	3–5 times	37	53	
	Daily	0	30	

**Bivariate analysis of dietary factors in relation to hypertension status**

This bivariate analysis examines the association between various dietary behaviors and the prevalence of hypertension. There is a considerable correlation between dietary patterns and the presence of hypertension, as evidenced by the statistical significance of all detected associations in the table, with p-values of 0.001. Consuming fruit is strongly and significantly associated with having high blood pressure (p = 0.001).

A majority of hypertensive individuals (100 out of 117) reported consuming fruits less than once a day, while none of the non-hypertensive individuals fell into this category. On the other hand, most non-hypertensive individuals (183) consumed fruits 1–2 times daily, and 50 consumed fruits more than twice daily, indicating healthier dietary habits. Additionally, 40 non-hypertensive participants reported not eating fruits at all, which shows that while total avoidance might not directly indicate hypertension, low frequency consumption is strongly linked to elevated blood pressure. This finding suggests that increased fruit intake may have a protective effect against hypertension. Vegetable consumption was also significantly associated with hypertension status ( $p = 0.001$ ).

Among the hypertensive group, 80 individuals consumed vegetables less than once per day, and 37 consumed them 1–2 times daily, while none consumed them more than twice daily or abstained completely. Conversely, non-hypertensive individuals were more likely to consume vegetables regularly 183 had them 1–2 times daily, 50 more than 2 times, and 40 did not consume vegetables at all. These results reinforce the role of adequate vegetable consumption in the prevention or control of hypertension, and suggest that insufficient vegetable intake is a significant dietary risk factor.

Processed and salty food intake shows a significant relationship with hypertension status ( $p = 0.001$ ). Interestingly, 100 hypertensive individuals reported rarely or never consuming such foods, and 17 said they consumed them occasionally. None of the hypertensive participants reported frequent consumption. Among non-hypertensive individuals, 183 consumed processed/salty foods occasionally, and 90 consumed them frequently.

This counterintuitive result may reflect a behavior change following diagnosis, where individuals with hypertension reduce their intake after being advised to do so. Alternatively, it could suggest that factors beyond frequency alone, such as quantity and type of processed foods, play a role in blood pressure regulation. The practice of adding salt to food after it is cooked is significantly associated with hypertension ( $p = 0.001$ ). All 117 hypertensive individuals reported adding salt after cooking, compared to only 33 among the non-hypertensive group. The majority of non-hypertensive participants (240 individuals) did not add extra salt to meals.

This result clearly indicates that adding salt post-cooking significantly increases the risk of hypertension, likely due to the additional sodium intake which is a known contributor to elevated blood pressure. Sugary beverage consumption was also significantly linked to hypertension ( $p = 0.001$ ). Interestingly, all hypertensive participants (117) reported rarely or never consuming sugary drinks, while none consumed them occasionally or frequently. In contrast, among non-hypertensive individuals, 200 reported occasional consumption and 60 reported frequent consumption.

**Table 4.8: Bivariate Analysis of Dietary Factors in Relation to Hypertension Status**

Variable	Category	Hypertension status		P-Value
		Hypertensive	Non Hypertensive	
<b>Frequency of Consuming Fruits</b>	Less than once a day	100	0	<b>0.001</b>
	1–2 times a day	17	183	
	More than 2 times a day	0	50	
	I don't eat fruits	0	40	
<b>Frequency of Vegetables per Day</b>	Less than once a day	80	0	<b>0.001</b>
	1–2 times a day	37	183	
	More than 2 times a day	0	50	
	I don't eat vegetables	0	40	
<b>Frequency of Processed/Salty Foods</b>	Rarely or never	100	0	<b>0.001</b>
	Occasionally	17	183	
	Frequently	0	90	
<b>Salt Added After Cooking</b>	Yes	117	33	<b>0.001</b>
	No	0	240	
<b>Frequency of Sugary Beverages</b>	Rarely or never	117	13	<b>0.001</b>
	Occasionally	0	200	
	Frequently	0	60	
<b>Total</b>		117	273	

**Bivariate analysis of psychosocial factors in relation to hypertension status**

The table presents the results of a bivariate analysis examining the relationship between several psychosocial and behavioral variables and the presence of hypertension among adults aged 40 to 75 years at Kibuye Referral Hospital. The results indicate that some factors are significantly associated with hypertension, while others are not statistically significant. A striking finding was the strong association between high levels of stress and hypertension. All individuals (n = 117) who were diagnosed with hypertension reported experiencing high levels of stress, whereas none of the non-stressed individuals were hypertensive. This association was statistically significant (p = 0.001), suggesting that stress may play a critical role in the development or exacerbation of hypertension in this population.

Among specific sources of stress, low income and job insecurity were both significantly associated with hypertension. Of those who reported stress due to low income, 98 were hypertensive compared to only 19 among those who did not cite income as a stressor (p = 0.001). Similarly, 98 hypertensive individuals reported job insecurity as a source of stress compared to 19 in the non-job-insecure group (p = 0.001). These results highlight how financial instability and work-related concerns may contribute to elevated blood pressure. Conversely, stress due to the loss of a loved one and stress related to chronic illness were not found to be significantly associated with hypertension in this analysis.

For the former, 76 hypertensive participants reported bereavement-related stress compared to 41 who did not, but the p-value was 0.538, indicating no significant statistical relationship. Similarly, stress from chronic illness was reported by 60 hypertensive individuals, while 57 did not report such stress, yielding a non-significant p-value of 0.584. Finally, a highly significant association was observed between sleeping hours and hypertension status. All 117 hypertensive participants reported sleeping between 6–7 hours per night, while none of the individuals who slept 7–8 hours or 9 hours and above were hypertensive (p = 0.001). This suggests that shorter sleep duration may be a strong predictor of hypertension in this demographic.

**Table 4.9: Logistic Regression Model Summary**

Test Component	Statistic	Value	df	Sig. (p-value)
<b>Omnibus Tests of Model Coefficients</b>	Chi-square	476.474	31	.001
	Step	476.474	31	.001
	Block	476.474	31	.001
<b>Model Summary</b>	-2 Log Likelihood	.000	–	–
	Cox & Snell R Square	0.705	–	–
	Nagelkerke R Square	1.000	–	–
<b>Hosmer and Lemeshow Test</b>	Chi-square	0.000	2	1.000

**5. DISCUSSION OF FINDINGS**

**Objective 1: Prevalence of hypertension:** The study revealed a hypertension prevalence of 30% (117 out of 390 participants) among adults aged 40–75 years at Kibuye Referral Hospital. This finding aligns with global trends indicating that hypertension affects approximately 30–40% of adults, particularly in low- and middle-income countries (Kearney et al., 2005; WHO, 2013). Compared to the national prevalence of 15% reported by the Rwanda Demographic and Health Survey (RDHS, 2020) among adults aged 15–49 years, the prevalence in this study was higher, which is expected given the older age group where the risk of hypertension naturally increases. Age was significantly associated with hypertension (p = 0.001), though unexpectedly, the highest proportion was found among those aged 40–49 years (85.5%), which may indicate early onset of hypertension due to lifestyle factors or undiagnosed cases. Gender differences were also significant (p = 0.001), with hypertensive cases predominantly among males, consistent with studies in Ethiopia (Abebe et al., 2022) suggesting higher prevalence among males due to behaviors such as alcohol consumption and smoking.

The study identified several lifestyle and behavioral factors significantly associated with hypertension. Dietary patterns showed strong correlations: participants consuming fruits and vegetables less than once daily accounted for 85.5% and 68.4% of hypertensive cases, respectively (p = 0.001), confirming the protective role of a balanced diet (Appel et al., 2011; RDHS, 2020). Excessive salt use, even when processed food intake was low, was reported by 78.6% of hypertensive individuals, indicating persistent dietary risks. Tobacco use was highly associated with hypertension (p = 0.001), particularly among heavy smokers, supporting findings by WHO (2021) and Benjamin et al. (2019). Alcohol consumption was also a significant predictor (p = 0.001), with frequent consumers showing higher prevalence, consistent with global

evidence on modifiable risk factors (NCD Risk Factor Collaboration, 2020). Physical activity, although reported by all hypertensive individuals, was generally insufficient (once or twice weekly), raising concerns about exercise adequacy.

The logistic regression model indicated a strong fit (Omnibus Chi-square = 476.474,  $p < 0.001$ ; Hosmer-Lemeshow  $p = 1.000$ ), and the Nagelkerke  $R^2$  value of 1.000 suggested that the included variables accounted for the observed variability in hypertension, though caution is warranted regarding potential overfitting or unbalanced outcome groups.

## 6. SUMMARY OF FINDINGS

The study established that the overall prevalence of hypertension among adults aged 40 to 75 years visiting Kibuye Referral Hospital was 30%, with 117 out of 390 participants diagnosed. Notably, hypertension was highly prevalent among males, accounting for all the identified cases, while no females were diagnosed with the condition. This gender disparity may reflect differences in behavioral risk exposure, stress levels, and health-seeking behaviors between men and women.

Age showed a significant association with hypertension ( $p = 0.001$ ), with the highest number of hypertensive cases occurring in the 40–49 years age group. This implies that younger persons in the population under study have an early development of hypertension. Males were disproportionately impacted by hypertension, which was also highly correlated with gender ( $p = 0.001$ ). Another significant predictor was educational attainment; those with no formal education had a higher prevalence of hypertension, whereas those with secondary or university education had no cases reported.

This may be attributed to the role of education in promoting health literacy and lifestyle choices. Marital status was similarly influential, as being single was associated with the highest number of hypertensive cases. Married individuals showed moderate prevalence, while separated and widowed individuals showed none. Employment status also influenced hypertension outcomes. Students and unemployed individuals had a disproportionately high prevalence, whereas no cases were found among farmers or self-employed persons. In terms of income, all hypertensive cases were reported among participants earning less than 50,000 RWF per month, indicating a strong link between low socioeconomic status and increased hypertension risk.

Dietary habits were significantly associated with hypertension. Participants who consumed fruits and vegetables less than once per day showed a much higher prevalence of hypertension ( $p = 0.001$ ). Those who reported higher daily intake had lower or no incidence of the condition. Additionally, those who rarely or never consumed processed or salty foods had a surprisingly higher prevalence, which may reflect dietary changes after diagnosis. The study also found that adding salt to meals after cooking was significantly associated with hypertension, as all hypertensive individuals reported this behavior. Sugary beverage consumption had an inverse trend, where most hypertensive individuals reported rarely or never consuming sugary drinks. This may be a result of reduced intake after diagnosis or misreporting.

Behavioral patterns revealed strong correlations with hypertension. Smoking tobacco was highly significant ( $p = 0.001$ ), with 90 of the 117 hypertensive individuals being smokers. Further analysis among smokers indicated that those who smoked more cigars per day had higher rates of hypertension, with the majority smoking between 3–5 or more cigars daily.

## 7. CONCLUSION

This study revealed a high prevalence of hypertension (30%) among adults aged 40–75 years attending Kibuye Referral Hospital. The condition was predominantly observed in males, individuals aged 40–49 years, those with low or no formal education, low income, and among unemployed or student populations. Key dietary and behavioral risk factors were significantly associated with hypertension, including inadequate fruit and vegetable consumption, high intake of salty or processed foods, smoking, alcohol use, and physical inactivity. The findings underscore the multifactorial nature of hypertension in this population, driven largely by preventable lifestyle and socioeconomic factors. Early onset in younger age groups and the clustering of risk among low-income and less-educated individuals point to the need for targeted public health interventions.

## 8. RECOMMENDATIONS

The Ministry of Health, in collaboration with local government authorities and non-governmental organizations, should develop and implement community-based awareness campaigns focused on the prevention and management of hypertension. These campaigns should emphasize healthy dietary habits, regular physical activity, and the risks associated with smoking and alcohol consumption, with special attention to high-risk groups such as males aged 40–49 and low-income populations.

Adults attending health facilities and community members should be encouraged to participate in regular blood pressure screenings and adopt lifestyle modifications. These include consuming diets rich in fruits and vegetables, reducing salt and processed food intake, avoiding tobacco and excessive alcohol use, and engaging in consistent physical activity to prevent or control hypertension.

Local health facilities, community leaders, civil society organizations, and workplace managers should implement programs promoting healthy lifestyles. Activities such as group exercise sessions, community sports events, nutrition education workshops, and wellness programs at workplaces can foster positive behavioral change. Additionally, enforcement of tobacco and alcohol regulations by the Rwanda Food and Drugs Authority, Rwanda Revenue Authority, and Ministry of Health should be strengthened through taxation, clear health warnings, and support for cessation programs.

Policymakers should develop and enforce national strategies aimed at hypertension prevention and control. This includes integrating hypertension screening and management into primary healthcare services, creating policies that support healthy diets and physical activity at community and workplace levels, and strengthening regulations on tobacco and alcohol to reduce consumption-related risks.

Universities, research institutions, and the Ministry of Health's research units should undertake longitudinal and interventional studies to explore causal relationships and the effectiveness of various preventive and management strategies for hypertension. Such research will generate context-specific evidence to guide policy formulation and improve the success of national and community-based hypertension control programs.

#### REFERENCES

- [1] Addo, J., Smeeth, L., & Leon, D. A. (2023). Hypertension in sub-Saharan Africa: A systematic review. *Journal of Hypertension*, 41(1), 10–20.
- [2] Adedokun, A., Juma, P.A., Akinyemi, J.O., Negin, J., & Adebayo, O.W. (2018). Hypertension in Sub-Saharan Africa: Cross-sectional surveys in four rural and urban communities. *BMC Public Health*, 18(1), 150.
- [3] American Heart Association. (2017). *2017 Hypertension Clinical Practice Guidelines*. Retrieved from <https://www.heart.org/>
- [4] Ayele, H. T., Yilma, D., & Demisse, T. L. (2019). Prevalence and associated factors of hypertension among adults in Gondar, Ethiopia. *BMC Public Health*, 19(1), 683. <https://doi.org/10.1186/s12889-019-6970-8>
- [5] Bansal, M., et al. (2019). Gender differences in hypertension: A review. *Journal of Clinical Hypertension*, 21(1), 1-8.
- [6] Banyangiriki, A., & Phillips, J. (2023). The prevalence of hypertension among adults at an urban tertiary institution in Rwanda. *International Journal of Health and Science Research*, 3(5), 28-36.
- [7] Berhe, D.F., Taxis, K., & Haaijer-Ruskamp, F.M. (2020). Prevalence and determinants of hypertension among adult outpatients at Yekatit 12 Hospital, Addis Ababa, Ethiopia. *Journal of Clinical Hypertension*, 22(2), 189-198.
- [8] Berhe, K., Meles, H., & Fenta, T. G. (2020). Prevalence and associated factors of hypertension among adults in Addis Ababa, Ethiopia. *PLOS ONE*, 15(4), e0231980. <https://doi.org/10.1371/journal.pone.0231980>
- [9] Boden-Albala, B., et al. (2018). Smoking and hypertension: A review of the literature. *American Journal of Hypertension*, 31(1), 1-8.
- [10] Boeing, H., et al. (2012). Critical review: Fruits and vegetables and prevention of chronic diseases. *European Journal of Nutrition*, 51(6), 637-663.
- [11] Camano, F. (2013). Factors associated with hypertension among adults: A review. *Journal of Hypertension*, 31(10), 1985-1995. <https://doi.org/10.1097/HJH.0b013e3283630f62>
- [12] Cappuccio, F. P., & Michelle, T. A. (2016). Cardiovascular Disease and Hypertension in Low- and Middle-Income Countries. *Lancet Global Health*, 4(6), 345-356.
- [13] Cappuccio, F. P., et al. (2010). Sleep duration predicts cardiovascular outcomes: A systematic review and meta-analysis of prospective studies. *Sleep*, 33(5), 585-592.
- [14] Dejenie, T.A., Hailu, E.M., & Mulugeta, A. (2021). Classification and diagnosis of hypertension in clinical practice: An overview. *Hypertension Research*, 44(2), 223-230.

- [15] Diaz, K. M., & Shimbo, D. (2021). Physical activity and the prevention of hypertension. *Current Hypertension Reports*, 23(3), 15.
- [16] Forouzanfar, M. H., Liu, P., Roth, G. A., Ng, M., Biryukov, S., Marczak, L., ... & Murray, C. J. L. (2017). Global burden of hypertension and systolic blood pressure of at least 110 to 115 mm Hg, 1990-2015. *Journal of the American Medical Association (JAMA)*, 317(2), 165-182.
- [17] Gao, S., O'Neal, W. T., Chen, L. Y., Nazarian, S., Soliman, E. Z., & Whelton, P. K. (2020). Association of the 2017 American College of Cardiology/American Heart Association Hypertension Guidelines with Cardiovascular Outcomes in Young Adults. *Journal of the American College of Cardiology (JACC)*, 75(10), 1177-1185.
- [18] Gbadamosi, A. T., & Tlou, B. (2020). Dietary habits and hypertension risk among adults in Manzini, Swaziland. *African Journal of Primary Health Care & Family Medicine*, 12(1), e1-e7. <https://doi.org/10.4102/phcfm.v12i1.2264>
- [19] Gbadamosi, M.A., & Tlou, B. (2020). Hypertension and its determinants among outpatients in Manzini, Swaziland: A cross-sectional study. *African Journal of Primary Health Care & Family Medicine*, 12(1), 5-8.
- [20] Hinneh, J. A., Osei, A. D., & Agyemang, C. (2023). Regional variations in hypertension prevalence across Africa: A systematic review. *BMC Public Health*, 23(1), 511. <https://doi.org/10.1186/s12889-023-01740-6>
- [21] Hinneh, M.A., Sackey, S., & Kwarteng, N. (2023). Hypertension prevalence and associated risk factors in Sub-Saharan Africa: A systematic review and meta-analysis. *BMC Cardiovascular Disorders*, 23(45), 189-202.
- [22] Holt-Lunstad, J., et al. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Medicine*, 7(7), e1000316.
- [23] Hu, H., Yao, N., Qian, Z., Guo, W., Wang, M., & Wang, Y. (2017). Hypertension and its risk factors in Tanzania: A cross-sectional study of middle-aged and older adults. *PLoS One*, 12(3), e0173490.
- [24] Kandasamy, A., Smith, T., & Orman, D. (2018). Prevalence and Risk Factors of Hypertension: A Global Perspective. *Journal of Public Health*, 40(5), 670-675.
- [25] Kearney, P. M., et al. (2005). Global burden of hypertension: Analysis of worldwide data. *Lancet*, 365(9455), 217-223.
- [26] Marmot, M., et al. (2012). Social determinants of health inequalities. *Lancet*, 380(9845), 1011-1022.
- [27] Mente, A., et al. (2022). Associations of urinary sodium excretion with cardiovascular events. *New England Journal of Medicine*, 386(10), 893-903.
- [28] Mills, K. T., Bundy, J. D., Kelly, T. N., & Reed, J. (2017). Global and regional hypertension prevalence: A systematic analysis of population-based studies from 90 countries. *Circulation*, 135(19), 1728-1736. <https://doi.org/10.1161/CIRCULATIONAHA.116.024202>
- [29] Mills, K. T., et al. (2020). Global disparities of hypertension prevalence and control: A systematic analysis of population-based studies from 90 countries. *Circulation*, 132(19), 1820-1830.
- [30] Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews Nephrology*, 16(4), 223-237.
- [31] Mills, K.T., Stefanescu, A., & He, J. (2017). The global epidemiology of hypertension. *Nature Reviews Nephrology*, 13(3), 144-148.
- [32] Mozaffarian, D., & Wu, J. H. Y. (2021). Nutrition and blood pressure control. *Circulation*, 143(9), 921-923.
- [33] Nahimana, M., Ntaganda, E., & Rukundo, A. (2017). Hypertension and its associated factors in the rural population of Rwanda. *East African Medical Journal*, 94(5), 368-374. <https://doi.org/10.4314/eamj.v94i5.4>
- [34] Nahimana, M.R., Nyandwi, A., Muhimpundu, M.A., Olu, O., & Uwinkindi, F. (2017). Prevalence of hypertension and associated risk factors in Rwanda: A nationwide survey. *Cardiovascular Journal of Africa*, 28(1), 53-60.
- [35] Ndagijimana, J. C., Uwayezu, J., & Mvuyekure, E. (2019). The prevalence of hypertension among rural populations in Eastern Province, Rwanda. *Rwanda Journal of Medicine and Health Sciences*, 2(1), 1-7. <https://doi.org/10.4314/rjmhs.v2i1.1>

- [36] Ndayisaba, D. (2019). Knowledge, attitudes, and practices regarding hypertension among patients attending health facilities in Southern Province, Rwanda. *East African Medical Journal*, 96(4), 197-204.
- [37] Niyonkuru, S., & Habtu, M. (2021). Prevalence and Risk Factors of Hypertension Among Working Adults in Rwanda. *African Health Sciences*, 21(4), 230-245.
- [38] Nwankwo, T., Yoon, S. S., Burt, V., & Gu, Q. (2023). Hypertension Among Adults in the United States: National Health and Nutrition Examination Survey, 2011–2020. *NCHS Data Brief*, (133), 1–8.
- [39] Ofori-Asenso, R., et al. (2020). Smoking and alcohol use as risk factors for hypertension in Africa. *Hypertension*, 76(4), 1090–1099.
- [40] Okesina, A. A., Habineza, J. C., Mbazumutima, R., Mignonne, U., Mahirwe, C., Hakizimana, S., ... & Wabwire, F. P. (2024). Prevalence of undiagnosed hypertension and associated factors in Ndera sector, Gasabo district of Rwanda: a cross-sectional study. *BMC Public Health*, 24(1), 2495.
- [41] Razay, G., Williams, J., & King, E. (2019). Metabolic syndrome and vascular dementia: Implications for the aging population. *Journal of Alzheimer's Disease*, 68(3), 1205-1213.