DETERMINANTS OF HIGH BLOOD PRESSURE MANAGEMENT AMONG PATIENTS EXPERIENCING STROKE: A CASE OF MERU TEACHING AND REFERRAL HOSPITAL, KENYA

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DECLARATION

This thesis is my original work and has not been presented for a degree or any other award in any other institution.

NS401/203067/22

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DECLARATION BY SUPERVISORS

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DEDICATION

This research thesis is dedicated to my husband Jeremy Ndubi, my children (Ryan Kithinji and Rigan Mugambi), my mother (Lucy Gatiria) and my statistician Dennis Murithi all who have given me encouragement and support throughout the academic journey.

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ABBREVIATIONS, ACRONYMS AND SYMBOLS

ACE	Angiotensin Converting Enzymes
AHM	Antihypertensive Medication
ARB	Angiotensin II Receptor Blockers
BMI	Body Mass Index
CCB	Calcium Channel Blockers
CPG	Clinical Practice Guidelines
CVD	Cardiovascular Diseases
DBP	Diastolic Blood Pressure
ECG	Electrocardiogram
FGD	Focused Group Discussions
HCW	Health Care Workers
HRH	Human Resource for Health
ICT	Information Computer Technology
ISH	International Society of Hypertension
KHIS	Kenya Health Integrated System
LMIC	Low-Middle-Income Countries
MeTRH	Meru Teaching and Referral Hospital
MMHG	Millimeters of Mercury
MOH	Ministry of Health
NCD	Non-Communicable Diseases
RBS	Random Blood Sugar
SBP	Systolic Blood Pressure
SSA	Sub-Saharan Africa
STEPS	Stepwise Approach to Surveillance

TCM	Traditional Complementary Medicine
WHF	World Heart Federation
WHO	World Health Organization

OPERATIONAL DEFINITIONS

High blood pressure	persistent elevation of systolic blood pressure (SBP) ≥140mmHg or greater and or a diastolic (DBP) ≥90mmHg or greater.
Hypertension	Chronic elevation of systolic blood pressure of ≥140mmHg and/0r diastolic blood pressure of ≥90mmHg, confirmed at-least two separate measurement. In this study, hypertension will be used synonymously with high blood pressure.
Determinants	Factors that influence how effectively high blood pressure is controlled and treated. In this study, they include: lifestyle modifications, medications, monitoring and regular check-ups, and health service delivery
High Blood pressure management	It is an approach to keep blood pressure within a healthy range by combining different factors.
Stroke	It is a sudden interruption to the blood supply to the brain, resulting in potential brain damage, disability or death.
Patients experiencing stroke	Refer to individuals who have recently had a stroke
Lifestyle Modifications	These are the changes individuals can make in their daily habits and routines to help lower blood pressure.
Anti-hypertensive medications	Drugs used to lower high blood pressure.
Self-management program	It is a structured approach towards helping people with high blood pressure to better their behaviour modification, thoughts

	and emotions in a conducive manner that helps them better manage their health daily.
Healthcare workers	These are trained officers like Nurses, Clinical Officers, Doctors and physicians involved in the day-to-day management of hypertensive patients.

ABSTRACT

Non-communicable diseases (NCDs) are a leading global health concern, with 77% of related deaths occurring in low- and middle-income countries. In Kenya, hypertension is a major contributor to cardiovascular diseases and a leading cause of morbidity and mortality. The risk of stroke continues to rise, with 1 in 4 individuals expected to experience one in their lifetime (World Stroke Day 2022). This study examined the determinants of blood pressure management among hypertensive patients who developed stroke at Meru Teaching and Referral Hospital (MeTRH), and evaluated current management practices.

Using a mixed-methods convergent design, data was collected from 80 patients with stroke records (via systematic random sampling), 42 healthcare workers (stratified random sampling), and 10 hypertensive stroke patients (purposive sampling). Tools included medical checklists, structured questionnaires, and in-depth interviews. The study was conducted across MeTRH's outpatient, medical wards, and non-communicable disease clinics.

The results revealed a higher prevalence of hypertension with a complication of stroke among females and older adults (mean age 58.6). Nearly half (47.4%) of healthcare workers (nurses, clinical officer, medical officers, physicians) had under five years of hypertension management experience, and only 18.4% correctly identified the current definition of hypertension, indicating significant knowledge gaps. While 94.7% reported conducting regular blood pressure screenings and providing lifestyle counselling, patient non-adherence remained a significant barrier—often due to work-related challenges and financial constraints that limited self-care. There was no statistically significant association between healthcare delivery and blood pressure control ($p = 0.308$). The integration and people centricity of care was outstanding in convergence.

Despite consistent screening and counselling efforts, effective blood pressure control remains hindered by limited healthcare provider experience and patient adherence issues. Addressing these gaps is essential for reducing stroke risk and improving hypertension outcomes.

The study recommends strengthening clinical practice by introducing structured hypertension counselling at every clinic visit and developing standardized management guidelines. Policymakers should ensure access to essential diagnostics (e.g., ECG, lipid panels) and affordable medications. Follow-up tracking systems for adherence and lifestyle education are also necessary. Community-based support programs or peer-led hypertension clubs are encouraged to promote long-term self-care. Future research should investigate gender-specific and cultural barriers affecting hypertension control.

CHAPTER ONE: INTRODUCTION

1.1: Background of the Study

Blood pressure (BP) is the pressure exerted by the circulating blood on the walls of the arteries as it circulates throughout the body. Hypertension (HTN) is defined as persistent elevation of blood pressure in the arteries with absence of a secondary cause. According to World Health Organization (WHO) and American Heart Association (AHA) guidelines classifies blood pressure in the following categories: Normal ‹ 120/‹80 mmHg, Elevated (Pre-hypertension) 120-129/‹80mmHg, Stage 1 HTN (mild) 130-139/80-89mmHg, Stage 2 HTN (moderate) ≥140/≥90mmHg, and Stage 3 HTN (Hypertensive crisis) ≥180/≥120mmHg (Guirguis-Blake et al., 2021).

Management of hypertension encompasses several strategies used to control high blood pressure like: lifestyle modifications like reducing salt intake, weight management, regular physical activity, quitting smoking, moderate alcohol and healthy diet. (Hany et al., 2024). Pharmacological treatment is another way to manage hypertension, using anti-hypertensive medications such as ACE inhibitors, Calcium Channel Blockers, beta-blockers, and ARBs (World Health Organization, 2021). Monitoring and follow-up of blood pressure checks, adherence and patient education are essential in management of blood pressure. Some of the determinants of hypertension are patient related factors like adherence to medication and lifestyle changes, knowledge and socioeconomic status, health system factors like availability of drugs, access to healthcare, affordability, and follow-up systems, provider related factors such as healthcare worker knowledge, counselling skills, workload and attitude.

Hypertension is a worldwide pandemic affecting approximately 1.28 billion adults, with nearly two-thirds residing in low-and-middle income countries (World Health Organization, 2021). Nearly half of them are unaware of their condition, leading to

inadequate management and severe complications, with an estimated 9.4 million deaths annually (World Health Organisation, 2021). The prevalence of hypertension in Africa is among the highest globally, affecting around 46% of adults aged 25 years and older, with many unaware of their condition(Hussien et al., 2021). In Kenya, hypertension prevalence has been on the rise, affecting about 24% of the adult population, and is the leading contributor to stroke and other cardiovascular diseases (Pengpid & Peltzer, 2020). Effective management of hypertension is crucial in preventing stroke, which is strongly associated with uncontrolled blood pressure. Management of hypertension typically involves a combination of lifestyle modifications, pharmacological interventions, and continuous monitoring to maintain blood pressure within the normal range. The success of these measures is dependent on patient adherence, healthcare access and quality of care provided (Adomako et al., 2021). Despite the availability of various treatment options, controlling hypertension remains a global challenge, particularly in low-and middle-income countries where the health system faces numerous challenges leading to complications of stroke. Africa faces numerous challenges in the management of high blood pressure, primarily due to poor access to healthcare, under-diagnosis, and lack of awareness among patients. Many patients remain undiagnosed or inadequately treated, increasing the risk of stroke as a complications (Dzudie et al., 2024).

The main barrier to effective management of high blood pressure in Africa is the fragmented healthcare infrastructure, which mostly limits access to essential medicine and regular monitoring of blood pressure (Dzudie et al., 2024). Regional health initiatives have been implemented to scale up hypertension awareness, diagnosis and treatment, but these efforts are often hampered by insufficient resources and competing healthcare priorities.

Kenya, like many countries in Sub-Saharan Africa, faces challenges in the management of hypertension due to limited healthcare access, especially in rural areas and inadequate patient education. Some of the contributors to poor hypertension control are the high cost of anti-hypertensive drugs, combined with low awareness of the condition. Hypertension management guidelines in Kenya emphasize the need for lifestyle changes, such as reducing salt intake, increasing physical activity, stopping tobacco intake, reducing alcohol intake, healthy diet, managing stress, alongside medication adherence. Despite these efforts, many patients don't achieve adequate blood pressure control, leading to an increased risk of stroke and other cardiovascular events. As the burden of hypertension and stroke continues to rise, improving hypertension management through comprehensive health system interventions, patient education and community engagement is crucial to reducing the long-term impact of these conditions on public health.

Stroke is a significant health issue, affecting millions of people each year. Stroke is the leading cause of disability worldwide and the second leading cause of death after Ischemic heart disease (Feigin et al., 2021). According to the (World Health Organization, 2021), approximately 15 million people experience stroke annually, with around 5 million succumbing to the condition and 5 million left with permanent disability. The global stroke fact sheet released in 2022 reveals that the lifetime risk of developing stroke has increased by 50% over the last 17 years, and 1 in 4 people is estimated to have had a stroke in their lifetime. From 1990 to 2021, there was a 70% increase in incident stroke, 44% deaths due to stroke, 86% stroke prevalence and 32% increase in Disability Adjusted Life Years (DALY).

One of the main clinical risk factors for stroke is high blood pressure. Other risk factors include tobacco use, physical inactivity, unhealthy diet, use of alcohol, raised blood lipid

levels, atrial fibrillation, obesity, genetic disposition, stress, and depression. Stroke may end up with impacts like communication difficulties, loss of work, income, and social networks (https://www.who.int/). Hypertension is a modifiable risk factor, but it is the leading cause of stroke globally. Hypertension is termed a “silent killer” as it plays a crucial role in both the onset and recurrence of stroke, hence making blood pressure management critical in stroke prevention and recovery (Feigin et al., 2021).

Sub-Saharan Africa (SSA) has the highest stroke burden globally, with increasing estimated incidence to be 316 cases per 100,000 persons, with a prevalence of up to 1.460 per 100,000. In SSA countries, stroke is the leading cause of death and disability (Akinyemi et al., 2021). Stroke care is disjointed with glaring gaps in all areas of the stroke continuum due to poor health infrastructure, shortage of specialists, poor health financing models, lack of and poor implementation of health policies and resources, and poor leadership and governance (Hussien et al., 2021). According to WHO, low and middle-income countries bear the heaviest (86%) global stroke burden, with 8% of all first-ever strokes occurring in Africa and 5% of the 30 million stroke survivors worldwide living in Africa (Yuyun et al., 2020). Studies reveal that many patients present with severe and uncontrolled blood pressure at the time of stroke, and hypertension accounts for over 90% of stroke cases in Africa (Okekunle et al., 2023).

Stroke in Kenya is a growing public health concern (Waweru & Gatimu, 2021). According to the latest world health life expectancy ranking, stroke remains the leading cause of mortality in Kenya, with a death rate of 92.66 per 100,000 people (World Health Organization WHO, 2020). According to recent data, stroke prevalence has increased due to rising cases of hypertension, diabetes, and other lifestyle-related conditions(Behera et al., 2024). Ischemic stroke accounts for the majority of strokes in Kenya, with many patients unable to access timely healthcare interventions due to

socioeconomic and infrastructural challenges (Ongosi et al., 2020). Stroke in Kenya is a neglected condition despite the urgent care patients need. Most patients are managed in a general ward by non-neurologists and clinical officers with minimal training in stroke management, nurses who administer drugs, offer continuous bedside support, blood pressure monitoring, patient and family education, and diagnostic services like scanning are not available in most facilities (Waweru & Gatimu, 2021). According to WHO data published in 2020, stroke deaths in Kenya reached 15,895 (6.03%) of total deaths. The age-adjusted death rate of 92.66 per 100,000 of the population ranks Kenya number 81 out of 183 countries in the world (World Health Organisation, 2020).

In Meru County, according to KHIS data for 2020 and 2022, the prevalence of hypertension has increased from 81,797 cases in 2020 to 88,190 in 2022 respectively (Access, 2022). Despite that, while studies in hypertension have been done in Meru County, they have focused on hypertension, but none of the studies in the reviewed literature focused on why patients who have been managed for hypertension develop stroke.

Stroke is a sudden loss of brain function caused by an interruption in the blood supply to the brain or rupture of a blood vessel in the brain, leading to damage or death of brain cells. The two main types of strokes are ischemic and hemorrhagic strokes. Ischemic stroke occurs when a blood vessel supplying the brain is blocked, often by a clot or plaque, leading to brain tissue death due to lack of oxygen (Powers et al., 2019). Ischemic stroke at the cellular level triggers a cascade of events known as the ischemic cascade. A lack of oxygen and glucose results in cellular death through necrosis or apoptosis (Kitagawa, 2022). It accounts for about 85% of all stroke cases (Feigin et al., 2021).

Hemorrhagic stroke occurs when a blood vessel ruptures, hence causing bleeding in or around the brain, increasing pressure on the brain, and this leads to further damage (Magid-bernstein et al., 2023). This rupture of blood vessels leads to toxic effects on the brain tissues and mechanical pressure from the accumulated blood, leading to secondary injury and swelling (Magid-bernstein et al., 2023). Hemorrhagic stroke accounts for approximately 10-15% of all strokes and has a high mortality rate. The most significant risk factor for both types of stroke is uncontrolled hypertension, as it damages blood vessels, increasing the risk of either clot formation or rupture of the vessel (Wajngarten & Silva, 2019). Risk factors for stroke include: Non-modifiable risk factors; age, sex, Race/ethnicity, Transient Ischemic Attack (TIA) and genetics, while Modifiable risk factors are hypertension, smoking, alcohol and drug abuse, physical inactivity, hyperlipidemia, Diet, diabetes mellitus, atrial fibrillation (Kuriakose & Xiao, 2020).

Globally, ischemic stroke accounts for approximately 62% of all stroke cases, followed by intracranial hemorrhage at 28% and subarachnoid hemorrhage at 10%. Hemorrhagic stroke carries a higher risk of fatality and lost Disabilities Adjusted Life Years (DALYs) (Tadi, 2023). The trends are more in both high-income and low-and middle-income countries (LMICs). Ischemic stroke is more prevalent in high-income countries due to risk factors such as ageing populations and lifestyle changes, while hemorrhagic stroke tends to be more common in LMICs, often associated with poorly managed hypertension and limited healthcare access (Abba et al., 2021).

In Sub-Saharan Africa, stroke burden is disproportionately high, with uncontrolled hypertension being a significant driver of both ischemic and hemorrhagic strokes. Many people in the region suffer from untreated or inadequately managed high blood pressure. This has led to a higher prevalence of hemorrhagic strokes, which tend to have worse outcomes due to the limited availability of advanced medical interventions. Lifestyle

transitions, such as increased urbanization and diet changes, have contributed to a rising incidence of ischemic strokes in Africa (Yuyun et al., 2020).

In Kenya, ischemic stroke is the most common, accounting for around 80% of all stroke cases. Hemorrhagic stroke is more prevalent among individuals with poorly managed hypertension. Healthcare systems in Kenya face challenges in stroke management, especially in rural areas where access to timely care is limited. This leads to many patients experiencing severe disability or death following stroke (Waweru & Gatimu, 2021). As such, highly trained nurses (specialized medical surgical nurses), being the first contact with patients could contribute to prevention and severe disabilities and better management of hypertension to prevent stroke. Despite there being improvement in awareness and healthcare infrastructure, much of the population still faces barriers in accessing stroke prevention and management services, which increases the burden of both ischemic and hemorrhagic stroke in the country.

Non-communicable diseases (NCDs) are chronic, non-transmissible diseases of often long duration. NCDs, including cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases, are the leading cause of morbidity and mortality globally, accounting for 74% of all deaths, while 26% of deaths outside NCD are due to communicable diseases, maternal causes, neonatal disorders, injuries, and nutritional deficiencies. One of the main complications of uncontrolled blood pressure is stroke, which contributes significantly to global NCD burden, with low and middle-income countries bearing 86% of premature deaths from NCDs (Müller et al., 2024).

In sub-Saharan Africa, NCDs are rising rapidly, significantly impacting public health. Cardiovascular diseases and diabetes are more prevalent, which is exacerbated by factors such as urbanization, ageing, physical inactivity, unhealthy diets, and increased tobacco and alcohol use. In Kenya, the growing burden of NCDs, including hypertension and

stroke, accounts for 50% hospital admissions and 55% of hospital deaths (Okekunle et al., 2023). The growing burden of NCDs is contributed to by limited healthcare resources and infrastructure, hindering effective diagnosis and treatment. The Ministry of Health in Kenya has developed strategies to combat NCDs, including national policies and action plans aimed at prevention and management (World Health Organisation, 2023).

1.2 Problem Statement

According to the WHO report on hypertension, approximately 4 out of every 5 people with high blood pressure are not adequately treated, but if the countries can scale up coverage by implementing protocols, ensuring steady supply of medications, empowering the healthcare workers, and use better information system to track patient records, 76 million deaths could be averted between 2023 and (https://www.who.int/).Nearly half of the people living with hypertension globally are currently unaware. “Every hour, more than 1000 people die from strokes and heart attacks, mostly caused by high blood pressure, and most could have been prevented,” said Dr Tom Frieden, President & CEO, Resolve to Save Lives. “Good hypertension care is affordable, within reach and strengthens primary healthcare, and nurses take their role as the first line contact with the patients. The challenge now is to go from “within reach” to “reached”(https://www.who.int/).

This will require commitment from governments around the world. Stroke, specifically ischemic and hemorrhagic, remains a prevalent complication among patients with uncontrolled or poorly managed hypertension, especially in LMICs, despite advances in hypertension management. It differs from other hypertension-related complications, like heart failure or chronic kidney disease, in its direct impact on the brain. Stroke continues to be a major cause of morbidity and mortality and disability in Kenya, despite efforts to improve blood pressure control (Wajngarten & Silva, 2019). Stroke can be preventable

with control of risk, early detection and prompt treatment (Ministry of Health (MOH, 2024). While numerous interventions exist to manage hypertension, studies indicate that a substantial number of patients still experience stroke, suggesting gaps in the effectiveness of blood pressure management strategies, patient adherence and healthcare access (Feigin et al., 2021).

The treatment and effectiveness of hypertensive management vary across countries due to financial resources, the extent of health insurance, how people interact frequently with healthcare workers, and utilization of clinical guidelines and availability of medications (Naanyu et al., 2019). Evidence suggests that even among patients on anti-hypertensive therapy, adherence challenges, healthcare system inefficiencies, and individual variability in response to treatment contribute to ongoing stroke occurrences (Sui & Wan, 2021). Hence, there is a need for a deeper investigation into the factors affecting blood pressure management in patients developing stroke. Scaling up treatment coverage and improving its effectiveness can significantly reduce the health burden of hypertension (Zhou et al., 2021).

According to anecdotal data at MeTRH indicates that from January to December 2023, there were 3648 patients with high blood pressure followed up at the NCD clinic, out of whom 386 (10.6%.) arrived at by: stroke patients/total hypertensive x100, had developed stroke. Effective management in MeTRH could have been hindered by poor adherence, weak healthcare systems, inadequate follow-up, and limited diagnostic infrastructure. The gaps contribute to preventable complications such as stroke, which increase morbidity, disability, and mortality among patients. Therefore, this study assessed the determinants of high blood pressure management among patients with a primary diagnosis of hypertension and developed stroke at MeTRH, to better understand why stroke occurs even with established management practices.

1.3 Study Significance

The study findings are valuable for various stakeholders in the healthcare system, contributing to both clinical practice and policy formulation. The study findings will used by healthcare workers to respond to the gaps identified in hypertension management. Specifically, the findings shall inform continuing professional development (CPD) programs, to enable healthcare workers enhance their knowledge and skills on hypertension management. This shall in turn, enable them to provide better patient education and improve overall health outcomes for individuals with high blood pressure. The study findings shall be used also by policy makers and health administrators to develop or refine existing policies and clinical guidelines.

By identifying specific areas of improvement in care, the study shall help the creation of standardized treatment protocols that ensure care is based on the latest evidence-based practices. Identified gaps in hypertension care research by the researcher, shall highlight areas to provide a foundation for further research for the academic and research community. This can lead to new studies focusing on under-explored areas of hypertension management or development of innovative interventions to address these gaps. The study can help health training institutions identify various competencies amongst healthcare workers, allowing for the design of targeted training programs. These programs will focus on addressing the specific training needs required to improve hypertension management and ensure healthcare workers are well equipped to manage patients with hypertension.

1.4 Purpose of the Study

The purpose of the study was to assess and describe the determinants of hypertension management among patients with stroke as a complication, from the perspective of

people living with hypertension and healthcare systems. The healthcare system included patient records and healthcare professionals.

1.5 Specific Objectives

i. To determine the prevalence of stroke as a complication among hypertension patients attending Meru Teaching and Referral Hospital.

ii. To explore patients' experiences and determinants of self-management practices in controlling high blood pressure.

iii. To evaluate the determinants influencing delivery of hypertension healthcare services at Meru Teaching and Referral Hospital.

1.6 Research Questions

i. What is the current prevalence of stroke as a complication among hypertension patients attending Meru Teaching and Referral Hospital?

ii. How do Patients attending Meru Teaching and Referral Hospital perceive their ability to manage high blood pressure by use of self-management programs?

iii. How is the healthcare system delivered in the management of hypertension at MeTRH?

1.7 Assumptions

The study assumed that the necessary information was available to screen patients who had experienced stroke as a complication of high blood pressure. It is also assumed that some patients with comorbidities did not experience speech disturbances, making it feasible to conduct interviews with them. Furthermore, the study presumed that clinical guidelines for hypertension management were relevant and were being applied by healthcare providers at MeTRH, although variations in adherence may exist. Finally, it was assumed that a patient’s level of engagement in self-management practices directly influenced their blood pressure control and overall health outcomes.

1.8 Delimitations

The study focused on Meru Teaching and Referral Hospital only; therefore, the results had limited applicability to other settings. The patient population and sample consisted solely of individuals with a comorbidity of stroke and high blood pressure, with hypertension preceding the stroke, and who had been enrolled in hypertension management for no less than six months. Additionally, the study covered a specific time frame for data collection, concentrating on the medical practices and hypertension management in place at that time. As such, any changes in clinical guidelines, treatment protocols, or healthcare practices that occurred outside this period were not considered.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Literature on hypertension and stroke is documented in this chapter. This includes prevalence of hypertension/ stroke comorbidity, self-management programs like adherence to medication, lifestyle modifications, blood pressure monitoring, patient education, peer support programs and health system delivery. Understanding these determinants of high blood pressure management is vital for developing targeted interventions that enhance hypertension control, ultimately improving the prognosis and quality of life for those patients with hypertension.

The literature review was conducted using several academic databases, including Pub-med, involving research articles, clinical studies and reviews, Cochrane Library, and Google Scholar to identify relevant studies published between 2019 and 2024. Only peer-reviewed articles, systematic reviews, and clinical studies in English were included. Key search terms included "hypertension management, self-care in hypertension, determinants of blood pressure control. Additional literature was accessed through university repositories and websites of relevant organizations such as the WHO.

2.2 Prevalence of hypertension/stroke comorbidity

Hypertension is the most significant modifiable risk factor for stroke, contributing to approximately 48% of all stroke cases globally (World Health Organisation, 2021). Blood pressure is measured in systolic BP, Diastolic BP, Pulse pressure. And mean Arterial Pressure. Blood pressure is classified in different ranges: Normal ‹ 120/‹80 mmHg, Elevated (Pre-hypertension) 120-129/‹80mmHg, Stage 1 HTN (mild) 130-139/80-89mmHg, Stage 2 HTN (moderate) ≥140/≥90mmHg, and Stage 3 HTN (Hypertensive crisis) ≥180/≥120mmHg (Guirguis-Blake et al., 2021).

The coexistence of hypertension/stroke comorbidity is a critical public health concern due to the increased risk of mortality, long-term disability, and healthcare costs

associated with the two conditions. Studies show that a high proportion of stroke patients have either untreated or inadequately controlled hypertension. Quantifying determinants of poor management, therefore explains why some hypertensive patients develop stroke. Globally, it is estimated that up to two-thirds of stroke patients have a history of hypertension, underlining the strong link between the two conditions (Fatima et al., 2022).

In 2019, strokes accounted for 11% of all global deaths, with approximately 54% of those cases attributed to hypertension (Feigin et al., 2021). The burden of hypertension/stroke comorbidity is not evenly distributed across countries. In low- and middle-income countries (LMICs), including Kenya, the prevalence of hypertension among stroke patients ranges between 45% and 80%, due to challenges such as limited access to healthcare, delayed diagnosis, and sub-optimal management of hypertension (Abba et al., 2021)(World Health Organisation, 2021). In contrast, in high-income countries, the prevalence of hypertension is about 30% among adults, and although healthcare advancements have led to improved blood pressure control, stroke still occurs in hypertensive patients, indicating persistent gaps in patient adherence and treatment efficacy (Feigin et al., 2021).

The situation in Sub-Saharan Africa is particularly concerning. Urbanization, lifestyle changes, medication adherence, poor hypertension knowledge, age, socioeconomic status , and weak health systems have contributed to a rise in both hypertension and stroke cases (Sharma et al., 2021), noting a growing incidence of stroke attributable to poorly controlled hypertension across the region. In Kenya, the national prevalence of hypertension stands at 28%, yet only 6.5% of hypertensive individuals are on treatment (Pengpid & Peltzer, 2020). Among stroke patients admitted in major hospitals in Kenya, 50–80% had a history of uncontrolled hypertension (Waweru & Gatimu, 2021),

indicating a high prevalence of hypertension/stroke comorbidity. Stroke can be caused by other factors like cardiac conditions, atherosclerosis, diabetes, smoking, blood disorders, aneurysms, and lifestyle factors.

In Meru County, the Collective Blueprint for Innovative Access Program (Access, 2022) revealed that hypertension was the most prevalent non-communicable disease, with 88,190 confirmed cases in the 2019–2020 period. While this figure highlights the burden of hypertension, it also correlates with rising stroke cases, especially in settings where hypertension is undiagnosed or poorly managed. Low community awareness and weak primary healthcare structures contribute to late diagnoses, when complications like stroke have already developed.

Age and genetics further influence the prevalence of comorbidity. The risk of hypertension increases with age, and the elderly are particularly vulnerable to stroke if their blood pressure is not well controlled (Fatima et al., 2022). Studies from the United States and Europe also support this trend. (Imoisili et al., 2024) reported a 7.8% increase in age-standardized stroke prevalence between 2011 and 2022, largely among patients with preexisting hypertension.

Social determinants such as low socioeconomic status, poor health literacy, and limited access to healthcare facilities exacerbate the prevalence of hypertension/stroke comorbidity in LMICs (Chaturvedi et al., 2024). In Kenya, financial barriers and limited healthcare infrastructure further reduce early detection and treatment adherence, increasing the risk of stroke in hypertensive individuals (Gatimu & John, 2020).

Despite growing awareness of the problem, data gaps persist. Most research focuses on the prevalence of each condition independently rather than the comorbidity. There is a need for more studies specifically addressing the burden and determinants of

hypertension/stroke comorbidity in resource-limited settings, as well as evaluations of interventions designed to address both conditions concurrently.

Globally, guidelines recommend blood pressure control as a central strategy for stroke prevention. Programs such as the Million Hearts Initiative in the U.S. have demonstrated success in reducing stroke incidence by improving hypertension management (Diallo et al., 2024). Similarly, mHealth innovations and community-level screening programs in Kenya have shown promise in enhancing hypertension control, potentially reducing the burden of stroke as a secondary outcome (Vedanthan et al., 2019).

2.3 Self-Management Program

Effective self-management is vital for hypertension control and plays a central role in reducing the risk of stroke. Self-management programs empower patients to actively participate in their care through informed decision-making, improved adherence to treatment, lifestyle modification, and regular monitoring. These interventions are particularly critical in preventing the progression of hypertension and minimizing the risk of complications such as stroke.

2.3.1 Adherence to anti-hypertensive medications (AHMs).

The World Health Organization (WHO) defines AHM adherence as the extent to which patient's follow their prescribed medication regimen as agreed with their healthcare provider (World Health Organization, 2023) . Improving adherence to AHM is crucial in reducing the risk of stroke development or recurrence and achieving optimal blood pressure control in patients with hypertension. Adherence should be seen as a shared responsibility between the patients and healthcare providers. Healthcare providers should offer clear explanations on the importance of consistent medication use and ensure the patient understands, as well as emphasize the consequences of non-adherence. Simplified medication regimens, regular follow-up appointments, and the use of reminders through

mobile health platforms can enhance patient adherence. Patient involvement in treatment decisions fosters a sense of ownership and motivation to comply with their therapy (Galletta et al., 2022). To bridge the knowledge gap and promote sustained adherence, community-based education and counselling services should be offered. These recommendations show that patient education, simplified regimens, and continuous monitoring significantly improve adherence and hypertension outcomes (Hossain et al., 2025).

Despite the availability of AHM, non-adherence has been identified as a significant factor contributing to poor blood pressure control, influenced by a variety of factors, hence increasing the risk of stroke and other cardiovascular diseases (G. C. Y. Kang et al., 2020). These factors include: Socioeconomic factors such as income level, education level, and access to healthcare services play a significant role in determining adherence to AHM. Patients with low income or who have limited access to health facilities struggle to afford the cost of drugs or transport to attend regular follow-up appointments, leading to inconsistent use of drugs (Abbas et al., 2020). Education level plays a key role in determining adherence, where patients with lower education levels may have limited health literacy, making it difficult to understand the importance of follow-up appointments, adherence to medications or how to manage their treatment regimen (Pathak et al., 2022). This increases the risk of stroke and results in poor health outcomes. Psychological and behavioral factors such as depression, anxiety or perceived stress are common among patients with hypertension and can negatively impact medication adherence. Depression leads to poor self-management practices, including missed doses of medication or discontinuation of treatment (Kariis et al., 2023). Long-term need for AHM leads to medication fatigue, hence decreased motivation to continue taking the medication as prescribed (Gebreyohannes et al., 2019). Behavioral factors, including

forgetfulness, lack of routine, patient beliefs about medication or perceived low benefit to medication, can also contribute to non-adherence. Some patients, if required to take multiple pills at different times of the day, may forget to take their medications regularly (Aljofan et al., 2023). Employing mobile phone reminders or using pill organizers can help establish a daily medication routine, which can help address these behavioral challenges (Aljofan et al., 2023).

Some patients may believe that medications are unnecessary if they do not experience symptoms, especially in hypertensive patients, where symptoms may not be evident until complications arise, such as stroke (Pathak et al., 2022). Also, viewing pharmaceuticals as harmful or unnatural may lead to intentional non-adherence, hence causing patients to skip or discontinue medication (Pathak et al., 2022). When patients do not perceive significant or immediate benefits from taking AHM, they are more likely to become non-adherent. Especially those on AHM, the goal is long-term management rather than immediate symptom relief, hence the patients may question the need to continue with medications if they don't notice any immediate improvement (Gardezi et al., 2023).

Medication-related factors, including the medication regimen, like the number of pills prescribed and dosing frequency, influence adherence. Patients prescribed multiple medications or with complicated dosing schedules may have difficulties following their treatment plan (Pathak et al., 2022). Additionally, side effects of AHM, such as fatigue, dizziness or gastrointestinal disturbances, mostly lead to patients stopping taking their medications or altering the dose without consulting the healthcare provider (Abbas et al., 2020). Other patients' perception of medication effectiveness, like when they feel better or when they experience no immediate improvement in their symptoms, they discontinue their AHM, falsely believing that the medication is no longer necessary (Gardezi et al., 2023).

The structure and delivery of healthcare services significantly influence medication adherence. Patients with limited access to healthcare providers may not receive adequate health counselling on the condition and medication, adequate follow-up or regular blood pressure monitoring, leading to poor adherence (Abbas et al., 2020). In LMICs, health facilities have inconsistent availability of AHM, contributing to non-adherence, as patients may be unable to obtain their prescribed medications regularly.

The quality of the patient-provider relationship plays a key role, where patients who feel supported by their healthcare providers, are actively involved in their treatment plan, decision making and receive clear communication from their healthcare provider are more likely to adhere to their medications (Edward et al., 2021). Alternatively, a poor patient-provider relationship leads to a lack of trust in the healthcare system, resulting in poor adherence. Other factors contributing to poor adherence were healthcare procurement costs, where procurement challenges may lead to an inconsistent supply chain, causing stock outs, as well as result in high prices for AHM. Patients may struggle to afford prescriptions as well as or stop treatment, or switch to alternatives (Adhikari et al., 2024).

Cultural beliefs and social factors, like in some communities, traditional remedies or alternative therapies are preferred over conventional medications, leading to poor adherence to AHM (Wahab et al., 2021). Support from family members, peers, or community groups through encouragement and practical assistance, like reminders to take medications or helping with accessing health facilities, can positively impact adherence (Lauffenburger et al., 2019). Lack of this support can hinder adherence, as patients may feel overwhelmed or unsupported in managing their condition. Studies show that patients with strong social networks adhere to medications better than those who lack such support (Al-Noumani et al., 2023).

Non-adherence to AHM can lead to poor hypertension management, leading to poorly controlled blood pressure and increasing the risk of stroke and other cardiovascular conditions. Studies show that hypertensive patients who are non-adherent to medications are up to four times more likely to experience a stroke compared to those adherent to their treatment plan. (Burnier et al., 2020). Non-adherence negatively impacts health care costs and patients' outcomes. Consequently, non-adherence to AHM leads to patients requiring more emergency interventions, hospitalizations and long-term care, which strains the healthcare systems (Pathak et al., 2022). To reduce the burden of stroke as a complication of uncontrolled hypertension globally, factors that influence non-adherence need to be addressed.

WHO has attributed poor adherence to AHM to multiple factors, such as socioeconomic factors, including education level, income level, cost of medications, treatment issues, patient-associated factors, illness-related factors and health system issues (World Health Organization (WHO), 2023). The journal of the American Heart Association (2017) revealed that poor adherence to AHM is associated with increased risk of development of stroke among hypertensive patients. This shows the need for effective strategies to enhance adherence as part of a comprehensive self-management program. Studies carried out highlight several factors that contribute to poor adherence to AHM. These include: lack of understanding of treatment, side effects, poly-pharmacy, forgetfulness (Kvarnström et al., 2021), social, economic, and healthcare system barriers like medication costs, availability and inadequate patient-provider communication (Ongosi et al., 2020). Another study emphasizes behavioral factors, such as patient beliefs about medications, psychological distress and perceived low benefit to treatment as key contributors to poor AHM adherence (Kvarnström et al., 2021). A study carried out in

rural Kenya found that cost and availability of AHM were major barriers to adherence, leading to uncontrolled blood pressure and higher stroke rates (Otieno et al., 2023).

Therefore, healthcare workers need to focus on intervention strategies to ensure that patients adhere to AHM and provide continuing support to achieve long-term adherence, hence minimizing the risk of stroke. Interventions aimed at improving adherence to AHM are essential in reducing the burden of hypertension and preventing stroke. Self-management programs involving simplified medication regimens, patient education, and regular monitoring of blood pressure have been shown to improve adherence and health outcomes (Hany et al., 2024). Providing patients with timely reminders and education content by use of mobile health (mHealth) interventions such as text message reminders and educational content has demonstrated promise in supporting medication adherence (Arshed et al., 2024).

In Kenya, integration of mHealth interventions into primary health care settings has been identified as a potential strategy for enhancing adherence to AHM and improving hypertension management (Mutua et al., 2023). Patient education is relevant as it equips individuals with the knowledge and skills needed to manage their blood pressure effectively. Studies have shown that patients who understand the importance of drug adherence are more likely to take their AHM consistently (Baryakova et al., 2023). Health care providers especially nurses, are key in promoting adherence by engaging in clear communication with patients, offering support and counselling, and addressing any concerns regarding medication side effects or complexities of the treatment regimen.

2.3.2 Lifestyle modifications

Lifestyle modifications are key to both prevention and control of hypertension. Lifestyle modifications are more beneficial than the treatment of single risk factors and play a vital role

in treating high blood pressure. The prevention and control of hypertension is not only addressed by pharmacological management. Adherence to lifestyle modifications among hypertensive individuals is low for several reasons. Several lifestyle changes are universally recommended by health authorities, including dietary adjustments, weight management, increased physical activity, reduction of alcohol consumption and smoking cessation. (Charchar et al., 2024), (Bhandari et al., 2021), (Irwan et al., 2022).

Several studies emphasize the importance of maintaining a healthy lifestyle to prevent hypertension and its complications, such as stroke (Unger et al., 2020). Research shows that adherence to preventive lifestyle measures, including a balanced diet and regular physical activity, significantly lowers the risk of developing high blood pressure. Dietary modifications: The Dietary Approaches to Stop Hypertension (DASH) diet is one of the recommended strategies. It encourages consumption of fruits, vegetables, whole grains, and lean proteins while reducing sodium, sugar and saturated fats (Carey, 2020). Global and local guidelines suggest that individuals who adopt these dietary patterns reduce their risk of hypertension by lowering BP levels, maintaining vascular health (Charchar et al., 2024).

Studies show that regular physical exercise, like moderate-to-intense aerobic activities, such as walking, jogging or cycling for at least 30 minutes per day, can significantly lower systolic and diastolic BP. Maintaining regular physical activity contributes to weight loss, improved cardiovascular health, and reduces factors for comorbidities (Charchar et al., 2024). Weight management is crucial for preventing hypertension, where individuals with a higher body mass index (BMI) have a higher risk of developing high blood pressure. Weight loss through interventions like dietary and physical activity can reduce systolic BP by approximately 5-20 mm Hg per 10kg of weight loss.

In known hypertensive patients, lifestyle modifications work in tandem with anti-hypertensive medications to control BP and reduce the risk of complications like stroke. Reduction of sodium intake to less than 2300 mg per day is a key recommendation to control BP. Studies show that modest reduction of sodium intake can lead to a reduction in systolic BP by 2-8mm Hg (Charchar et al., 2024). Physical activity not only prevents but also plays a crucial role in BP control for patients undergoing treatment. Hypertensive patients are advised to engage in more structured, frequent exercises to complement their pharmacotherapy. Regular aerobic exercises reduce systolic BP by 5-7mm Hg, even in patients on AHM (Charchar et al., 2024).

Excessive alcohol consumption and smoking are known as risk factors for hypertension and cardiovascular diseases. Reduction of alcohol consumption and cessation of smoking can reduce systolic BP (Charchar et al., 2024). Smoking has a direct link to atherosclerosis and stroke, which further complicates hypertension management. Lifestyle changes can significantly enhance the effectiveness of anti-hypertensive treatment, as they complement and enhance the effects of medications(Charchar et al., 2024). Such changes reduce the need for multiple drugs and mitigate the risk of further developing complications such as stroke, and improve overall health outcomes (Ojangba et al., 2023).

Several factors drive whether patients adopt and adhere to lifestyle modifications for BP management; health literacy and education are key determinants, where patients with higher health literacy are more likely to understand the importance of lifestyle modifications and how to incorporate them in their treatment plan (Gaffari-Fam et al., 2020). Healthcare workers and patients' education programs are essential to drive adherence recommendations. The availability of resources such as healthy food options, exercise facilities and cessation of smoking programs varies between regions and can

influence the extent of adherence by patients to lifestyle modifications (Ojangba et al., 2023). Family members, friends and healthcare providers' support has been shown to positively impact adherence to lifestyle modifications (Lauffenburger et al., 2019). Patients receiving support and encouragement are more likely to succeed in making long-term lifestyle changes.

Lifestyle modifications are an essential part of comprehensive management, but their effectiveness depends on consistent and long-term adherence. BP reduction ranges by 3.5 mmHg in patients who implement these changes, depending on the specific intervention (Ojangba et al., 2023). This impact is comparable to the effect of first-line AHM, which underscores the importance of lifestyle changes in both preventive and treatment settings. In patients already on medication, lifestyle modifications help optimize treatment, reduce the need for poly-pharmacy, and decrease the risk of stroke and other cardiovascular diseases (Chlabicz et al., 2022)

A study carried out among hypertensive patients at Bahir Dar city hospitals, in North West Ethiopia, revealed that the overall adherence to lifestyle modification practices was about 32.4%. Only one-third of the participants had adhered to the recommended lifestyle modifications in Ethiopia (Jayte, 2024). Some of the significant predictors of adherence to lifestyle modification in this study were educational status, knowledge, self-efficacy, social support and patient-physician relationship. A study carried out in North East Ethiopia revealed that the overall adherence to lifestyle modifications was very low, and some of the predictors are marital status, education level, monthly income and self-efficacy. Education level plays a significant role in influencing a patient's ability to understand and implement lifestyle changes. Patients with higher levels of education are more likely to comprehend the connection between lifestyle factors leading to better adherence to recommended modifications (Tan, 2020).

Patients with higher self-efficacy are more likely to adhere to prescribed physical activity and dietary instructions as they believe in their ability to control their BP through these actions (Kang et al., 2022). Marital status affects adherence due to social support provided by the spouse, psychological, emotional and practical support which encourages patients to maintain lifestyle modifications (Gouin & Dymarski, 2024). Patients who perceive the benefits of lifestyle modifications, such as improved health and reduced medication reliance, are more likely to adhere to lifestyle modifications (Carey, 2020). Social support from the families, friends, support groups and healthcare providers encourages the patient to participate in healthy activities and is more likely to adhere to lifestyle modifications (Lauffenburger et al., 2019).

Economic factors often determine the extent of lifestyle modifications, especially Dietary Approaches to Stop Hypertension (DASH) may be more expensive, limiting a patient's ability to make dietary changes or access to safe outdoor activities (Smachew et al., 2022). Access to healthcare and resources influences adherence, where patients who receive regular counselling, follow-up visits and monitoring are more likely to maintain lifestyle changes. Healthcare professionals' guidance by promoting and monitoring lifestyle changes, providing clear guidance and encouragement, results in better adherence among their patients (Tsiampalis et al., 2023).

As much as many patients understand the importance of dietary modifications, actual adherence to the changes varies. Studies show that adherence to the DASH diet is low because of the unavailability of recommended foods, the cost of healthier diets and ingrained dietary habits (Smachew et al., 2022). The extent to which patients engage in physical activity is often limited by time constraints, lack of motivation, and insufficient access to safe exercise spaces (Peng et al., 2023). A study showed that when many patients begin exercise programs, adherence tends to decline over time due to barriers

like lack of time, fatigue and pain, lack of motivation, lack of social support, and high cost (Peng et al., 2023). Smoking cessation and alcohol reduction efforts face resistance due to addiction and social influences (Stone & Western Australia Mental Health Commission, 2019). This highlights the need for targeted interventions and support systems to help patients overcome these challenges. To improve adherence, it is important to address these barriers through patient education, social support and healthcare systems improvement.

2.3.3 Patient education and counselling on hypertension management

Patient education and counselling on the management of blood pressure can significantly reduce the risk of stroke by encouraging consistent blood pressure control through adherence to medication and lifestyle changes. Elevated blood pressure is a known risk factor for stroke, kidney disease, heart failure, and loss of vision. As primary caregivers, especially nurses who are often the first point of contact with patients and play a key role in planning follow-up care, there is a unique opportunity to identify, manage, and educate patients about hypertension, thereby reducing the risk of complications.

Nurses should have a structured plan for patient education and ensure that patients understand what hypertension is, the factors that influence it, the associated risk of stroke, and the importance of effective management. This education can be delivered through materials, counselling sessions, and community events. Critical points to emphasize include the importance of adherence to medication, lifestyle modifications, and regular clinic follow-ups. Patients should be informed that hypertension requires permanent, life-long treatment; it can be controlled but not cured.

They should also be encouraged to self-monitor their blood pressure at home, recognize normal and abnormal readings, and understand the appropriate actions to take. Since hypertension is often asymptomatic and may progress silently (earning it the name "the

silent killer"), regular monitoring and proactive management are essential. It is important to highlight that hypertension is a major risk factor for cardiovascular diseases such as heart attacks and strokes, which can be prevented through adequate blood pressure control. Lifestyle modifications form an essential part of treatment, often improving blood pressure management and reducing the need for multiple medications or higher doses.

Patients should be made aware that treatment decisions are based on blood pressure readings rather than symptoms like headaches or dizziness. While stress can contribute to hypertension, genetic predisposition is typically the more common underlying cause. Nurses should also continuously reinforce the dangers of smoking, not just in relation to hypertension, but also in terms of cardiovascular and lung health. Lastly, both systolic and diastolic blood pressure readings are important, with systolic pressure often being a more accurate predictor of complications, particularly in older adults.

2.4 Healthcare Delivery in the Management of Hypertension

Hypertension is a major health challenge globally, contributing significantly to the burden of cardiovascular diseases, including stroke. The quality and accessibility of healthcare services heavily influence the effective management of hypertension. This varies across regions. High-quality healthcare services ensure timely diagnosis, effective treatment plans, and continuous monitoring, which are essential for blood pressure management and control. When patients access healthcare services, they are able to interact with healthcare professionals, receive appropriate medications, and adhere to treatment plans through health education received. Without access to well-equipped healthcare facilities and trained healthcare workers, many hypertensive patients remain undiagnosed or inadequately treated, leading to poor management of hypertension (Bhattarai et al., 2023). Limited accessibility to healthcare leads to delayed diagnosis,

inconsistent medication availability, and inadequate follow-up, which leads to poor hypertension management and control (Bhandari et al., 2021).

When there are poor-quality health services, patients are not educated about their condition, lifestyle modifications, medication adherence, or the importance of regular monitoring, exacerbating the condition (Bhattarai et al., 2023). Hypertension affects over 1.28 billion adults globally, and the WHO has identified it as a leading risk factor for premature death (World Health Organisation, 2021). High-income countries have comprehensive hypertension care programs, like routine screening, access to anti-hypertensive medications, and patient education programs, which have led to better blood pressure control.

In Sub-Saharan Africa, the prevalence of hypertension is among the highest in the world, approximated to be as high as 46% in adults (World Health Organisation, 2023). The healthcare system in some SSA countries is ill-equipped to manage the growing burden of hypertension. In LMICs, the delivery of hypertension healthcare services is faced with difficulties of inadequate health infrastructure, limited resources, and a shortage of essential medicines. Health infrastructure deficiencies lead to a lack of diagnostic tools and poorly equipped facilities, preventing timely detection and follow-up of hypertensive patients, hence increasing the risk of stroke (Bhattarai et al., 2023). Shortage of trained healthcare workers and limited finances restrict access to quality care. Insufficient funding limits the availability of essential services like blood pressure monitoring, treatment and diagnosis, while shortage of trained healthcare workers means that hypertension care lacks continuity and follow up (Bhattarai et al., 2023).

Shortage of anti-hypertensive medications, especially in rural areas, results in inconsistent treatment leading to poor control of high blood pressure (Sorato et al., 2021). More so, infectious diseases have overburdened these regions, leaving non-

communicable diseases like hypertension under-prioritized (Shu & Jin, 2023). In rural regions, healthcare systems are often focused on combating infectious diseases like malaria, tuberculosis, and HIV. These consume a large proportion of already constrained resources, leaving non-communicable diseases like hypertension under-addressed and given insufficient attention, staff, and funding, hence poor management and control (Shu & Jin, 2023). This results in sub-optimal screening, diagnosis, and treatment of hypertension, contributing to poor control rates of hypertension and higher prevalence of hypertension-related complications such as stroke (McCombe et al., 2022). Additionally, frequent outbreaks of infectious diseases divert healthcare workers' focus, reducing time and attention given to hypertensive patients (Phadke et al., 2021).

Hypertension healthcare delivery in Kenya is primarily integrated into the broader healthcare system, with primary healthcare playing a central role. However, there are numerous challenges in the management of hypertension, including a lack of routine blood pressure monitoring, inconsistent availability of anti-hypertensive medications, and inadequate follow-up). Shortage of healthcare workers and lack of training in managing chronic diseases like hypertension are the contributing factors to the challenges faced in healthcare. The Ministry of Health (MOH) has made efforts through implementation of guidelines to address hypertension. The Kenya National Guidelines for Cardiovascular Diseases Management emphasize early detection, continuous monitoring, and use of affordable and accessible medications for controlling hypertension (Ministry of Health, 2024). However, the effectiveness of these guidelines is often undermined by gaps in healthcare.

In Kenya, there is a disparity in healthcare delivery between rural and urban areas, where rural populations are under-served with limited access to healthcare facilities and essential medications, making it difficult to manage hypertension effectively (Otieno et

al., 2020). The cost of healthcare services and medications remains a barrier for many patients, especially those in lower socioeconomic category, hence low adherence to prescribed treatment regimens and poorer health outcomes. There is a shortage of trained healthcare workers capable of managing hypertension and other chronic diseases. Studies have shown that healthcare workers in many primary care settings lack adequate training in the prevention, diagnosis and treatment of hypertension (Shu & Jin, 2023). This highlights the need for continuous professional development for healthcare workers to enhance their capacity to manage hypertension.

One solution that is applicable to LMIC and resource constrained areas is task shifting, which involves training non-physician healthcare workers like nurses, and community health workers to manage hypertension. Another strategy is the integration of hypertension management into primary care services (Yankam et al., 2023). Decentralization of care has allowed more patients to access hypertension care at local health facilities. Additionally, the use of digital health technologies, such as m-Health applications, enables healthcare workers to monitor patients' blood pressure remotely and provide timely interventions, when necessary, hence improving adherence. Another intervention is the availability of affordable medications, where Kenya has included essential anti-hypertensive drugs in the national list of essential medicines (Ministry of Health, 2023). However, the inconsistent availability of these drugs remains a challenge, particularly in rural areas (Diallo et al., 2024)

2.5 Theoretical Framework

The theoretical framework for the study will be guided by the World Health Organization (WHO) conceptual framework for self-care, as outlined by Narasimhan et al., 2019. This framework provides a comprehensive approach to understanding the

factors influencing self-care in managing hypertension, particularly in patients who have experienced stroke (Narasimhan et al., 2019).

WHO conceptual framework for self-care provides a structured way of understanding how individuals, communities, and health systems interact to promote health, prevent disease, and manage illness. It variables are individual level factors like health literacy, socio-demographic determinants, and behaviors, health system factors, environmental and contextual factors. At the individual level, self-care is influenced by health literacy, knowledge, skills, motivation, and self-efficacy, which determine behaviors to adherence. The health system contributes through access to services, workforce support, guidelines, technologies and policies that create an enabling environment for individuals to practice self-care. Contextual factors include family, and community support, cultural norms, governance, and social determinants of health, shape both individual capacity and system effectiveness. The framework in this study guided the definition of variables, organization of data tools, and interpretation of findings by linking individual characteristics, health system delivery, and contextual influences to the management of hypertension and prevention of stroke.

The WHO defines self-care as the abilities of individuals, families, and communities to promote and maintain health, prevent disease and cope with illness and disability with or without the support of healthcare providers. It includes activities like lifestyle modifications, adherence to medication, regular monitoring, and seeking healthcare services. It has three core domains that influence self-care: enabling environment, access to healthcare, and individual capacity. These domains are interrelated and collectively determine the extent to which patients can manage hypertension.

2.5.1 Enabling environment

It includes social, economic and policy factors that support or hinder self-care. In the context of hypertension management. This domain considers how healthcare policies, insurance coverage, availability of essential medications, and community support influence patients' ability to manage their blood pressure. If the patients don't have access to healthcare and medications are inconsistent, policy plays a critical role in ensuring that patients have the necessary resources to manage their condition. These include access to trained healthcare workers, stroke rehabilitation services, which are essential for effective self-management

2.5.2 Access to healthcare

It focuses on the availability and accessibility of healthcare services, which are critical for hypertension management. Hypertensive patients require regular monitoring, follow-up, medication and lifestyle counselling to control blood pressure and prevent stroke occurrence. However, in rural areas and low-resource settings, access to healthcare is limited due to geographical, financial, and infrastructural barriers. Hypertensive patients' ability to access healthcare providers for regular blood pressure monitoring, medication refills and stroke rehabilitation significantly impacts their self-care practices and overall health outcomes (Narasimhan et al., 2019).

2.5.3 Individual capacity

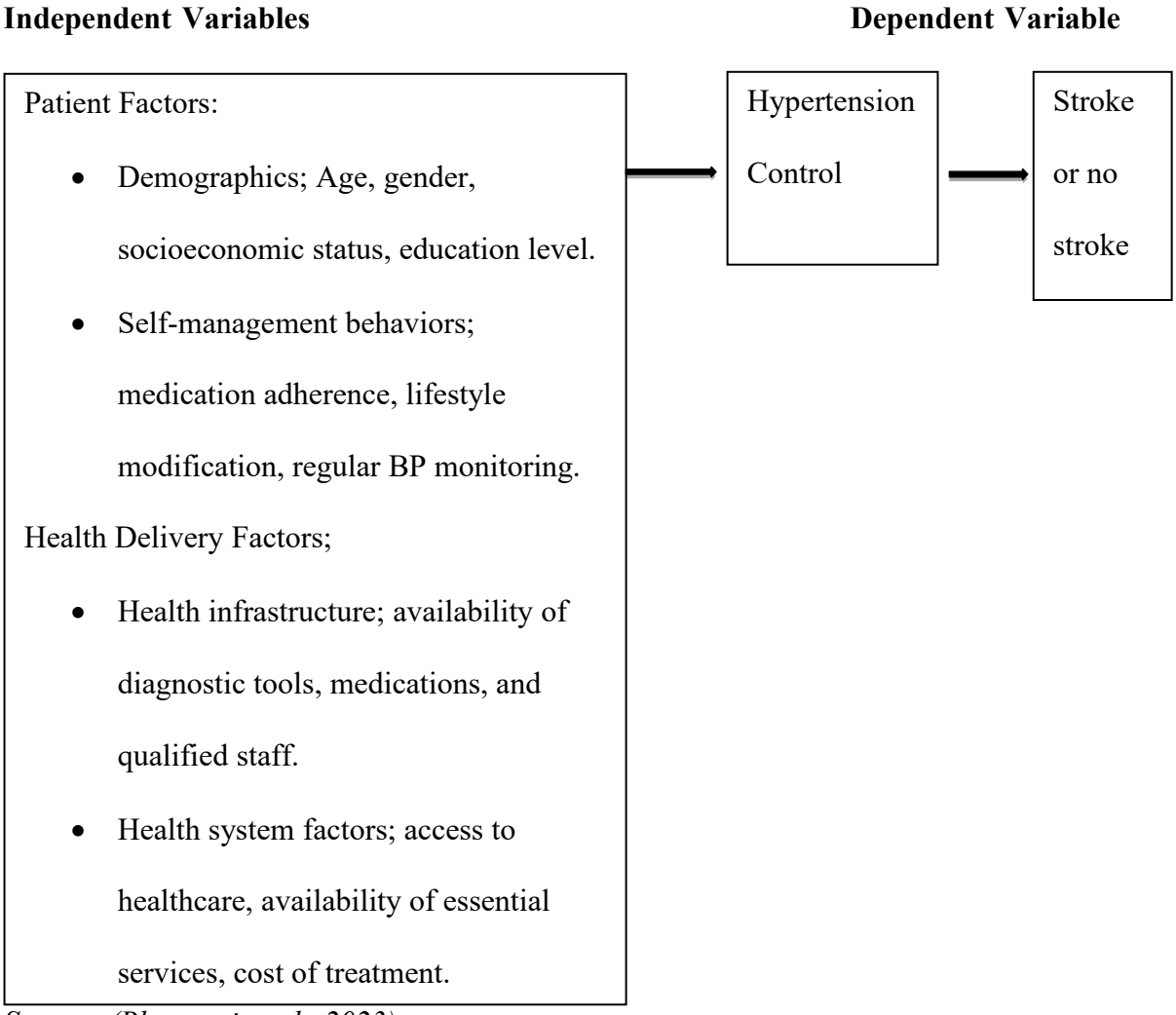
This refers to the knowledge, skills, motivation, and self-efficacy of patients in managing their condition. In the case of hypertension management, individual capacity includes the patient's ability to understand the importance of controlling their blood pressure, adhering to prescribed medications and adopting lifestyle modifications such as diet, exercise, and smoking cessation. Hypertensive patients with low self-efficacy may struggle to adhere to treatment regimens, thereby increasing the risk of uncontrolled

blood pressure and the development of stroke (Kara, 2022). The framework helped to contextualize hypertension management as a multidimensional issue, influenced by several factors like individual behaviors, structural and systemic factors. By use of this framework, the study highlighted gaps in policy, healthcare access, and patient capacity that need to be addressed to improve hypertension management and prevent stroke occurrence.

2.6 Conceptual Framework

Figure 2.1

Conceptual Framework



Source: (Bhattarai et al., 2023)

The conceptual framework illustrates the presumed relationships between independent variables, e.g., socio-demographic factors, knowledge of hypertension, adherence to anti-

hypertensive medication, lifestyle practices and independent variable, high blood pressure among stroke patients at Meru Teaching and Referral Hospital. It is based on the idea that effective hypertension management is influenced by both patient-related and health-system factors. The framework clarified the key predictors to assess high blood pressure, ensuring each objective addressed a specific link in the model. It guided in data collection and analysis, interpretation of results.

2.7 Summary Highlighting Key Findings

Hypertension is a significant risk factor for stroke, with studies indicating a strong correlation between the conditions. The high prevalence underscores the critical need for effective hypertension management and reduces stroke incidence. Apart from pharmaceutical management, lifestyle modifications are key in the management and control of BP. These include salt reduction, weight loss, regular physical exercise, avoiding tobacco use, limiting alcohol consumption, dietary approach to stop hypertension, getting support, clinic follow up and continuous BP monitoring. Lastly, how the WHO health systems building blocks impact hypertension management.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study Area

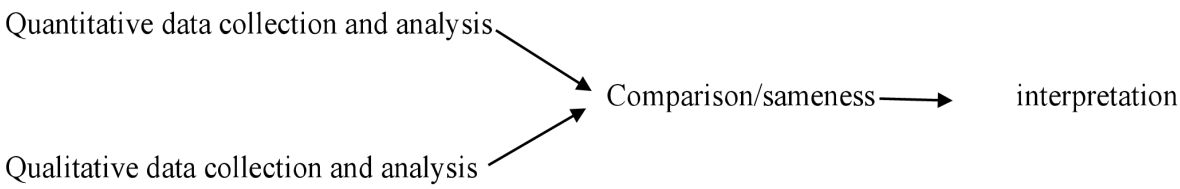
The research was carried out at the Meru Teaching and Referral Hospital. It is a level V hospital, located in Meru County, Kenya. It serves a catchment population of 250,000 people, has a bed capacity of 331 beds, with staffing levels of over 700 technical and supportive staff. MeTRH serves as a referral facility for neighboring counties like Tharaka Nithi, Isiolo, Moyale, Marsabit, Garissa, among others. The hospital offers outpatient, inpatient and specialized services, including a non-communicable disease (NCD) clinic where patients with hypertension and stroke are managed. Meru County has a total population of 1,625,982 people (KNBS, 2019) . The study was carried out in an outpatient clinic, medical wards and a non-communicable disease clinic. The data for medical records was form the patient record retrieved from medical records department.

3.2 Research Approach and Design

A mixed-method research approach was adopted, where a convergent study design was utilized. Both quantitative and qualitative data were collected concurrently and then integrated during analysis. This design enabled a comprehensive understanding of the patients, healthcare providers and structural determinants influencing high blood pressure management (Mackiewicz, 2018). Then comparison of the results from both strands occurred during the interpretation discussion of the results (McCrudden et al., 2019).

Figure3.1

Diagrammatic presentation of a convergent study design



Source: (McCrudden et al., 2019)

3.3 Study Population

The study's patient population comprised of 386 records, for patients who have been on follow-up at MeTRH, who had been diagnosed with primary hypertension, followed up for at least six months, and subsequently developed a stroke during the year 2023. They represent a population at high risk of poor outcomes due to poor management leading to hypertension complications of stroke. Healthcare workers population comprised of 71 healthcare workers managing these hypertension patients from outpatient services, medical wards and NCD clinics at MeTRH. These specifically included doctors, nurses and clinical officers. Medical records retrieved were for the patients actively on follow-up at MeTRH NCD clinic who had developed stroke in the year 2023.

3.4 Sampling Strategy

3.4.1 Sample size determination

Quantitative sample size was derived from the population of 386 medical records and 71 Healthcare workers. For the medical records and healthcare workers, sample size determination was done by the Yamane formula since the target population is less than 10,000 (Oluigbo et al., 2024).

Sample Size Calculation for Medical Records:

Formula assumes 95% confidence level, proportion of 0.5, e = Level of precision (10%)

$$n = \frac{N}{(1+N(e)^2)} \qquad (1)$$

where n= sample size, N=population size (386),

$$n = \frac{386}{(1+386(0.1)^2)}$$

$$n = \frac{386}{4.86} = 79.4 \approx 80$$

Sample size Calculation for Healthcare workers

$$n = \frac{N}{(1+N(e)^2)} \qquad (2)$$

$$n = \frac{71}{(1+71(0.1)^2)} = 41.5 \approx 42$$

The ideal sample size for a qualitative study shall be determined by data saturation.(Hennink & Kaiser, 2022). The researcher utilized the principle of emergent and data saturation to determine the sample size, where data saturation was achieved with 10 patients when no new data were recognized.

3.4.2 Sampling techniques and procedures

In quantitative sampling, a systematic random sampling method was used for medical records. Sampling interval (k) was calculated (Population/sample size), using a population (N) of 386 and sample size of 80 (n),

where K= N/n=386/80= 4.8 ≈5.

Random sampling was used to select the first file. A random number between 1 and 5 was generated by lottery method, where random number was 1, and was the first to be sampled. Then subsequent files were picked by including every 5th record until the sample size (80) was achieved.

Stratified random Sampling was adopted to select 42 healthcare workers from various cadres (nurses, doctors, and clinical officers). Each cadre formed a stratum, and participants were randomly selected proportionate to size.

Table 3:1

Healthcare workers sample proportion allocation

Healthcare workers role	Population size (N=71)	Proportion of population	Sample size (n=42)
Physician	3	4.23%	2
Medical Officers	4	5.63%	2
Nurses	29	40.84%	17
Clinical Officer	35	49.29%	21
Total	71	100%	42

Source; Researcher (2025)

In Qualitative sampling**,** the researcher utilized Purposive sampling method. Data collection and preliminary thematic analysis were conducted concurrently. After each interview, transcripts were coded and compared with previous data in order to know the point of data saturation. By the 8th and 9th interviews, no new codes or themes emerged, and the 10th interview confirmed redundancy of information. This indicated that data saturation was achieved as there was no new substantive insights were obtained. The selection aimed to capture variation in populations' dimensions relevant to the phenomenon under study, like age, sex, and socioeconomic status.

3.5 Eligibility Criteria

3.5.1 Inclusion criteria

Patients above 18 years who were diagnosed with primary hypertension and followed up in MeTRH for at least 6 months, and later developed stroke and with no cognitive or speech disorder. Healthcare providers who are involved in the management of hypertension with six months of experience. Patients and healthcare workers who

consented to participate. Medical records for patients with documented hypertension and subsequent stroke.

3.5.2 Exclusion criteria

Incomplete patient records. Patients unable to participate in interviews due to severe disability or communication barriers, or have comorbidities like diabetes, heart condition, kidney diseases, or cancers. Patient referred from other facilities, and a pregnant woman with hypertension

3.6 Recruitment of Participants

The researcher recruited healthcare workers from Meru Teaching and Referral Hospital. A staff list of all eligible healthcare workers (physicians, medical officers, clinical officers, and nurses), was obtained from the hospital administration. Using stratified random sampling, the healthcare workers who met the eligibility criteria were grouped according to cadre, after which proportional numbers were randomly selected from each group to reach the required sample size. Those selected were approached in their departments, given information about the study, and those who provided informed consent were enrolled. Then the researcher sought the retrieval of stroke patients' files for the year 2023.

For the stroke patients, the researcher identified the clients by visiting the medical records department in MeTRH, and identify the patients booked for the Hypertension clinic the following day. The researcher perused the files retrieved for the clinic and identified the stroke patients. Using the eligibility criteria, the researcher screened the patients records for who qualified and knew who to approach that day. The clinic day, the patient was approached and informed about the study, if he or she consented, then arrangement on data collection was done.

3.7 Ethical Considerations

Ethical approval was obtained from Meru University of Science and Technology (MUST) Institutional Research Ethics Review Committee (MIRERC). Permit got from NACOSTI. Approval to conduct the study was sought from Meru County Research Committee, and Meru Teaching and Referral Hospital (MeTRH). Respondents were taken through the informed consent form before they took part in the study (informed consent attached in Appendix III). They were informed of the purpose of the study and emphasized that the study had no physical or economic risks. Specific measures were put in place for participant support by having trained staff who conducted data collection. Participants were assured of utmost confidentiality, and the information obtained was not to be shared with those not part of the study. Their names were not included on the questionnaire. Participants were informed that there would be no denial of access to any service for choosing to abstain from the study and no disciplinary action for refusal to participate. They were informed that participation is voluntary and withdrawal at any point was also allowed. The researcher obtained informed consent from the participants, explaining clearly how data would be collected, stored and used before data collection.

3.8 Data Collection

The researcher was assisted to collect data by two research assistants to assist: a Kenyan Registered Community Health Nurse and a statistician working in MeTRH. The researcher trained research assistants on what was required of them, like explaining the study objectives and procedures to potential participants, obtaining informed consent from participants as well as ensuring all questions were answered completely and correctly, assisting the participants in case of any clarification required, and identifying the eligible medical records for the study.

3.8.1 Data collection instruments

Quantitative data was collected by use of a checklist for medical records to extract clinical data on hypertension management, for objective on prevalence and healthcare delivery, and self-administered questionnaire for healthcare workers, to capture knowledge, attitudes, and practices in managing hypertension, for objective on healthcare delivery. Qualitative data, an in-depth interview guide was used to explore personal experiences with self-care and treatment challenges, for objective on self-care management experiences.

3.8.2 Reliability and validity

Reliability and validity of the research were conducted at Chuka Level 5 hospital by the researcher without the involvement of a research assistant.

Reliability

In a quantitative study, a test and retest method was used where the questionnaires were administered to healthcare workers attending to hypertensive patients at Chuka Level 5 hospital hypertensive clinic at different points in time to see how stable the responses were. Values were considered well if the coefficient correlation (r) ≥ 0.70. Inter-rater reliability was used for medical records, where two or more raters assessed the same records independently, then calculated the level of agreement between the raters using Cohen's Kappa, where a Kappa value of 0.6 or above indicates good reliability.

Validity

In the Quantitative study, face validity was adopted by the researcher to measure the validity of the questionnaires, where the respondents (Healthcare workers at Chuka Level 5 Hospital) were provided with the questionnaire and asked to review the items and judge if they seemed appropriate and relevant to the construct being measured in content validity.

The rate of adherence by the medical staff to management of hypertension by use of guidelines was assessed by checking the medical records the management instituted if it adhered to the Kenya National Guideline for Cardiovascular Diseases, 2018.

Trustworthiness of qualitative study stream

To ensure the trustworthiness of this study, several strategies were employed. Credibility was enhanced through peer debriefing sessions with experienced qualitative researchers who reviewed the coding and emerging themes to ensure accurate interpretation of the data collected from patient interviews. Transfer-ability was supported by providing rich, thick descriptions of the study setting, participant characteristics, and context, allowing readers to determine the applicability of findings to other similar settings or populations. To ensure dependability, a detailed audit trail was maintained, documenting all stages of data collection, transcription, coding, and analysis to promote transparency and consistency throughout the research process. Finally, confirm ability was strengthened through reflexive journaling by the researcher to recognize and minimize potential biases, complemented by the audit trail that ensured transparency of decisions made during the study. These measures collectively enhance the trustworthiness and rigor of the study findings.

3.8.3 Data collection procedure

Self-administered questionnaires for healthcare workers were used to gather information on healthcare workers' experiences, knowledge, attitudes and practices in managing hypertensive patients. The tool was adapted from a modified version of the World Hypertension League questionnaire that was used to assess knowledge, attitude, and practice of Primary health care physicians in Qatar towards hypertension management. It was validated by experts in hypertension management and provision of primary care services in Mongolia (Joudeh et al., 2023). The questionnaire consisted of closed-ended

and open-ended questions. The questionnaire had several sections: demographic information, knowledge of hypertension and stroke, attitude in hypertension management, practices in hypertension management, challenges and barriers. The questionnaire was administered via paper format. Completion time for the interview was within 20-30 minutes, and follow-up reminders were sent to healthcare workers who did not complete the questionnaire within the first week of distribution. The researcher was there to support them either physically or via calling throughout the process.

A checklist was used to collect data from the medical records, focusing on accuracy and completeness of documentation regarding hypertension management. It focused on various key aspects: demographic data, diagnosis, cardiovascular disease risk factor assessment, diagnostic assessment, management of hypertension and patient education and follow-up. The checklist was adapted from the Kenya National Guidelines for Cardiovascular Diseases (Ministry of Health, 2024) for the management of hypertension. After sampling medical records, the researcher used a checklist to review and examine each of the selected medical records. Each record review took 20-30 minutes.

In qualitative data collection, the researcher developed topics for the interview guide from different studies on self-care models and home-based monitoring (Konlan & Shin, 2023), factors influencing self-care behaviors in hypertension patients with complications (Pahria et al., 2022), self-care management for hypertension in South East Asia: A scoping review (Irwan et al., 2022) and predictors of self-care behaviors in patients with hypertension. The interview guide had open-ended questions to steer the conversation, and exploration of their experiences and allowed flexibility at some points as they came up. The researcher audio recorded the interview to ensure accuracy in capturing the conversation and transcribed it later to create a detailed record for analysis. The interview duration took approximately 30 minutes to 1 hour, but also depended on

the participants' answering the questions until no new information came up. The researcher explained to the participant that the interview would take approximately 30 minutes to 1 hour and negotiated with the participants on the venue and the date for the interview. All the participants selected the interviews to be conducted at their homes. The researcher asked how their home looked to understand if it was conducive for the interview, especially if there was no noise. The researcher sometimes travelled with the research assistant to collect the data from the participants' homes.

3.9 Data Analysis and Management

Phased data analysis was adopted by the researcher, where Quantitative data was analyzed first by coding and then entered into a statistical software package, SPSS version 25, and subjected to data cleaning. Statistical software allows efficient identification and handling of missing values, outliers and inconsistencies.

In Qualitative data analysis, thematic data analysis (Braun & Clarke, 2020) was used. The researcher read and re-read the data and transcribed the recorded interviews or discussions, making initial notes about patterns that emerged. Transcripts were coded using qualitative data analysis software NVivo version 15. Code-book was developed to provide a systematic framework for coding to ensure consistency during data analysis. It contained definition of the initial codes that were derived deductively from the research objectives and inductively from the data. As coding progressed, the code-book was refined, and through iterative comparison and clustering of codes, broader sub-themes and themes were generated to capture underlying patterns in the data. This created mutually exclusive sets of data that inform each other. Findings from both datasets merged during interpretation to conclude converging and diverging patterns in determinants of hypertension management. Then the researcher conducted a discussion with seamless integration of quantitative results with the qualitative insights, offering a

comprehensive narrative that addressed the research questions and hypothesis. Then a discussion of the implications of the findings to practice, policy and future research was done. Data was protected by observing the Data Protection Act, 2019 by obtaining informed consent from all participants after they were fully briefed on the purpose of the study and their right to withdraw at any stage. Confidentiality was maintained by avoiding use of names or personal identifiers and instead, assigning codes to each participant. Electronic data were stored in password-protected devices, while hard copies were kept in locked cabinets accessible only by the researcher. Access to the data was restricted to the researcher, academic supervisors and research assistants, and findings were reported in aggregate form to ensure anonymity. In compliance with the Act, data will be retained only for academic purposes and disposed of securely after completion of the study.

3.10 Data Dissemination

As per the study, the researchers' target primary consumers were healthcare workers (nurses, physicians, and clinical officers), policy makers, health managers, stroke/hypertensive patients, academic and research community. Findings of the study were disseminated through academic platforms by presenting at the Meru University of Science and Technology International Conference. The thesis report shall be submitted to the university repository, seminar presentations within the institution, as well as publication in peer-reviewed journals. To the policy makers and practitioners, dissemination is targeted to the county, MeTRH management and healthcare workers, where a summary of the report will be shared with the managers, and a presentation shall be made to the county health department. To improve practice, the researcher shall share the report with healthcare workers through continuous professional development meetings and together come up with actions to be implemented. To the patients, the

researcher shall share the findings in simple, actionable terms through brochures and health talks when they come for clinic follow-up. The dissemination process will adhere to ethical standards and promote the use of research findings to inform policy and practice.

CHAPTER FOUR: RESEARCH FINDINGS

4.1 Introduction

This chapter presents the findings from both the quantitative and qualitative data of the study. The research findings include demographic data, descriptive statistics, inferential statistics and integration and convergence. Quantitative data shall be presented using tables and figures in numerical and percentages, while quantitative data will be presented using narratives and verbatim quotes by use of thematic analysis. Tables shall be used to present quantitative and qualitative data for convergence and divergence.

4.1.1 Response rate

Response rate refers to the proportion of respondents who participated in the study out of the total number who were selected to participate.

A total of 42 health workers were selected from the population, with 38 healthcare workers filling out and submitting their questionnaires. This translated to a response rate of 90.5%. This response rate was satisfactory to make conclusions for the study. A total of 80 medical records files were also sampled, with all 80 used for the study, a 100% response rate.

4.2 Demographic Characteristics

4.2.1 Patients' demographic characteristics

This section presents the combined demographic characteristics of the patients whose files were sampled in the study.

Out of the 80 medical records assessed, 67.5% (n= 54) were female and 32.5% (n=26) male. Qualitatively, out of 10 participants, 70% (7) were female and 30% (3) were male. This indicates that the prevalence of stroke was higher in females than in males.

The study sought to know the prevalence of stroke among different age groups. The findings indicate that stroke prevalence was highest among individuals aged 60 years and

above at 44% (n=35), followed by those aged 51–60 years at 25% (n=20). These results demonstrate an increasing trend of stroke prevalence with advancing age.

The results show that 54(67.5%) respondents were married, 16(20%) were widowed. This suggests that stroke was more common among married and widowed individuals, possibly due to their older age profiles.

Of the respondents, 45% (n=36) had attained primary education, 30% (n=24) had secondary education, 17.5% (n=14) had never attended school, and only 7.5% (n=6) had post-secondary education. This suggests that stroke was more prevalent among patients who had lower levels of education.

Additionally, 70% (n=56) of the respondents were unemployed, with just 6.3% (n=5) formally employed, an indication that stroke was more prevalent among unemployed hypertensive patients. These results are illustrated in Table 4.1.

Table 4:1

Patients' Demographic Characteristics

Demographic	Classification	Count	%
Gender	Male	26	32.5%
	Female	54	67.5%
	Total	80	100%
Age	21-30	2	2.5%
	31-40	9	11.3%
	41-50	14	17.5%
	51-60	20	25.0%
	60 and Above	35	43.7%
	Total	80	100%

Marital status	Single	6	7.5%
	Married	54	67.5%
	Widowed/widower	16	20.0%
	Divorced/Separated	3	3.8%
	Total	80	100%
Education status	Other	1	1.3%
	Secondary	24	30.0%
	Post-secondary	6	7.5%
	None	14	17.5%
	Total	80	100%
Employment status	Employed	5	6.3%
	Self employed	13	16.3%
	Unemployed	56	70.0%
	Other	6	7.5%
	Total	80	100%

Source; Researcher (2025)

4.2.2 Healthcare workers' demographic characteristics

This section presents the demographic characteristics of the health workers who participated in the study, including their age, gender, profession, years of experience, and primary location of work.

The findings show that 71% (n=27) of the healthcare workers were female, while 29% (n=11) were male. This suggests that females constituted the majority of those involved in the daily management of hypertensive patients. The majority were aged between 21-30 years 58 %(n=22), while only 3% (n=1) were between 51-60 years. This indicates that

young healthcare workers were more engaged in the management of hypertensive patients.

The data indicate that registered Clinical Officers and nurses were the predominant professional groups among respondents, each comprising 45% (n=17) of the sample.

The majority of the respondents had between 1-5 years of work experience in hypertension management 44.7 % (n=17), with only 13.2 %(n=5) having over 10 years' experience. This might imply the workforce had little exposure to hypertension management. This information is presented in Table 4.2.

Table 4:2

Health Workers Demographic Characteristics

Demographic	Classification	Count	Count %
Gender	Male	11	28.9%
	Female	27	71.1%
	Total	38	100%
Age	21-30 Years	22	57.9%
	31-40 Years	11	28.9%
	41-50 Years	4	10.6%
	51-60 Years	1	2.6%
	61 Years and above	0	0.0%
	Total	38	100%
Profession	Physician	2	5.3%
	Medical Officer	2	5.3%
	Nurse	17	44.7%
	Clinical Officer	17	44.7%

	Total	38	100%
Years of experience	Less than 1 year	9	23.7%
	1-5 years	17	44.7%
	6-10 years	7	18.4%
	more than 10 years	5	13.2%
	Total	38	100%
Primary location of work	Outpatient	11	28.9%
	Medical Ward	20	52.6%
	Non-communicable Disease (NCD) Clinic	7	18.5%
	Total	38	100%

Source; Researcher (2025)

4.3 Prevalence of Stroke Among Hypertensive Patients Attending Meru Teaching and Referral Hospital

This section presents data on the prevalence of stroke among hypertension patients at Meru Teaching and Referral Hospital. The study focused on this sub-group and prevalence was compared across the demographic data. The findings help inform clinical practice and guide targeted interventions aimed at reducing the incidence of stroke among hypertensive patients.

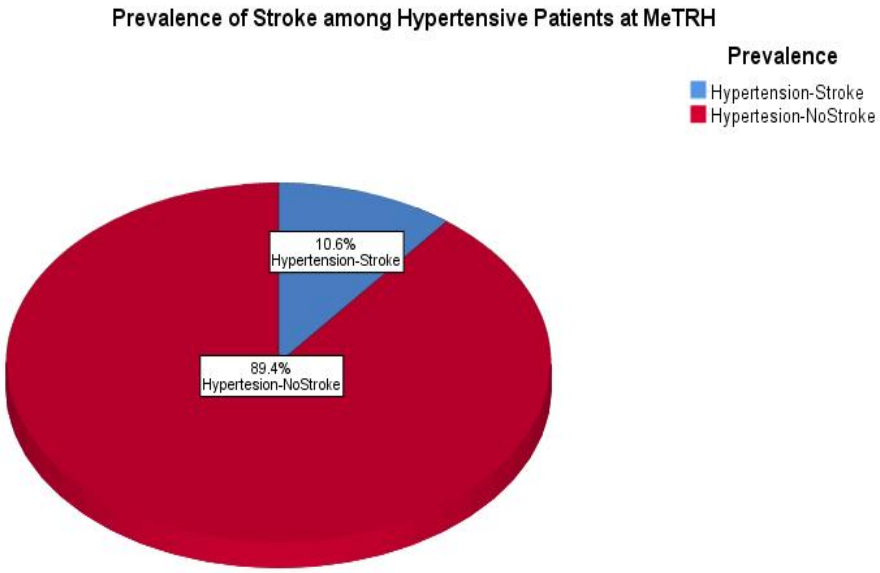
The researcher used point prevalence to calculate the prevalence because the proportion of individuals were in a defined population who have specific condition (stroke due to uncontrolled hypertension) the year 2023. The study excluded patients who developed stroke before 2023, or stroke caused by other comorbidities.

$$Point\ prevalence\ of\ stroke\ among\ hypertensive\ patients = \frac{Number\ of\ hypertensive\ patients\ with\ stroke}{Total\ number\ of\ Hypertensive\ patients} \times 100 \quad (3)$$

Out of the 3648 patients who had been diagnosed with primary hypertension, followed up for at least six months, 386 had developed stroke. This translated to a stroke prevalence of 10.6% among hypertensive patients at MeTRH.

Figure 4.1

Prevalence of Stroke among Hypertensive Patients at MeTRH



Source; Researcher (2025)

From Table 4.2 above, out of 80 respondents sampled from the population of Hypertension patients with stroke complications, 67.5% (n=54) were female and 32.5% (n=26) male, indicating a higher prevalence of stroke among female hypertensive patients. Age-wise, stroke prevalence was highest among individuals aged 60 years and above at 44% (n=35) and lowest at 21–30 years at 3% (n=2), demonstrating a clear increase in stroke risk with advancing age.

Marital status analysis showed that stroke was more prevalent among married individuals at 67.5% (n=54) and widowed at 20% (n=16), which may be attributed to their older age demographics.

Only 7.5%, (n=6) had attained education to a post-secondary level, indicating an inverse relationship between education level and stroke prevalence.

Stroke was more prevalent among the unemployed, 70% (n=56), possibly linked to socioeconomic vulnerabilities that affect access to consistent care and lifestyle modification.

Overall, the findings highlight that stroke is more prevalent among older, female, less educated, and unemployed hypertensive individuals, emphasizing the need for targeted interventions in these subgroups.

4.4 Healthcare System Delivery in Management of Hypertension at MeTRH

This section presents descriptive statistics related to the healthcare system delivery in the management of hypertension at Meru Teaching and Referral Hospital (MeTRH). The analysis focuses on key components of service delivery, including diagnosis of hypertension, patient follow-up practices, counselling and education, medication adherence monitoring, and health workers' knowledge, attitudes and practices in managing hypertension. These statistics provide insight into the structure, processes, and consistency of care offered to hypertensive patients within the facility, helping to assess the effectiveness and gaps in the current healthcare delivery system.

4.4.1 Blood pressure measurement

The study sought to evaluate if the patients had their blood pressure for both arms measured and recorded at most 1 to 2 minutes apart, and if monitoring was being done before the participant developed a stroke. The results indicate that 67.5% (n=54) of the respondents did not have blood pressure measured on both arms 1 to 2 minutes apart, whereas 32.5 % (n =26) did have it measured. This shows that the guide on the decision to make a diagnosis and classification was not being adhered to. Additionally, 97.5% (78) of the respondents had their blood pressure monitored before the development of stroke,

and only 2.5% (2) were not monitored. This implies there was a good practice of monitoring hypertensive patients' blood pressure. Those results are presented in Table 4.3.

Table 4:3

Blood pressure measurement

Blood Pressure Measurement	Both Arms	Last Three Visits
Yes	26(32.5%)	78(97.5%)
No	54(67.5%)	2(2.5%)
Total	80(100%)	80(100%)

Source; Researcher (2025)

4.4.2 Blood pressure control before stroke occurrence

The study assessed blood pressure control in respondents before stroke by reviewing readings from the three most recent clinical visits. Results showed a consistently high prevalence of uncontrolled blood pressure ranging between 144/93-215/140mmHg: 92.5% (74) out of 80 at the first visit, 96.3% (77) at the second (with one unmeasured), and 95% (76) at the third (with two unmeasured). Overall, 95% (n=76) of respondents had uncontrolled blood pressure before stroke onset, suggesting poor blood pressure management may have contributed to stroke occurrence. These findings are summarized in Table 4.4 below:

Table 4:4

BP Readings before Stroke Occurrence

Bp Reading	1st Visit	2nd Visit	3rd Visit
High(144/93-215/140mmHg)	74 (92.5%)	77 (96.3%)	76 (95%)

Normal(124/90-140/78mmHg)	6 (7.5%)	2 (2.5%)	2 (2.5%)
Undocumented	0 (0%)	1 (1.2%)	2 (2.5%)
Total	80 (100%)	80 (100%)	80 (100%)

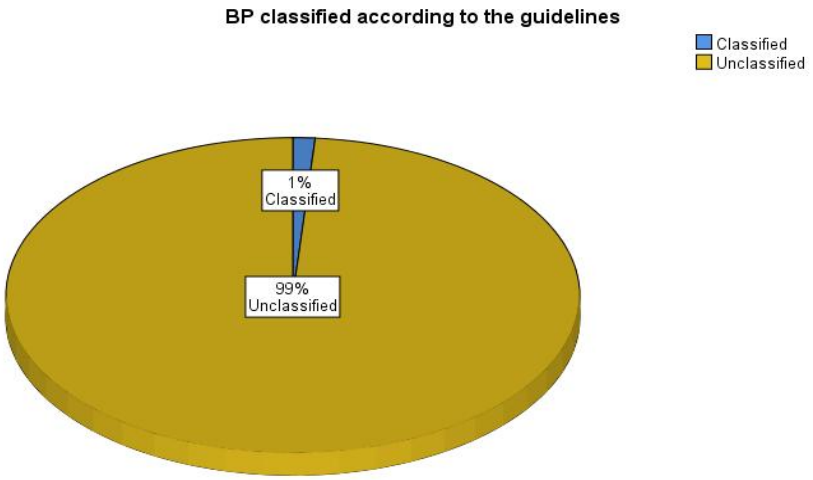
Source; Researcher (2025)

4.4.3 Blood pressure classified as per the guidelines

The study further explored whether the classification of the blood pressure was done and if it followed the guidelines. According to the findings, 99% (79) of the respondents did not have their blood pressure classified, with only 1% (1) having it classified as Grade 3 (hypertensive urgency). This indicates that blood pressure categorization, which is a determinant of the treatment mode, was not adhered to. These results are presented in Figure 4.1 below.

Figure4.2

Classification of BP as per the guideline



Source; Researcher (2025)

4.4.4 Cardiovascular risk factor stratification

The study evaluated whether there was cardiovascular disease risk factor stratification for hypertensive patients before initiation of blood pressure management. The findings indicate that levels of systolic and diastolic blood pressure were the one that was mostly evaluated at 92.5% (74), followed by total cholesterol 23.7% (19), diabetes mellitus 16.3% (13), smoking 10.0% (8), alcohol use 8.7% (7), family history of early onset of CVD 5.0% (4), Dyslipidemia 3.7% (3), and waist circumference 1.2% (1). This implies that evaluation and comprehensive assessment of most of the risk factors to hypertensive patients, which can guide in hypertension management, investigations to undertake and health education weren't adhered to by all patients. These findings are presented in Table 4.5 below.

Table 4:5

Cardiovascular Disease Risk Factor Stratification

Risk Factor	Yes	No
Levels of systolic and diastolic BP	74(92.5%)	6(7.5%)
Smoking	8(10.0%)	72(90.0%)
Alcohol use	7(8.7%)	73(91.3%)
Dyslipidemia	3(3.7%)	77(96.3%)
Total Cholesterol >5.1mmol/l or LDL > 3mmol/l or HDL men < 1mmol/l, women <1.2mmol/l	19(23.7%)	61(96.3%)
Diabetes mellitus men >55 yeas, women > 65 years	13(16.3%)	67(83.7%)
Family history of early onset of CVD: Men aged < 55 years, women aged <65 years	4(5.0%)	76(95.0%)
Waist circumference: abdominal obesity, men≥102cm, women ≥88cm	1(1.2%)	79(98.8%)

Source; Researcher (2025)

4.4.5 Laboratory and diagnostic tests

The study sought to evaluate if the basic laboratory investigations were carried out to rule out any comorbidity and whether there was any evaluation of heart problems if indicated. According to the results, only half of the respondents 50% (n=40), were tested for urea and creatinine, whereas urinalysis 30% (24), lipid profile 28.7% (23), blood sugar (fasting/ random) 26.3% (21), and ECG investigated 22.5% (18). This is an indication that basic baseline investigations are not conducted for all patients to be able to rule out any underlying condition which might pose a great risk to the development of stroke. Those findings are presented in Table 4.6 below.

Table 4:6

Laboratory and Diagnostic Tests

Laboratory and Diagnostic tests	Done	Not Done
Lipid profile	23(28.7%)	57(71.3%)
Blood Sugar (fasting/ Random)	21(26.3%)	59(73.7%)
Urinalysis	24(30.0%)	56(70.0%)
Renal Function tests (electrolytes, creatinine)	40(50.0%)	40(50.0%)
ECG	18(22.5%)	62(77.5%)

Source; Researcher (2025)

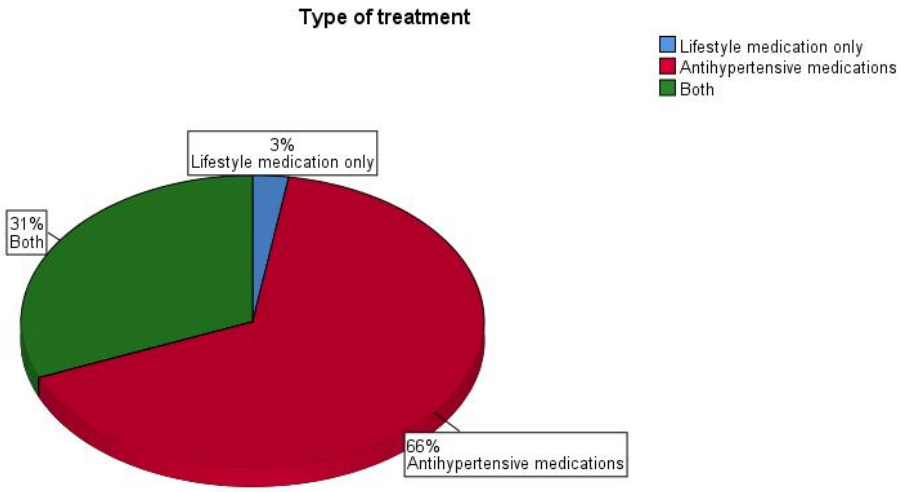
4.4.6 Type of treatment

The research intended to evaluate the type of treatment the respondent was put on after diagnosis, whether there was a trial of lifestyle modification only or both lifestyle modification and drugs, or put on drugs only. The findings indicate that the highest number of respondents were started on anti-hypertensive medication 66% (n =53) only, both Anti-hypertensive Medication (AHM) and lifestyle modifications 31% (n=25), and

3% (n=2), only lifestyle modification. This implied that the trial of lifestyle modification only was not practiced, and the common practice was AHM, which could not have been sufficient to manage hypertension without combining lifestyle modification and AHM. This could have been the contributing factor to elevated blood pressure and complications of stroke. The results are presented in Figure 4.2.

Figure4.3

Type of treatment



Source; Researcher (2025)

4.4.7 Management of hypertension

The study sought to evaluate whether continuous assessments were carried out for the respondents during follow-up clinics. Medication adherence screening was conducted for only 32.5% (n=26) of the respondents, while assessment for the presence of drug side effects and their management was performed in just 5% (n=4) of cases. On the other hand, 95% (n=76) of the respondents were referred to a specialist. These findings indicate that referral practices for hypertensive patients were generally well-observed, demonstrating a strong commitment to specialist involvement. However, the monitoring

of medication adherence and assessment of drug side effects were inconsistently implemented and not routinely conducted during follow-up visits. This gap in care may have contributed to poor medication adherence, thereby increasing the risk of stroke among hypertensive patients. The findings are presented in Table 4.7.

Table 4:7

Management of Hypertension

Management of Hypertension	Yes	No
Medication Adherence Documented	26(32.5%)	54(67.5%)
Presence of side effects noted and managed	4(5.0%)	76(95.0%)
Referral to a specialist	76(95.0%)	4(5.0%)

Source; Researcher (2025)

4.4.8 Lifestyle modification and self-care topics covered in every counselling visit

The study examined whether respondents received counselling on various aspects of lifestyle modification and self-care during each clinic visit. The findings reveal substantial gaps in patient education concerning hypertension self-management. Counselling on general hypertension management was provided to only 2.5% (2) respondents. Similarly, just 1.3% (1) respondent received advice on alcohol cessation, and only 1.3% (1) was counseled on quitting tobacco use.

Counselling on engaging in at least 30 minutes of daily physical activity was more common, with 37.5% (30) respondents reporting they received such guidance. A similar number 37.5% (30) respondents also received counselling on diet and nutrition. However, only 11.2% (9) respondents were advised on the importance of medication adherence, and just 26.3% (21) were instructed on how to self-monitor their blood pressure at home. Notably, none 0% (0) of the respondents reported being informed about the importance of returning to the clinic if they felt unwell or experienced new symptoms.

These findings indicate that essential counseling and education on hypertension self-care were frequently overlooked. As a result, many patients lacked the necessary knowledge and support to manage their condition effectively at home, potentially increasing their risk of serious complications such as stroke. The results are detailed in Table 4.8 below.

Table 4:8

Lifestyle Modification and Self-care Topic Covered in Every Counselling Visit

Counselling is provided at every visit	Yes	No
Hypertension and management	2(2.5%)	78(97.5%)
Stop alcohol use	1(1.3%)	79(98.7%)
Stop all forms of tobacco use	1(1.3%)	79(98.7%)
Daily exercise, at least 30 minutes of moderate to intense dynamic aerobic exercise	30(37.5%)	50(62.5%)
Diet and nutrition	30(37.5%)	50(62.5%)
Medication adherence	9(11.2%)	71(88.8%)
BP Self-monitoring	21(26.3%)	59(73.7%)
Return to the clinic if unwell or experience new symptoms	0 (0%)	80(100%)

Source; Researcher (2025)

4.4.9 Duration of follow-up visits

The research assessed the duration between the patient follow-up clinic visits and were still on management. The findings show that the majority of respondents, 51% (n=41), were given a two-month return date, 29% (n=23) were scheduled to return after three months, 19% (n=15) after one month, and only 1% (n=1) after four months.

These results suggest that follow-up appointments were most commonly set at two- to three-month intervals, which are only ideal for patients with controlled blood pressure.

This is indicative of poor practice, given that 95% of the respondents had uncontrolled blood pressure before stroke occurrence.

4.4.10 Patient follow-up clinic adherence and assessment of hypertensive crisis

The study sought to examine if there was adherence by the respondents to follow-up clinics and if there was assessment of hypertensive crisis. The results indicate that out of 51 patients who had hypertensive crisis (BP ≥180/≥120 mmHg), no respondent was assessed for hypertensive crisis, 0% (n=80). This indicated that no assessment was done for a hypertensive emergency, which is key to guiding the management. Resultantly, the healthcare workers were not aware of the signs of impending stroke to be able to avert it early. Follow-up visits were documented in 97.5% (n=78) of the respondents. Additionally, 98.8% (n=79) were given a subsequent appointment. There was also good practice on adherence to follow-up care and assigning respondents with the dates for clinic follow-up. The findings are presented in Table 4.9 below.

Table 4:9

Patient Follow-up Clinic Adherence and Assessment of Hypertensive Crisis

Patient follow-up	Yes	No
Assessment of hypertensive crisis 51 patients had (BP >180mmHg/120mmHg) and appropriate management	0(0%)	80(100%
Evidence of follow-up visits and continuity of care	78(97.5%)	2(2.5%)
Next appointment dates given	79(98.8%)	1(1.2%)

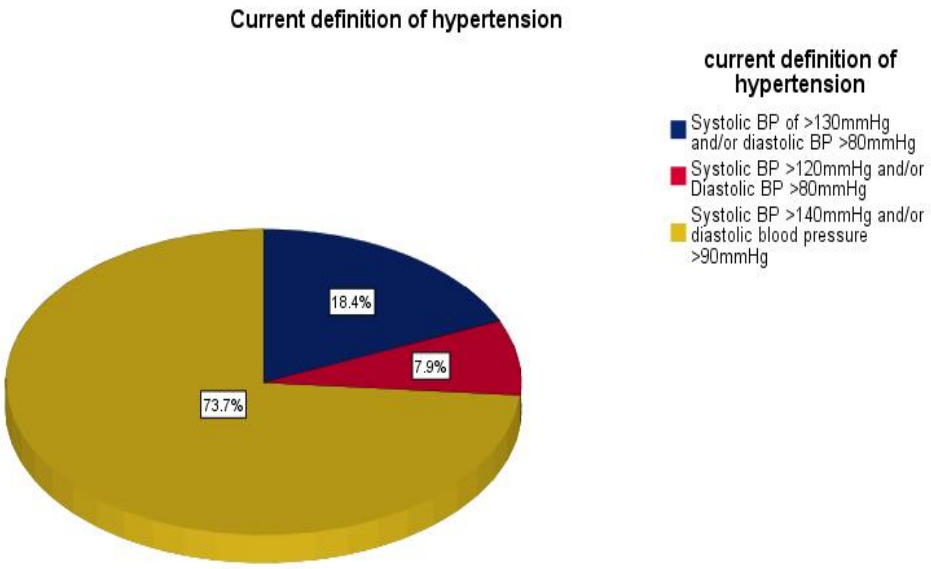
Source; Researcher (2025)

4.4.11 Current definition of hypertension

The level of knowledge of healthcare workers was assessed on the current definition of hypertension. The findings reveal varying levels of understanding among respondents regarding the current definition of hypertension. A majority, 74% (n=28), identified hypertension as systolic blood pressure greater than 140 mmHg and/or diastolic pressure above 90 mmHg. The majority of the respondents have accurate knowledge of the current definition of hypertension, which is essential for early detection and management of hypertensive patients. The findings are presented in Figure 4.4. below.

Figure4.4

Current respondents definition of hypertension



Source; Researcher (2025)

4.4.12 Cardiovascular risk factors

The study assesses the health workers' knowledge of risk factors for hypertension, which is a cardiovascular disease. The results show that only 52.6% (n=20) of respondents identified a family history of premature cardiovascular disease (CVD) as a risk factor. In contrast, smoking and high salt intake were each identified by 94.7% (n=36), obesity by

100% (n=38), and physical inactivity by 89.5% (n=34). While the majority of respondents demonstrated awareness of major cardiovascular risk factors, the inability to recognize all relevant risks highlights the need for refresher training on comprehensive cardiovascular risk assessment. Those findings are illustrated in Table 4.10.

Table 4:10

Cardiovascular Risk Factors

Cardiovascular Risk Factors	Yes	No
Family history of premature CVD	20(52.6%)	18(47.4%)
Smoking	36(94.7%)	2(5.3%)
Obesity	38(100%)	0(0%)
High salt intake	36(94.7%)	2(5.3%)
Physical inactivity	34(89.5%)	4(10.5%)

Source; Researcher (2025)

4.4.13 Recommended lifestyle modification

The study set out to assess health workers' knowledge regarding the identification of lifestyle modifications recommended for the management of hypertensive patients.

All respondents (100%) were aware of the importance of reducing salt intake in the management of hypertension. Additionally, 94.7% (n=36) recognized the need to increase physical activity, and an equal proportion acknowledged the importance of maintaining a healthy weight. Limiting alcohol consumption was identified by 86.8% (n=33), quitting smoking by 97.4% (n=37), and adopting a healthy diet by 92.1% (n=35). These results demonstrate a generally high level of knowledge among healthcare workers regarding recommended lifestyle modifications, which is essential for effective hypertension management. This is seen in Table 4.11 below.

Table 4:11

Recommended lifestyle modification

Recommended Lifestyle Modification	Yes	No
Reduce salt intake	38(100.0%)	0(0%)
Increase physical activity	36(94.7%)	2(5.3%)
Maintain weight	36(94.7%)	2(5.3%)
Limit alcohol consumption	33(86.8%)	5(13.2%)
Quit smoking	37(97.4%)	1(2.6%)
Eat a healthy diet	35(92.1%)	3(7.9%)

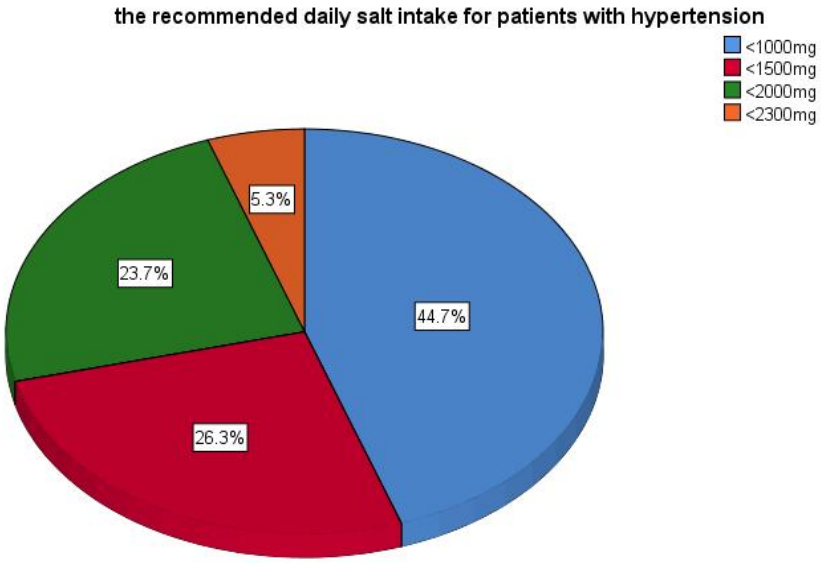
Source; Researcher (2025)

4.4.14 Recommended daily salt intake for hypertensive patients.

The study assessed the health workers' knowledge of the recommended salt intake for hypertensive patients. According to American Heart Association guidelines and U.S Dietary guidelines recommend limiting sodium intake to less than 2300mg per day for adults (Snetselaar et al., 2021). The data indicated that 44.7% mentioned ‹ 1000mg, 26.3% (n=10) less than 1500 mg, 23.7% less than 2000mg, and only 5.3% correctly stated less than 2300mg per day. These findings suggest that knowledge of dietary salt intake recommendations among healthcare workers is sub-optimal. This gap may hinder effective dietary counselling and patient education, thereby negatively impacting blood pressure control and overall hypertension management outcomes. These findings are presented in Figure 4.5.

Figure4.5

Recommended daily salt intake for patients with hypertension



Source; Researcher (2025)

4.4.15 Knowledge and prescription of hypertensive medications

The study set out to assess the health workers' knowledge of different anti-hypertensive drugs used to manage hypertensive patients. Most respondents identified ACE inhibitors (94.7%, n=36), calcium channel blockers (92.1%, n=35), and diuretics (84.2%, n=32) as commonly used anti-hypertensive medications. Angiotensin receptor blockers (ARBs) and beta blockers were each identified by 73.7% (n=28). This indicates a moderate level of awareness among healthcare workers regarding major anti-hypertensive drug classes. However, the lower identification rates for ARBs and beta blockers may reflect local prescribing practices or limited availability of these medications within the facility. These findings are presented in Table 4.

Table 4:12

Common Hypertensive Medications

Common HTN Medications	Yes	No
ACE inhibitors	36(94.7%)	2(5.3%)
ARBs	28(73.7%)	10(26.3%)
Beta Blockers	28(73.7%)	10(26.3%)
Calcium channel blockers	35(92.1%)	3(7.9%)
Diuretics	32(84.2%)	6(15.8%)

Source; Researcher (2025)

This study also aimed to identify the anti-hypertensive medications commonly prescribed by healthcare workers and to assess how their choices reflect knowledge of treatment guidelines, clinical experience, or drug availability at the facility. The findings show that calcium channel blockers (CCBs) are the most frequently prescribed, used by 86.8% (n=33) of respondents. This is followed by diuretics at 71.1% (n=27), angiotensin receptor blockers (ARBs) at 57.9% (n=22), ACE inhibitors at 55.3% (n=21), beta blockers at 36.8% (n=14), sympathomimetic agents at 21.1% (n=8), and vasodilators at 5.3% (n=2).

While CCBs are the preferred choice, the overall variability in prescribing patterns suggests possible gaps in the use of standardized clinical guidelines. These inconsistencies may stem from differences in clinical training, personal prescribing habits, or variations in drug availability at MeTRH. The findings highlight the need to reinforce adherence to evidence-based treatment protocols to ensure consistent, effective, and rational hypertension management across providers. This is presented in Table 4.13

Table 4:13

Medications prescribed for hypertension

Medication	Yes	No	Total
ACE Inhibitors	21 (55.3%)	17 (44.7%)	38 (100.0%)
Antidiuretics	27 (71.1%)	11 (28.9%)	38 (100.0%)
ARBs	22 (57.9%)	16 (42.1%)	38 (100.0%)
Beta blockers	14 (36.8%)	24 (63.2%)	38 (100.0%)
CCB	33 (86.8%)	5 (13.2%)	38 (100.0%)
Central sympatholytic	8 (21.1%)	30 (78.9%)	38 (100.0%)
Vasodilator	2 (5.3%)	36 (94.7%)	38 (100.0%)

Source; Researcher (2025)

4.4.16 Potential complications of uncontrolled BPs.

The study evaluated the healthcare workers' awareness of the potential complications of poorly controlled blood pressure. Among the respondents, 100%(n=38) identified stroke as a complication of uncontrolled blood pressure, 97.4% (37) mentioned kidney disease, 89.5% (34) noted heart attack, and 71.1% (27) were aware of vision loss. Only 63.2% (24) recognized vascular complications such as peripheral artery disease. The results indicate that there was strong awareness of the major complications like stroke, kidney disease and heart attack. However, the lower recognition of vision loss and peripheral vascular complications indicates a knowledge gap that may affect comprehensive risk education to the patients. These results are presented in Table 4.14.

Table 4:14

Potential Complications of uncontrolled BPs

Potential complications of uncontrolled BPs	Yes	No
Stroke	38(100.0%)	0(0%)
Heart attack	34(89.5%)	4(10.5%)
Kidney disease	37(97.4%)	1(2.6%)
Vision loss	27(71.1%)	11(28.9%)
Peripheral artery disease	24(63.2%)	14(36.8%)

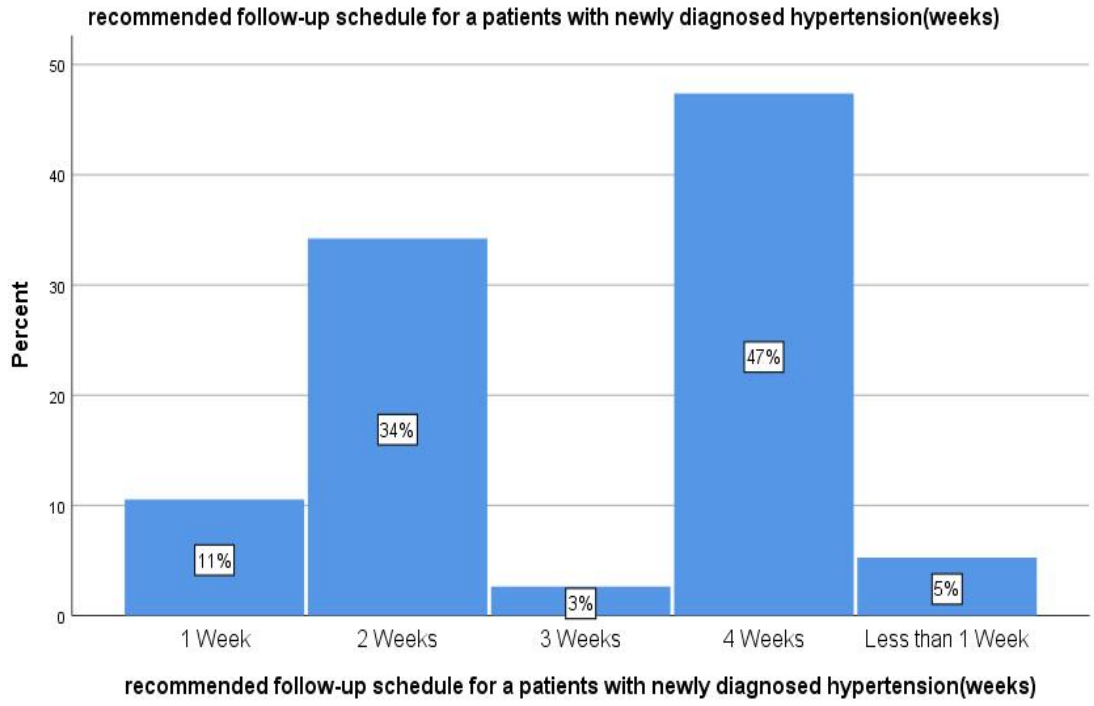
Source; Researcher (2025)

4.4.17 Recommended follow-up schedule for a patient with newly diagnosed hypertension

The study evaluated healthcare workers' awareness of the recommended follow-up schedule for newly diagnosed hypertensive patients. Out of a total of 38 respondents, 47% (n=18) identified the follow-up interval as 4 weeks, 34% (n=13) indicated 2 weeks, 11% (n=4) stated 1 week, 5% (n=2) reported less than 1 week, and 3% (n=1) mentioned 3 weeks. This suggests that most healthcare workers are aware of the recommended follow-up interval of 2 to 4 weeks after initiating anti-hypertensive treatment, which is critical for monitoring blood pressure and evaluating potential side effects. The findings are presented in Figure 4.6.

Figure4.6

Recommended follow-up schedule for patients



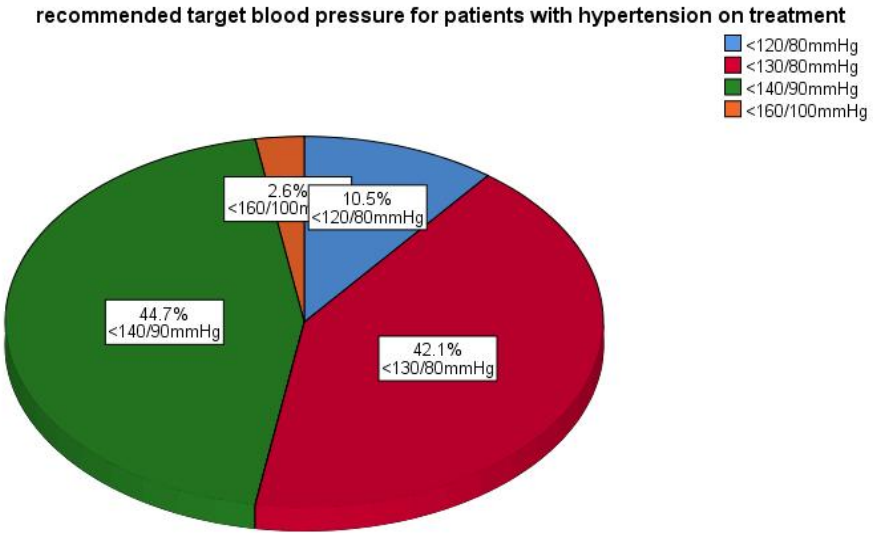
Source; Researcher (2025)

4.4.18 Recommended target blood pressure for patients on hypertension treatment.

The study sought to assess the healthcare workers' awareness of the target blood pressure for patients on management of hypertension. The results show that 44.7% (n=17) of respondents correctly identified the target blood pressure as less than 140/90 mmHg. These responses suggest that a significant proportion of healthcare workers are not fully aligned with the standard target blood pressure recommended for most hypertensive patients under treatment. This gap highlights the need to reinforce awareness and application of guideline-based blood pressure targets to support effective treatment evaluation and patient outcomes. The findings are presented in Figure 4.7.

Figure4.7

Recommended Target blood pressure



Source; Researcher (2025)

4.4.19 Attitude assessment

The study assessed healthcare workers' attitudes toward hypertension management. Most (68.4%, n=26) strongly agreed that hypertension is a serious condition requiring medical attention. Only 2.6% strongly believed that lifestyle changes alone are sufficient, suggesting that most view medication and other interventions as necessary.

When asked whether hypertension is common but not a major health concern, 50% strongly disagreed and 44.7% disagreed, showing that most healthcare workers recognize its seriousness. Regarding self-medication, 50% strongly disagreed and 23.7% disagreed with encouraging it, indicating general disapproval, though a small number (18.5%) showed some level of acceptance, highlighting the need for further training and oversight. There was strong agreement on the importance of regular blood pressure monitoring, with 65.8% strongly agreeing and 31.6% agreeing. Most also supported shared

responsibility in managing hypertension, with 52.6% strongly agreeing and 39.5% agreeing.

These findings, detailed in Table 4.15, reflect generally appropriate attitudes but point to areas needing reinforcement, particularly around self-medication and the role of lifestyle changes.

Table 4:15

Attitude Assessment

Attitude Assessment	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Hypertension is a serious condition that requires medical attention	1(2.6%)	0(0%)	0(0%)	11(28.9%)	26(68.4%)
Lifestyle modifications alone are sufficient to manage hypertension	6(15.8%)	15(39.5%)	5(13.2%)	11(28.9%)	1(2.6%)
Hypertension is a common condition, but it's not a major health concern	19(50%)	17(44.7)	0(0%)	1(2.6%)	1(2.6%)
Patients with hypertension are encouraged to self-medicate	19(50%)	9(23.7%)	3(7.9%)	5(13.2%)	2(5.3%)
Regular blood pressure monitoring is important for managing hypertension	1(2.6%)	0(0%)	0(0%)	12(31.6%)	25(65.8%)
Hypertension management is a shared responsibility between healthcare workers and patients	1(2.6%)	0(0%)	2(5.3%)	15(39.5%)	20(52.6%)

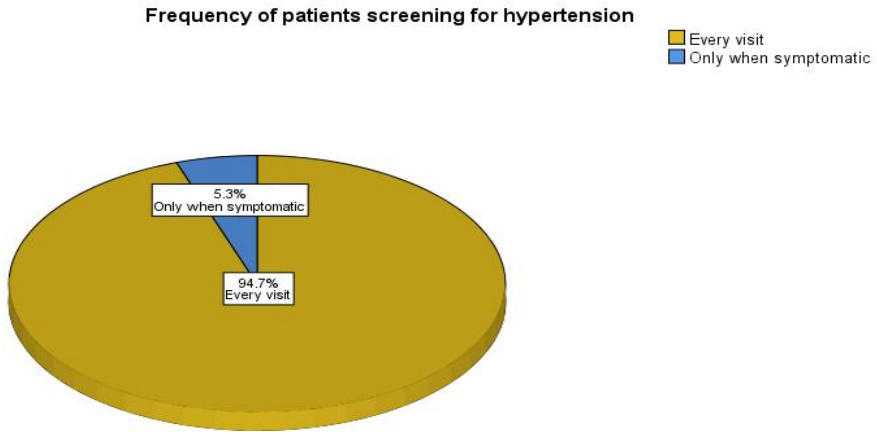
Source; Researcher (2025)

4.4.20 Frequency of hypertension screening in the facility

This study seeks to understand how often screening of blood pressure is conducted in the facility. Out of 42 Healthcare workers sampled for the study, only 38 who responded, where 95% (n=36) reported that blood pressure screening was conducted during every hospital visit, while 5% (n=2) indicated that screening occurred only when a patient was symptomatic. This reflects a strong practice of routine screening for all patients, which is crucial for early detection and timely diagnosis of hypertension. The findings are presented in Figure 4.8.

Figure4.8

Frequency of hypertension screening



Source; Researcher (2025)

4.4.21 Steps to take when you suspect a patient has hypertension

This study aimed to assess whether healthcare workers understand the appropriate steps to take when managing a hypertensive patient for the first time. The data show varied responses: 50% (n=19) reported that initiating anti-hypertensive medication is the first step, while 47.4% (n=18) indicated beginning with counselling. Additionally, 50% (n=19) emphasized taking the patient's history, 39.5% (n=15) mentioned conducting investigations, 15.8% (n=6) cited initiating follow-up care, and 84.2% (n=32) identified blood pressure screening as the starting point.

These mixed responses point to a lack of standardized clinical guidelines among healthcare workers for managing newly diagnosed hypertensive patients. The findings underscore the need for targeted training and clearer clinical protocols to promote consistent and effective hypertension care. The results are detailed in Table 4.16.

Table 4:16

Steps to take when you suspect patient hypertension

Step	Yes	No	Total
AHM	19 (50.0%)	19 (50.0%)	38 (100.0%)
Counseling	18 (47.4%)	20 (52.6%)	38 (100.0%)
Follow-up care	6 (15.8%)	32 (84.2%)	38 (100.0%)
History taking	19 (50.0%)	19 (50.0%)	38 (100.0%)
Investigations	15 (39.5%)	23 (60.5%)	38 (100.0%)
Screening	32 (84.2%)	6 (15.8%)	38 (100.0%)

Source; Researcher (2025)

4.4.22 Resources that you use to stay up to date on hypertension management guidelines

The researcher sought to understand what mechanisms do healthcare workers use to update their knowledge on hypertension, management. According to the findings, some respondents 10.5% (4) mentioned that they get updates from American College of Cardiology, 7.9%(3) from American Heart Association, 44.7 (17) get updates through Continuous medical education (CME), 2.6%(1) from European Society of Cardiology, 15.8% (6) from jacaranda, 2.67% (1) from KIDIGO, 39.5% (15) from medical apps, 13.2% (5) from the ministry of health (MOH), 15.8% (6) from National Cardiovascular guidelines, 26.3% (10) from WHO, while 5.3% (2) responded that they don't receive any updates. Most of the respondents get updates from the American Heart Association and KIDIGO.

The results imply that healthcare workers have no clear source for updating themselves to have a guided way to manage blood pressure in the hospital. There needs to be clear

protocols and guidelines to ensure staff have continuous updates. This is demonstrated in Table 4.17 below.

Table 4:17

Resources used to stay up to date on hypertension management guidelines

Resource used to stay up to date	Yes	No	Total
American College of Cardiology	4 (10.5%)	34 (89.5%)	38 (100.0%)
American Heart Association	3(7.9%)	35(92.1%)	38 (100.0%)
CME	17 (44.7%)	21 (55.3%)	38 (100.0%)
European Society of Cardiology	1 (2.6%	37 (97.4%)	38 (100.0%)
Jacaranda	6 (15.8%)	32 (84.2%)	38 (100.0%)
KIDIGO	1 (2.6%)	37 (97.4%)	38 (100.0%)
Medical Apps	15 (39.5%)	23 (60.5%)	38 (100.0%)
MOH	5 (13.2%)	33 (86.8%)	38 (100.0%)
National Cardiovascular Guidelines	6 (15.8%	32 (84.2%)	38 (100.0%)
No updates	2 (5.3%)	36 (94.7%)	38 (100.0%)
WHO	10 (26.3%)	28 (73.7%)	38 (100.0%)

Source; Researcher (2025)

4.4.23 Patient counselling on lifestyle modifications

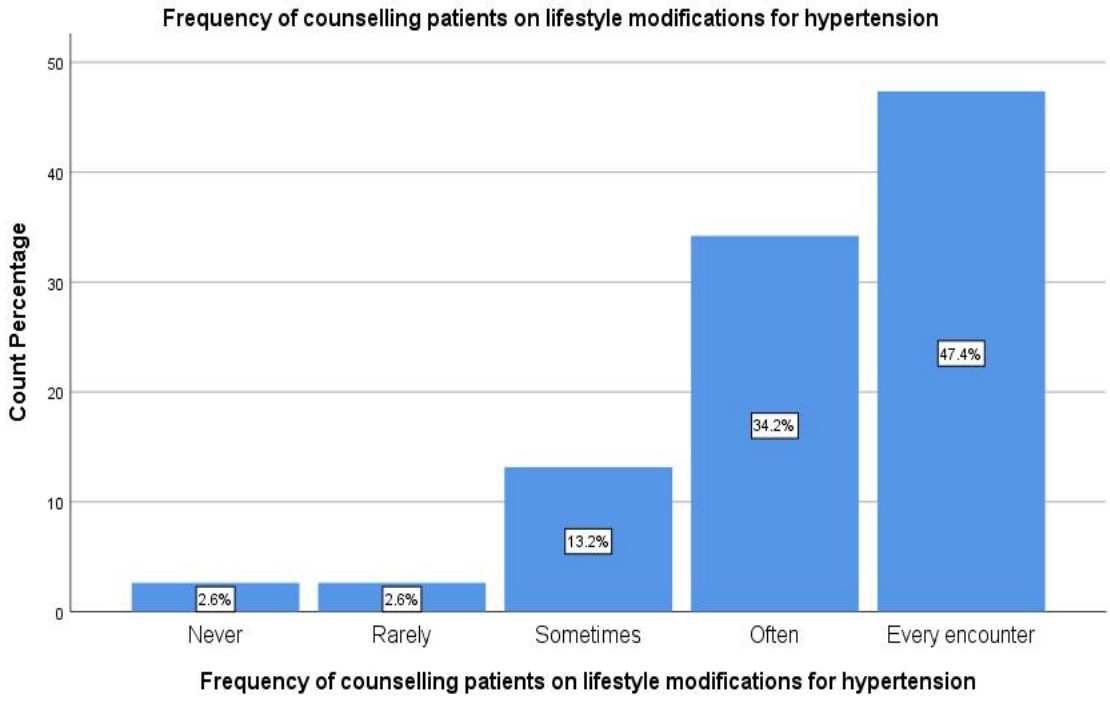
The study assessed how frequently healthcare workers provide counselling on lifestyle modification as part of self-care in blood pressure management. Results showed that 47.4% (n=18) counsel patients at every clinical encounter, while 34.2% (n=13) do so often. Additionally, 13.2% (n=5) reported counselling sometimes, 2.6% (n=1) rarely, and 2.6% (n=1) never.

The fact that most respondents fall into the “every encounter” and “often” categories is encouraging and suggests alignment with recommended hypertension care practices.

However, the inconsistency in counselling frequency points to the need for targeted training and system-wide strategies to ensure routine, standardized delivery of lifestyle counselling. The findings are illustrated in Figure 4.9 below.

Figure4.9

Counselling on lifestyle modifications



Source; Researcher (2025)

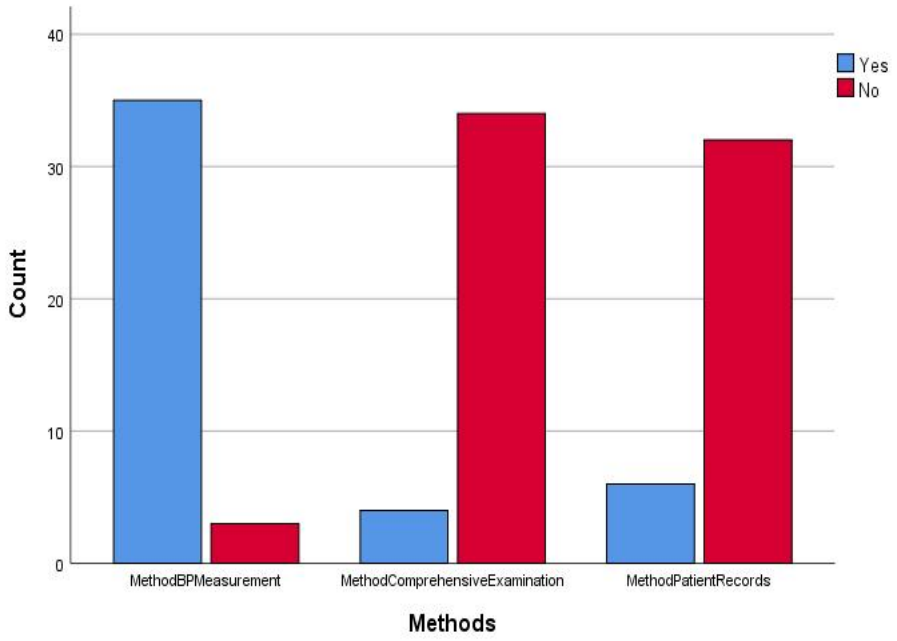
4.4.24 Common methods used to assess patients' blood pressure

The study sought to understand the methods used by healthcare workers to assess blood pressure. The findings indicate 92.1% (35) of health workers use blood pressure monitoring equipment, 15.8% (6) assess using patient records, whereas 10.5% (4) mentioned that they do comprehensive examination. The majority of the respondents were to use BP measurements/screening, which is an indicator of good practice in BP measurement. There is also a need for further training for healthcare workers on how to assess blood pressure, as well as hospital protocol on the methods used by the facility to

assess BP, to have a coordinated way of performing. The findings are presented in Figure 4.10.

Figure4.10

Methods used to assess patient blood pressure



Source; Researcher (2025)

4.6.25 Methods healthcare workers use to assess patient adherence to hypertension management

This study aimed to explore the methods healthcare workers used to determine whether patients with hypertension were following their prescribed management plans. The majority of respondents (84.2%, n=32) assessed adherence to hypertension management primarily through blood pressure monitoring. Additionally, 44.7% (n=17) used history taking, 36.8% (n=14) relied on drug counts, while only 2.6% (n=1) assessed adherence through family involvement, and another 2.6% (n=1) used clinical investigations. While blood pressure monitoring was the most commonly reported method, the findings suggest a lack of standardized clinical practices and structured tools for routinely

assessing adherence. This highlights the need for the adoption of comprehensive and systematic adherence assessment strategies to support effective hypertension management. The findings are presented in Table 4.18.

Table 4:18

Assessing patient adherence to hypertension management

Assessment Method	Yes	No	Total
BP Monitoring	32 (84.2%)	6 (15.8%)	38 (100.0%)
Drug Count	14 (36.8%)	24 (63.2%)	38 (100.0%)
Family Involvement	1 (2.6%)	37 (97.4%)	38 (100.0%)
History Taking	17 (44.7%)	21 (55.3%)	38 (100.0%)
Investigations	1 (2.6%)	37 (97.4%)	38 (100.0%)

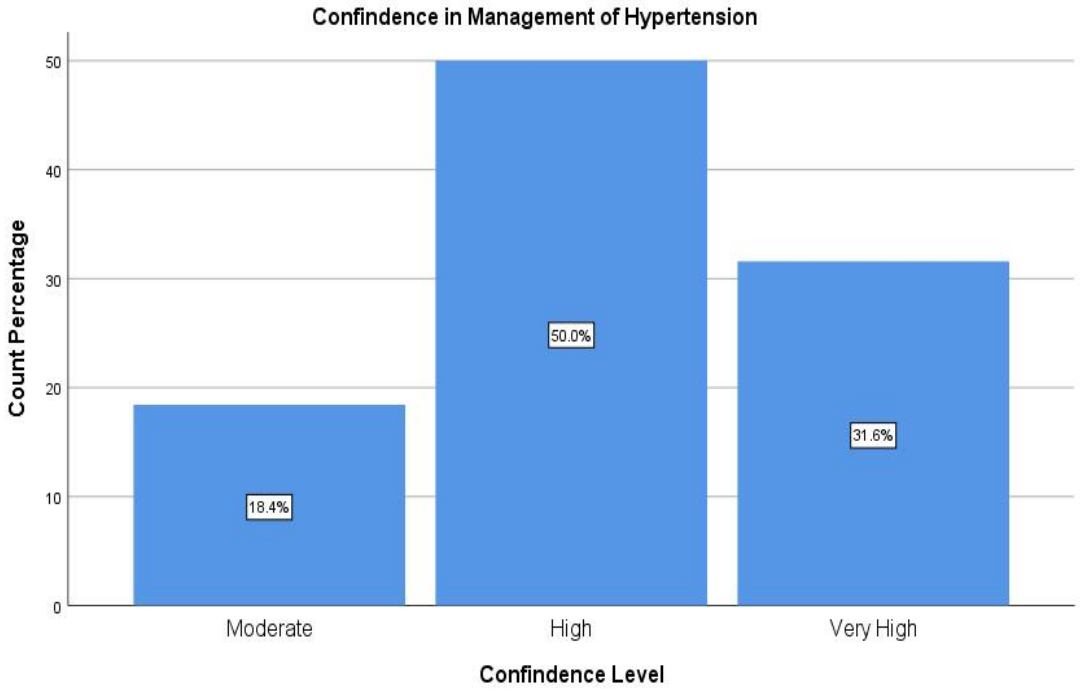
Source; Researcher (2025)

4.4.26 Healthcare workers' confidence in their ability to manage hypertension

The study aimed to assess the self-perceived confidence levels of healthcare workers in diagnosing, treating, and monitoring patients with hypertension. This reflects their knowledge, experience, training and comfort in handling hypertensive cases. Half of the respondents (50%, n=19) reported having high confidence in managing hypertension, 31.6% (n=11) expressed very high confidence, while 18.4% (n=8) indicated moderate confidence. This suggests that some healthcare workers may have limited experience or certainty in hypertension management, highlighting the need for targeted training and the development of standardized guidelines to support consistent clinical practice. The findings are presented Figure 4.11 below.

Figure4.11

Confidence in management of hypertension



Source; Researcher (2025)

4.4.27 Barriers that healthcare workers face in effectively managing hypertension

The study explored the challenges the healthcare workers encountered when managing patients with hypertension. They might be system-level, provider-level level or patient-level hindrances that can affect diagnosis, treatment, follow-up, and blood pressure control. The majority of respondents (81.6%, n=31) cited non-adherence to treatment as the biggest challenge in hypertension management, followed by inadequate resources reported by 68.4% (n=26). Other identified barriers included comorbidities (15.8%, n=6), denial (31.6%, n=12), financial constraints (23.7%, n=9), fragmented care (18.4%, n=7), knowledge gaps (28.9%, n=11), language barriers (10.5%, n=4), and limited access to healthcare (23.7%, n=9). These findings highlight the need to strengthen the medical supply chain, provide continuous medical education (CME), develop and disseminate hypertension management guidelines, enhance patient education, and integrate

community health strategies to support follow-up and continuity of care. The findings are presented in Table 4.19 below.

Table 4:19

Barriers to blood pressure management

Barrier	Yes	No	Total
Comorbidities	6 (15.8%)	32 (84.2%)	38 (100.0%)
Denial	12 (31.6%)	26 (68.4%)	38 (100.0%)
Financial Constraints	9 (23.7%)	29 (76.3%)	38 (100.0%)
Fragmented Care	7 (18.4%)	31 (81.6%)	38 (100.0%)
Inadequate Resources	26 (68.4%)	12 (31.6%)	38 (100.0%)
Knowledge Gap	11 (28.9%)	27 (71.1%)	38 (100.0%)
Language	4 (10.5%)	34 (89.5%)	38 (100.0%)
Limited Access to Healthcare	9 (23.7%)	29 (76.3%)	38 (100.0%)
Non-Adherence	31 (81.6%)	7 (18.4%)	38 (100.0%)

Source; Researcher (2025)

4.4.28 Guidelines used to manage hypertension

The study aimed to identify the standard clinical guidelines healthcare workers follow when diagnosing and treating hypertension. This will help in assessing alignment with national or international protocols, and reveal gaps in Knowledge or accessibility of such tools. The data show that the majority of respondents (31.6%, n=12) reported using WHO guidelines for hypertension management, followed by national cardiovascular guidelines (26.3%, n=10). Other sources mentioned include the American Heart Association (7.9%, n=3), Jacaranda guidelines (7.9%, n=3), the American Stroke Association (ASA) (2.6%, n=1), the European Society of Cardiology guidelines (2.6%, n=1), KIDIGO (2.6%, n=1), and standard operating procedures (SOPs) (2.6%, n=1).

Notably, 13.2% (n=5) reported not using any formal guideline, instead relying on their formal education, clinical experience, or peer consultation. These findings suggest the absence of a standardized hypertension management guideline at the facility level, with healthcare workers utilizing various external references based on personal preference. This fragmented approach presents a risk for inconsistent care delivery. There is a clear need to develop and adopt a standardized hypertension management protocol within the facility, supported by regular training and continuous medical education (CME) for all healthcare providers. The findings are presented in Table 4.20 below.

Table 4:20

Guidelines used in management of hypertension

Management Guideline	Yes	No	Total
American Heart Association	3 (7.9%)	35 (92.1%)	38 (100.0%)
ASA	1 (2.6%)	37 (97.4%)	38 (100.0%)
European Society of Cardiovascular Guidelines	1 (2.6%)	37 (97.4%)	38 (100.0%)
Jacaranda	3 (7.9%)	35 (92.1%)	38 (100.0%)
KIDIGO	1 (2.6%)	37 (97.4%)	38 (100.0%)
MOH	10 (26.3%)	28 (73.7%)	38 (100.0%)
National Cardiovascular Guidelines	10 (26.3%)	28 (73.7%)	38 (100.0%)
None	5 (13.2%)	33 (86.8%)	38 (100.0%)
SOPs	1 (2.6%)	37 (97.4%)	38 (100.0%)
WHO	12 (31.6%)	26 (68.4%)	38 (100.0%)

Source; Researcher (2025)

4.4.29 Suggestions for improving hypertension management

The study seeks input from healthcare workers on practical, context-specific ideas to improve the diagnosis, treatment, monitoring, and follow-up of patients with hypertension. The respondent's suggestion reflects challenges on the ground and possible solutions that are feasible and impactful. The most commonly suggested intervention was adequate resource supply, reported by 71.1% (n=27) of respondents. This was followed by the need for patient education (63.2%, n=24), implementation of standard treatment protocols (34.2%, n=13), enhanced patient screening (28.9%, n=11), and adoption of a team-based approach (18.4%, n=7). These suggestions underscore the need for a comprehensive policy response, including strengthening health system capacity, building healthcare provider competencies, and engaging the community in hypertension prevention and management efforts. The results are indicated in Table 4.21 below.

Table 4:21

Suggestions for improving hypertension management

Suggestion	Yes	No	Total
Adequate resource supply	27 (71.1%)	11(28.9%)	38 (100.0%)
Education	24 (63.2%)	14 (36.8%)	38 (100.0%)
Patient Screening	11 (28.9%)	27 (71.1%)	38 (100.0%)
Standard Treatment Protocols	13 (34.2%)	25 (65.8%)	38 (100.0%)
Team-Based Care Approach	7 (18.4%)	31 (81.6%)	38 (100.0%)

Source; Researcher (2025)

4.5 Inferential Statistics

4.5.1 Patients' demographics association with blood pressure control

This section explores the relationship between patients' demographic characteristics and their blood pressure (BP) control status before experiencing a stroke. The aim is to

determine whether certain demographic factors, such as age, sex, marital status, education level, and employment status, were significantly associated with uncontrolled blood pressure. Categorical variables were analyzed using Fisher's Exact Test, which is suitable for small sample sizes and sparse data. One-way ANOVA was applied to compare the mean age across different BP control categories. These statistical tests help identify populations at greater risk of poor BP management, which is a key contributor to stroke occurrence.

The study sought to assess whether there exists any significant association between the gender of the patients and the blood pressure readings of the last three visits before stroke. This was done by way of a Fisher's exact test as the Chi-square test returned more than 20% cells with an expected count less than 5 (50%). The null hypothesis states that there exists no significant association between gender and the BP readings, while the alternative hypothesis states the existence of a significant association. The exact significance value of 0.591 from Fisher's Exact Test indicates no statistically significant association between the variables under investigation. Since the p-value is well above the commonly used alpha level of 0.05, we fail to reject the null hypothesis and conclude that there is no evidence of a statistically meaningful association between the gender of the patients and the blood pressure readings of the last three visits before stroke.

The Fisher's exact test was employed to assess the association between education status and blood pressure control. The result was not statistically significant, $p = .531$ (2-sided), indicating no evidence of a relationship between the patients' education status and the control of their blood pressure. Based on Fisher's Exact Test ($p = 0.467$), there is no statistically significant association between Blood pressure and employment status in this sample. The lack of a statistically significant association does not mean the lack of a

relationship at all, just a lack of sufficient evidence to rule out the variation being out of chance.

The study evaluated whether the mean age of the patients was significantly different among the various categories of blood pressure control. A one-way ANOVA test was carried out. The F-statistic = 0.437 is the test statistic from the ANOVA comparing between-group to within-group variability. The significance value is the probability of observing such an F-value if there were no true difference between the groups. The p-value of 0.511 is greater than 0.05, hence we fail to reject the null hypothesis. There is no statistically significant difference in the means of age between the BP control groups.

4.5.2 Healthcare workers' inferential Statistics

Analysis of variance on knowledge of hypertension management

An Analysis of Variance (ANOVA) was conducted to examine whether there were statistically significant differences in knowledge on hypertension management among the different professions, years of experience or primary work location.

The one-way ANOVA revealed no statistically significant differences in knowledge scores across the profession groups (F (3, 34) = 1.172, p = 0.335). The between-group variance (Sum of Squares = 406.440) was relatively small in comparison to the within-group variance (Sum of Squares = 3930.824), resulting in a non-significant F-ratio. This suggests that observed differences in mean knowledge scores among the groups were likely due to random variation rather than actual group-level differences. The assumption of homogeneity of variances was met (p values: 0.322, 0.516, 0.519, 0.395) > 0.05, reinforcing the validity of the ANOVA results.

A one-way ANOVA was conducted to evaluate whether there were statistically significant differences in knowledge on hypertension management for the different groups of years of experience. Based on the results of the one-way ANOVA (F (3, 34) =

1.330, p = .281), there was no statistically significant difference in knowledge regarding hypertension management among the four groups assessed. The assumption of homogeneity of variances, confirmed via Levene's Test (p > .05), was met, ensuring the robustness of the ANOVA. These findings suggest that the years of experience did not have a meaningful effect on participants' knowledge levels.

A one-way ANOVA was conducted to evaluate whether there were statistically significant differences in knowledge on hypertension management for the different primary locations of work. Since the p-value (.265) is greater than 0.05, this means there is no statistically significant difference in the mean knowledge scores on hypertension management across the different primary work locations.

Table 4:22

Analysis of Variance on Knowledge of Hypertension

ANOVA	Sum of Squares	df	Mean Square	F	Sig.
Knowledge on Hypertension Management by Profession					
Between Groups	406.44	3	135.48	1.172	0.335
Within Groups	3930.824	34	115.612		
Total	4337.263	37			
Knowledge on Hypertension Management by Years of Experience					

Between Groups	455.433	3	151.811	1.33	0.281
Within Groups	3881.83	34	114.171		
Total	4337.263	37			
Knowledge of Hypertension Management by Primary Work Location					
Between Groups	316.661	2	158.33	1.378	0.265
Within Groups	4020.603	35	114.874		
Total	4337.263	37			

Source; Researcher (2025)

Analysis of variance (ANOVA) on attitude toward hypertension management

The study sought to assess whether there existed a significant difference in attitudes according to the primary work locations. The analysis revealed no statistically significant difference in attitude scores among the groups, F (2, 35) = 0.079, p = 0.924. The between-group variance (SS = 9.860) was minimal compared to the within-group variance (SS = 2181.908), suggesting that variations in attitudes are not attributable to the type of work setting. These results indicate that primary work location does not appear to influence health professionals' attitudes toward hypertension management in this sample.

A one-way Analysis of Variance (ANOVA) was conducted to determine whether attitude scores differed significantly based on respondents' years of professional experience. The analysis revealed that there was no statistically significant difference in attitude scores across the four experience groups, F (3, 34) = 1.883, p = .151. Although some variation in mean attitude scores was observed, the difference was not large enough to conclude that years of experience significantly influence attitudes toward hypertension management. While it is possible that experiential learning may shape attitudes in individual cases, these differences were not statistically meaningful in this sample. These results indicate that attitude formation toward hypertension care may be influenced more by other factors, such as training, institutional culture, or personal motivation, rather than by length of service alone.

This study explored whether profession is a significant factor affecting health professionals' attitudes toward managing hypertension. The ANOVA yielded a non-significant result, F (3, 34) = 1.259, p = .304, suggesting that attitudes toward hypertension management do not differ significantly among the professional groups examined in this study. Although slight differences in mean scores may exist, they were

not statistically meaningful. These findings imply that attitude formation may be influenced more by factors common across professional roles, such as shared training environments or institutional policies, than by the profession itself.

The combined ANOVA Table 4.23 presents this data below.

Table 4:23

Analysis of Variance on Attitude toward Hypertension Management

ANOVA	Sum of Squares	Df	Mean Square	F	Sig.
Attitude Assessments by Primary Work Location					
Between Groups	9.86	2	4.93	0.079	0.924
Within Groups	2181.908	35	62.34		
Total	2191.768	37			
Attitude Assessments by Years of Experience					
Between Groups	312.265	3	104.088	1.883	0.151
Within Groups	1879.503	34	55.28		
Total	2191.768	37			

Attitude Assessments by Profession					
Between Groups	219.196	3	73.065	1.259	0.304
Within Groups	1972.573	34	58.017		
Total	2191.768	37			

Source; Researcher (2025)

Practices in managing hypertension patients

Healthcare professionals' clinical practices in managing hypertension may vary depending on their professional roles due to differences in training, job responsibilities, and exposure to hypertension-related care. Assessing whether such differences exist is important for identifying gaps in implementation and targeting profession-specific continuing education. To evaluate this, a one-way ANOVA was conducted to determine whether there are significant differences in hypertension management practices across different professional groups. The analysis revealed no statistically significant difference in practices among the professional groups, F (3, 34) = 0.107, p = .956. The extremely high p-value (.956) and low F-ratio suggest minimal variation in practice behaviours across the groups.

Years of professional experience are often assumed to impact clinical decision-making and practical approaches to patient care. In the context of hypertension management, greater experience may be associated with more consistent or evidence-based practices. To examine whether clinical practices differ based on years of experience, a one-way ANOVA was performed. The ANOVA revealed no statistically significant difference in reported hypertension management practices among the four experience groups (F (3, 34)

= 0.345, p = .793). The results indicate that years of professional experience do not significantly influence clinical practices in managing hypertension. The minimal between-group variance and a high p-value suggest that clinical practices are likely shaped by other factors, such as institutional protocols, ongoing professional development, or guideline-based standardization, rather than experience alone. These findings underscore the importance of organizational and systemic influences on clinical behavior across all experience levels.

The specific unit or department where healthcare professionals work can influence their clinical focus, patient interactions, and adherence to disease-specific protocols. In hospital settings, staff assigned to different departments such as Non-Communicable Disease (NCD) clinics, outpatient departments (OPDs), and medical wards may approach hypertension management differently based on their roles, workflows, and patient profiles. To determine whether such departmental differences exist, a one-way ANOVA was conducted to assess variations in practices related to hypertension management across these hospital locations. The analysis showed that there were no statistically significant differences in practices related to hypertension management based on primary work location (F (2, 35) = 0.288, p = .752). The results suggest that departmental assignment within the hospital does not significantly influence the practices of healthcare professionals in managing hypertension. Regardless of whether staff were based in the NCD clinic, outpatient department, or medical wards, their reported practices were consistent. This likely reflects the implementation of standardized clinical guidelines or shared training across departments, promoting uniformity in hypertension care delivery throughout the hospital.

The results are as indicated in Table 4.24.

Table 4:24

Analysis of Variance on Practices in Managing Hypertension Patients

ANOVA	Sum of Squares	Df	Mean Square	F	Sig.
Practices in Managing Hypertension Patients by Profession					
Between Groups	18.577	3	6.192	0.107	0.956
Within Groups	1973.934	34	58.057		
Total	1992.511	37			
Practices in Managing Hypertension Patients by Years of Experience					
Between Groups	58.819	3	19.606	0.345	0.793
Within Groups	1933.692	34	56.873		
Total	1992.511	37			
Practices in Managing Hypertension Patients by Primary Work Location					
Between Groups	32.225	2	16.113	0.288	0.752
Within Groups	1960.285	35	56.008		
Total	1992.511	37			

Source; Researcher (2025)

4.5.3 Healthcare delivery and blood pressure control

The study sought to determine whether there was a statistically significant association between healthcare delivery and blood pressure control among hypertensive patients at Meru Teaching and Referral Hospital. The null hypothesis (H_0) stated that there was no

statistically significant association between healthcare delivery (categorized into five levels) and the outcome of blood pressure control. The association was tested using Fisher's Exact Test due to the expected cell counts being less than 5 in 50% of the cells. The test produced a p-value of 0.308, which is greater than the significance level of 0.05. This indicates that there is no statistically significant association between healthcare delivery and blood pressure control among the patients sampled at Meru Teaching and Referral Hospital. Therefore, the null hypothesis is not rejected, suggesting that variations in healthcare delivery do not have a significant effect on blood pressure control in this population. These results are presented in Table 4.25 below.

Table 4:25

Healthcare delivery and blood pressure control

	Value	Exact Sig. (2-sided)
Fisher's Exact Test	2.469	.308
N of Valid Cases	80	

Source; Researcher (2025)

4.6 Qualitative Analysis

4.6.1 Introduction

This analysis presents the findings from in-depth interviews conducted with stroke patients who had a history of hypertension. Data was analyzed thematically, guided by study objectives, and organized into themes and sub-themes. Each theme and sub theme have a researcher's narrative accompanied by the participant's verbatim quotes that best represent the voice of the patients. The analysis aimed to explore patients' experiences in managing hypertension before stroke occurrence.

4.6.2 Hypertension health education

Participants reported receiving both structured and unstructured health education regarding hypertension management. However, variations existed in how and when this education was provided.

> *".....not every time, because when you go for clinic, apart from when they taught me the first day, other times there are so many people so the teaching on how you take care of yourself are not easily seen". Participant 04*

Participants expressed the need for individualized and repeated instructions to support long-term adherence.

> *"The other thing is for doctors to be there, and take pressure people to be important, and at least when you go there, sometimes you forget those things that you were told long time ago, we be reminded like things to eat". Participant 04*

Unstructured education/learning

Lack of structured educational sessions may have led to knowledge gaps about hypertension management. Peer-to-peer learning played a minor but notable role. One of the participants reported having heard about drug adherence from a friend who shared and had hypertension, and also from support groups.

> ***"****Yes, she was coming to measure (BP check) us and would ask me if I drink (take) my medicine well. I could tell her that sometimes I do forget and then she and Lydia (neighbour) could tell me to stop joking with drugs they are not good. So we kept on talking and with that woman, they gave me strength and that is when I took time to use them well" Participant 01.*

Another participant mentioned that she has heard health talks shared in church about hypertension. This might lead to misinformation as the one sharing the health talk might not be a health worker.

"……. *until when I left work and came home that now we started being taught in church, in church I meet there is a health talk on hypertension and I was taught, and in the hospital when you are able to go for clinic you are taught" Participant 08*

Structured education/learning

Participants mentioned having been taught several changes in their way of living, changes in diet, exercise, increased water consumption, and stress reduction. These might have helped them control their blood pressure at home. Some participants mentioned they were told to reduce salt and drink a lot of water, exercise, eat a lot of greens, and reduce stress.

"I learnt through the hospital, when I went to the hospital I was told how I will be drinking (taking) drugs, and I was told to be drinking (taking) a lot of water. It is at the hospital I was told those things……Another thing is to stop eating a lot of fat, eat required amount of food, and not to eat a lot of starch, required amount not a lot and with little fat" Participant 05

Some participants expressed that they received limited formal health education from healthcare workers. Sometimes they cite that the healthcare workers were too busy and didn't have time to share health messages with the patients.

"I was given teachings only once when I was waiting in the queue."……. "Sometimes the doctor's are pressed by so many people. You can go and the doctor refuses to tell you what to do. So long as he has told you that you have BP, others want, so you see even the doctor lacks time to advice you" Participant 02

One of the participants felt that the doctor may not be in a state to advise the participant better, because if the participants lie to the doctor and says all that he was taught, he is

practising, then the doctor may not know what deficit the participant has and where he might need to be advised further.

"So when he asks how I am drinking my drugs, I was saying I drink them well. So how will he know to tell me what I should do? "Participant 10

4.6.3 Integration and people-centricity of care

The researcher sought to explore the structured arrangements through which health services are organized and provided to participants. According to WHO 2015 framework, health services should be designed around the needs and preferences of individuals rather than health system alone. Integration coordinates services across different levels of care, sectors, and providers, while people centricity ensures patients, families, and communities, are at the center of planning, delivery, and evaluation of care. These concepts, together promote equity, efficiency, responsiveness, and continuity of health services. Healthcare delivery seems to face many challenges, including inadequate resources, workforce shortages, fragmented services, and poor coordination between levels of care, which might indicate systemic barriers. The quality and consistency of care within the healthcare system were recurrent issues raised by participants. Participants often lacked continuity in care and had limited interaction with the same healthcare provider across visits. Sub-themes identified are discussed below.

Healthcare accessibility

Accessibility is the corner stone of people-centered care. Integration of services reduces fragmentation, allowing patients to access preventive, promotive, curative and rehabilitative services at the right place and time. Responses to healthcare accessibility varied between participants. This explored to know if the participants were able to receive the service at the healthcare facilities with ease and how it assisted them in adhering to self-management of hypertension. Barriers such as geographical distance,

financial constraints, turnaround time, accessibility of services, are some among those mentioned by participants that may limit accessibility. One of the participants mentioned that the health facilities near her home had BP machines without batteries, which might have contributed to the participant's lack of adherence to measuring BP.

> *"There are these village hospitals that don't have measurements (BP and laboratory). Like in our village hospital when you, you are told the machine does not have batteries. So, is it the patient who will go to buy batteries?" Participant 01*

Participant mentioned that sometimes they don't go for blood pressure measurement because they will be charged, and they don't have money. The participant felt that if BP checks are made free, then many can be measured and diagnosed early.

> *"……. the government or the hospital can assist to have these measurements (BP checks) in the village, and there are some people measuring (checking BP) and they are not charging, they do it for free. When it is like that everyone can be measured and whoever has BP can meet with that measurement and is measured, then it can be controlled. Many are unable to walk where there is a clinic or dispensary, because when he goes there, he will pay". Participant 02*

Some participants mentioned that sometimes they fail to go to the hospital because of the long queues and wait for the doctor to review them for the whole day, which might have led to challenges in adherence and could be a contributor to a bad outcome, because they failed to attend the clinic as required.

> *"I couldn't go because when you go you will wait for the doctor for long……I continued with the clinic and sometimes I was not able to go due to lack of time to go, other times you get patients are many and you are told your time passed*

(late for clinic time), and fare to go there I miss, so you get I go to clinic once in a while" Participant 06

Participants reported that initially, when they were going for follow-up clinic, measurements were not taken either for BP, weight or laboratory investigations, which could have left them unaware of their progress and if their efforts to reduce weight could have positive results in the reduction of blood pressure.

"Initially we were not being measured we were treated free (without measurement for BP or weight) like that……. No, I was not measured every time." Participant 08

Inconsistent drug and investigation Supply

An integrated and patient centered health system depends on reliable supply chains for medicine, diagnostics, and technologies. Inconsistencies availability disrupts continuity of care, breaks trusts, and may lead to poor health outcomes, especially in hypertension. Frequent stock-outs of medications in public facilities were noted. WHO framework calls for improved governance, accountability, and investment in supply chain management as part of system strengthening, ensuring that essential drugs and investigations are consistently available. Some participants mentioned that they could have got one type of drug, and the rest went to buy. This could have been a burden to them because they felt it might be one of the contributing factors to non-adherence and probably a poor outcome.

"No, most of them (anti-hypertensive drugs) was told to buy. I think I was getting one type only, the rest I was being told to go and buy, or I get even there is no type I have seen (gotten), so you get even the cost of going to buy those drugs, because each tablet will be sold a different price, I leave them" Participant 06

Another participant mentioned that when they go to the hospital, they queue for a long time hoping to get medications, but at the service point, they are told there are no drugs. This might have demoralized the participant, who might have felt it was a waste of time and gone home without drugs.

> *"When you go to Meru Hospital thinking that drugs are there, you go and get there are no drugs. You get angry because you have used transport, time and queued looking (to get drug) for drug but you find there is no drug" Participant 08*

Another participant mentioned that when laboratory samples are taken to lab, they get lost and fail to get the results, and other times you get the laboratory investigation requested is not available, hence could not achieve the desired purpose.

> *"Most times in the hospital, we go to general (MeTRH) and don't get drugs well. That is where we see someone has used fare and is coming from far, drugs are missing, investigations do not come well (some missing), now you get it is not the doctor with problems but maybe our government is not bringing drugs, because the doctor is working" Participant 01*

Other participants felt that they were able to get the investigations ordered at the facility with ease, and they were measured.

> *"I went and was measured (tested) and told I have cholesterol (high levels), I don't eat blue band, cream I don't eat, bread I don't like so much, I stopped those, I just take once (occasionally)" Participant 05.*

Participants also mentioned that as much as the healthcare workers serve them well, they also ensure there is availability of the drugs. They highlighted that when they go to buy the drugs outside the hospital, anti-hypertensive drugs are very expensive.

"Yes, serve us so that we stop buying drugs, or if it is buying we buy one. Because like one tablet we are buying at 100ksh, they are very expensive" Participant 07

Healthcare workers' shortage

Integrated, people centered health services require adequate staffing, skill mix, and equitable distribution of health workforce, to ensure people receive timely and quality services. Shortage of healthcare workers weakens the ability of systems to provide coordinated and continuous care. Overburdened staff, limited patient-provider interaction may have led the participants to feel that the doctor does not have enough time to listen or educate them as is required. Sometimes participants felt as if they were a bother to the doctors.

"Sometimes the doctor are pressed by so many people. You can go and the doctor refuses to tell you what to do. So long as he has told you that you have BP, others want, so you see even the doctor lacks time to advice you" Participant 01

One of the participants felt that they would need to be counseled after being diagnosed with hypertension and felt that because the doctors are too busy with a long queue waiting for them, they might not get enough time to talk to them and counsel or guide them till they come to accept their condition. This could have led to denial and might have contributed to non-adherence, which could be one of the aggravating factors for poor outcomes/stroke.

" We be given many people to give guidance and counselling, so that it will not be only one or two persons we are relying unto and we are like 15 people or 20 people, and all of us we want to see the doctor" Participant 06

Healthcare provider-patient Relationship

Strong provider-patient relationships are key to people-centric care. Communication, trust, empathy, and respect empower patients to participate in decision making and self-care. Poor and inadequate communication, relationship and exchange between the healthcare provider and participant were evident among the participants. Fragmented systems often compromise the relationship due to short consultation times, overburdened staff, or lack of continuity. This could have contributed to a lack of patient satisfaction, ignorance and a knowledge gap, where one probably did what he or she felt was the right thing to do at that time, hence overall healthcare outcome. Participants reported that some of the basic education that they were supposed to receive from a healthcare worker, like drug side effects, missed doses, laboratory investigations/ results, and some of the health talks, among others, was not done or inadequate.

> *I was given once the time when you go to the clinic as you wait in the line (que) sited outside there, the doctor might come or nurse and start teaching you those things before you start being attended inside. When sited there, you get there is a teaching of few minutes that passes (taught briefly). Participant 02*

Several participants also mentioned strongly the fear of the doctor, so the participants could not be able to tell the doctor the truth because they might be quarreled. This might have contributed to the participant not receiving the correct advice and help, hence worsening the outcome.

> *"I have never been told what to do, but to be truthful doctor, I have never told the doctor that I skip drugs or I have never bought. I always fear when I say, the doctor will be annoyed with you and talk to you badly, so when he asks how I am drinking my drugs, I was saying I drink them well. So how will he know to tell me what I should do?" Participant 10*

Participant noted that the doctor had informed him the ranges for normal blood pressure, but was not informed if it is high on how to respond.

> *"He had told me that when it is normal, it is supposed to be 140/80, but he has never told me in-case it was high what I am supposed to do" Participant 02*

> *".... and other times even these hospitals that we go, you get there are so many people in a day and when you go in the morning you will leave at night" Participant 04*

> *"Sometimes I may fail to talk the truth because you are fearing the doctor to quarrel me or hate each other, I can lie to him but in real sense you know there are things you are skipping" Participant 09*

Another participant pointed out that the cost of medication was higher at the hospital than at the chemist's. They felt that the hospital did not have the flexibility of allowing someone to buy the drugs equivalent to the money one had, hence the participants were left with no choice but to buy from external chemists. If the healthcare worker had explained to the patient that there is the flexibility of buying according to what you can afford at the hospital, the patients couldn't go to buy drugs outside. A chemist was more flexible for him because he could choose according to the money he had.

> *"At the hospital they were expensive excess, then I was buying according to the way I was able to. If they are told I buy for 3 months, at the hospital when you go get the receipt it asks for those 3 months, but in the chemist, I can buy for one month, half a month and I pushed with that style" Participant 02*

Healthcare system improvement

Sustainable healthcare improvement requires reforms that align with the principles of integration and people-centricity, improving governance, financing, workforce, use of technology, and service delivery. Participants gave their views related to enhancing the

performance, accessibility, and responsiveness of the health system. Some participants mentioned that the government should take hypertension with seriousness it deserves, like they do to other NCDs or communicable diseases. They advised on the addition of healthcare workers to improve service delivery. Also, the reduction of drug stock outs and facilitation of Community Health Promoters (CHPs) with the relevant resources to serve the community.

> "……. *the government is supposed to take pressure as a silent killer and treat it the way they treat these (big) major sicknesses. Like now we have CHP who are coming in the village to measure you……..,, if those people are given drugs and they come and give us, we can be happy……..public hospitals to be taken care of (should have) drugs for pressure we stop buying, ……..Now if we can get those drugs given for free in government hospitals, plus we be brought these clinics to measure us near. ……. Healthcare workers are the first people to be taken care of and be added……..The other thing I can advise, is like this hospital of ours that is at Kinoru,……Let it be added staff and drugs, not to be written (prescribed) a paper (prescription form) and go home, let them be done the way the other big levels are done, so that we can be helped and the service will come near the common people. Let them be taken care of so that they can help us" Participant 08*

4.6.4 Adherence to hypertension management plan

This captures the extent to which participants did not follow agreed-upon recommendations from healthcare workers. It reflects on the challenge's participants faced in consistently following treatment regimens, attending follow-up appointments, and making necessary lifestyle changes. Non-adherence was pointed out as the major

barrier to effective hypertension self-management by the participants, which might have contributed to the poor outcome.

Medication adherence

This captured the degree to which the participant took medications as prescribed in terms of dosage, timing, and continuity. Some of the non-adherence contributing factors mentioned by the participants were due to: forgetfulness, financial hardship, work-related issues, lack of supply of resources in the hospital or drug side effects. This could have been one of the contributors to uncontrolled BPs.

> *"I was taking morning and evening (participant said with emphasis), and I saw this load is big (burden), so at time I meet myself has taken in the morning and in the evening, I forget. Because for example there is a drug I was taking and get the whole night is waking up to urinate (participant emphasized), so the sleep is lost from there. So, I said all the drugs for the night, there is none I will take again, so I was taking for the day only" Participant 06*

Follow-up adherence

The researcher sought to understand how the participants followed up clinic, and the enablers and barriers that prevented them from adhering. This could have helped in monitoring the disease progression by checking treatment efficacy, and adjusting medical interventions where necessary. Participants exhibited the various factors that influenced their adherence to clinic follow-up, where financial challenges were strongly evident.

> *"I go to general and I attend clinic even now, unless when there is no money, I refuse (fail) to go, when I get money I go…. I can follow this month, two months, then the other month you miss money and it follows with the other month, then it gets where I go to buy drugs before measured" Participant 01*

Participants mentioned that sometimes they failed to adhere to follow-up due to a busy schedule at work, until they got time, and other times they found many patients, hence one had to queue for a long time, and another mentioned that taking drugs was degrading herself.

> *"I continued with the clinic and sometimes I was not able to go due to lack of time to go, other times you get patients are many and you are told your time passed (late for clinic time), and fare to go there I miss, so you get I go to clinic once in a while, and even drugs I fail to take, I see I am degrading myself because of taking drugs every day every day" Participant 06.*

Some participants mentioned that they were given TCA, and when they missed coming and came when they got money, they were rescheduled without seeing the doctor, which led to non-adherence.

> *"Clinic at times I was getting late the days that I have been told to go for clinic. If the clinic was scheduled after three months, I am forced to have passed 3 months, when I go that day, I am ordered another day (booked another date for clinic) and it is pushed in front excess (moved forward to another date)" Participant 02*

Another participant noted that even if TCA has been given, she was advised by the doctor that if at any time she feels sick or not well before the date given, she is supposed to come back to the hospital. This shows that patients can be attended to even when it is not the scheduled date for clinic follow-up.

> ***"****He was telling me to go back to the hospital, even if I am given a date to go back and I have become sick before then…." Participant 05*

Lifestyle modification adherence

This explored the participants' adherence to their way of living advice, such as dietary changes, physical activity, cessation of smoking/alcohol, and stress management to control hypertension and prevent stroke. Participants mentioned several challenges that might have led to non-adherence, like forgetfulness, denial, financial constraints, work-related issues, among others.

> *"To stop eating carbohydrate a lot, but depending on the way life is now, you get those are the things that you get easily and you eat ugali, rice, ugali rice, according to the way economy is, there is no time to go and look for beans so as to cook protein and greens in quantities, Greens is of must you go and buy, sometimes you get even feeding matters" Participant 06.*

Participant mentioned that due to a sedentary lifestyle, she was not able to adhere to the lifestyle modification as advised.

> *"Yes I was doing work, I wash, carry bags, harvest finger millet, and carry sacks while harvesting. It came a time I was not able to harvest, before I got sick I had stopped harvesting and told them I will not harvest again because my body does not accept harvesting'' Participant 07*

Another participant mentioned that he was drinking alcohol and smoking cigarettes, and despite being advised to stop, he reduced rather than stopping completely. This could be one of the triggering factors for the outcome of a stroke.

> *"Before I got it I was drinking alcohol and smoking cigarette, but I was told to stop drinking alcohol or smoking cigarette. But I reduced not to stop completely" Participant 04*

Participants admitted to having been advised on stress management, but it seemed a bit hard because they wondered, amidst the current day-to-day challenges, how one fails to think or be stressed.

> *"I was told not to think a lot, but someone with brain how will she not think and there is no time that you will not get angry, and I should not eat a lot of salt or add in food, unless if boiled. Even now that we are here, salt you hear it from far and I don't add" Participant 03*

4.6.5 Barriers and facilitators to self-management

These are deliberate actions participants took to maintain and improve their health, manage hypertension, and prevent disease progression. Participants mentioned some of the self-care mechanisms they observed, as well as facilitators and barriers to implementation of self-care.

Barriers to self-care

This explored the challenges that could have hindered participants from actively managing their health. Most of the participants felt that adherence to self-care was a challenge, and they posed many reasons as to why they were not able to practice self-care exactly as advised. Some pointed out some of the barriers to be work-related, financial constraints, long waiting times at the hospital, denial and so on.

> *"You will fail to do them because, for example, you are from work and not that you have anything a lot, you don't have money to buy drugs, you don't have money to buy that food, you don't have money for transport to go to Meru Hospital every time. When you go to Meru Hospital, saying (thinking) it is a public hospital, you go and get there are no drugs that are there, and those things become a barrier so you drink (take) drugs when you see (get) them. That is the biggest barrier that has disturbed us." Participant 08*

Some participants, probably because of not receiving good counselling on acceptance, mentioned that they did not accept that they had hypertension, because of the misconceptions that they had, that if one has it, they would die. This mostly contributed to them not accepting and failing to practice self-care.

> *"I continued to take drugs slowly without accepting (denial) that it is true I have pressure, because I knew pressure (hypertension) is the sickness to kill someone slowly. So I knew I am the next person because my sister has died. And my mum is not there (alive), I saw there is nothing else left. I saw life has disturbed me a lot, when I am told to go to the hospital and drink (take) drugs, I don't want to hear drinking (taking) drugs, I saw (felt) like a burden……Lack of time and believing myself (denial)" Participant 06*

Self-care facilitators

The study explores what enabled the participants to do what they were advised to do at home, which could promote active participant involvement in the care. Participants mentioned several things that made them adhere to the doctors' advice on home management of BP. Some felt supportive home environments enhanced adherence, fear of hypertension complications like stroke and death, fear of leaving the children as orphans, etc.

> *"I was told what it (hypertension) can do to someone, it can strike (cause) one with stroke, kill someone. Now like that dying is the one that made me try on how to control and leave those things I was told to stop, so that it can't make me like that (stroke or death)" Participant 02*

Challenges in self-monitoring of BP

This is a core component of self-care for hypertensive patients as it enables early detection, improves participant adherence, and builds participant awareness about the

impact of non-adherence. Most participants lacked the equipment and knowledge to monitor BP at home, measured when symptoms arise, and others were monitored by CHP. These could have contributed to uncontrolled blood pressure and stroke occurrence, as there is a possibility of poor BP monitoring.

> *"When I was hearing (feeling) I have a problem that is when I was going to the doctor, and I ask him, what am I feeling doctor, then he measures (checks BP) me, but not much anyway". Participant 05*

One of the participants mentioned that he was going to the nearby clinic for monitoring, and the other mentioned that the dispensary near her home, the monitoring machine have no batteries always.

> *"When I was told I have pressure (hypertension), I was told sometimes I be measured, but I was measured once in a while, because I hadn't taken it that serious…..I was measured at our home clinic near the main road and was charging 20ksh" Participant 02*

Positive stress coping mechanisms

Stress is known as a trigger for high blood pressure. This explores participants' effective stress coping mechanisms. Avoiding anger and practicing calmness by moving away from the stressors were common coping methods mentioned by the participants.

> *"the way I was doing, we were told to try and separate yourself from what is making you angry, most of the time I was hiding a lot, I move from there and go to Makutano salon, I pretend I am going to salon and go there keep quiet, then I step out and go round outside work, I give myself little time and when I go back I feel the anger has finished and the headache has gone down…….Yes it helped lower the pressure (hypertension)." Participant 08*

Participant also mentioned that when she is angry, she goes to other women in a group and they talk, then she gets relieved.

> *"It is going to other women, we talk and you relieve those things and I see I am not the only with those things (stress)……because I will go and talk with someone, I see am not alone. There is a group we were walking (staying together) with for women, we were meeting to sing and pray and when we talk all of us, everyone had her own problems, and you see ah, so am not alone, ah am not alone, I am better, and you be okay and continue." Participant 05*

Financial constraints

This focuses on limitations that the participant may have experienced due to a lack of money or financial resources. It focuses on how inadequate income, high cost of services, lack of insurance, or economic instability could have hindered participants' ability to meet essential needs such as healthcare, nutrition or transportation. Most of the participants mentioned that lack of money led to non-adherence to medication, transport to go to the hospital, follow-up clinic, as well as a lack of better nutrition as advised.

> *"You will fail to do them because, for example, you are from work and not that you have anything a lot, you don't have money to buy drugs, you don't have money to buy that food, you don't have money for transport to go to Meru Hospital every time. When you go to Meru Hospital, saying (thinking) it is a public hospital, you go and get there are no drugs that are there, and those things become a barrier so you drink (take) drugs when you see (get) them. That is the biggest barrier that has disturbed us." Participant 08*

4.6.6 Support systems

This theme explores the social and institutional structures that could influence participants' ability to manage their health, cope with illness and adhere to hypertension

management modalities. Participants mentioned receiving support from different sources, which might have positively impacted their health-seeking behavior, emotional well-being, recovery outcomes and continuity of care. Others felt that there was no support they received, because they felt strong and also had a denial that they were sick.

Community support

This sub-theme reflects the role of neighbors, religious groups, peer support groups, and community health promoters in assisting the participants. Most of the participants reported that the community has helped them in many ways, like sharing experiences, health talks, checking of BP, and others. This could have been beneficial to them as they were encouraged and felt they were not alone.

> *"Yes, she was coming to measure (BP check) us and would ask me if I drink (take) my medicine well. I could tell her that sometimes I do forget and then she and LN (neighbour) could tell me to stop joking with drugs they are not good. So, we kept on talking and with that woman, they gave me strength and that is when I took time to use them well" Participant 01.*

Family support

Family support explored was emotional, financial, and physical assistance offered by immediate or extended family members to the participant. Participants needed help attending clinics, buying drugs and maintaining daily routines. Some participants felt that the family was very supportive and encouraged them to do self-care to ensure their blood pressure was normal. Others described engaging the family as therapeutic.

> *"I get help from my husband because he doesn't stress me, and from the children they don't stress me, so I am always comfortable and they want me to be staying well according to how I see them….."Sometimes I don't lack food, when I want*

money I get, my husband try hard so that the money required for home is not missing". Participant 01

However, other participants felt that family assistance was limited. Some mentioned that even the husbands drink alcohol a lot, so they were not helping--

"No unless my husband, when I went to Nkubu I was asked why my husband has never stopped taking alcohol, I told them unless the God stops himr, some secrets I can tell you, me I am seeing as those thoughts. As you can see now the child is in school, there is no money to take him back, and some might be caused by those thoughts" Participant 03

Healthcare worker support

This subtheme helped understand the professional support participants received from healthcare workers. This includes clear communication, education, and respectful care. Participants are more likely to adhere to treatment when they feel supported by their care providers. Most of the participants noted that they received great support from the healthcare workers. They noted that they were listened to, prescribed drugs and given health education on self-care, which could have contributed to follow-up adherence.

"The doctor told me to avoid using a lot of salt in food, not to add salt in food, I use little fat, take a lot of fluids." Participant 10

Some participants also mentioned that support was inconsistent. They noted that doctors were too busy and a long queue, so sometimes you are only asked how you are doing and then drugs are prescribed. They mention that doctors had no time for counselling or comprehensive assessment to be able to decide on the next course of action. Others had fear that the doctor might be rude to them, in case they say the truth.

"Yes and much was measurement, and not word of mouth a lot but measurement to see how pressure is doing, because there a time you get the top (systolic) one is

high and the down (diastolic) one normal or the down (diastolic) one high and the top (systolic) low……He wanted to know the whole week what I was doing and I was explaining to him. Sometimes I may fail to talk the truth because you are fearing the doctor to quarrel you or hate each other, you can lie to him but in real sense you know there are things you are skipping''. Participant 09

4.7 Integration of Qualitative and Quantitative Results

Integration and using a convergent design were done to gain a comprehensive and nuanced understanding of the determinants of high blood pressure management among hypertensive patients, validate findings, revealed discrepancies for exploration, and enhanced practicability, enabling tailored, actionable interventions for effective blood pressure management. This approach combined both qualitative and quantitative research methodologies.

4.7.1 Convergence of "determinants evidence"

Table 4.26 below highlights areas where qualitative insights from patient interviews align with quantitative findings from the study's design or preliminary results, or where different qualitative accounts support the same determinant.

Table 4:26

Convergence of "Determinants Evidence"

THEME	SUB-THEME	QUALITATIVE DATA	QUANTITATIVE DATA
Hypertension Health Education	Unstructured Learning	Learned mainly from peers, minimal education from healthcare workers.	63% of HCWs: inadequate patient education on management of hypertension, 71% of HCWs: training gaps in patient education, Minimal documentation on counselling of participants
	Structured learning	Some education sessions but inconsistency and lack of depth.	HCW counselling of patients at every visit 47.4% (18), counsel the patient with every encounter, 34.21% (13) counsel often. Minimal documentation on patient counseling.
Integration and people-centricity of care.	Healthcare provider interaction	Lack of adequate communication and interaction.	Minimal documentation on counselling of participants during follow-up visits, 95% not assessed on drug side effects, 47.4% of HCW counseled patients at every encounter.
	Healthcare accessibility	Barriers: long queues, lack of	low BMI monitoring, inconsistent diagnostic,

		time, financial constraints, and BP & weight no measured.	23.7% HCW: participant-limited access to healthcare as a barrier
	Healthcare system improvement	Participants: government should prioritize HTN, Need better access and responsiveness.	HCW: 71.1% need more resources 63.2 % need more education,
	Healthcare workers shortage	Overburdened staff, limited patient-provider interaction, Participant felt ignored.	68.4% (26) HCW: inadequate resources, 71.1% (27): suggested more resources.
	Inconsistent drug and diagnostic supply	Frequent stock-outs of medications. Missing/lost lab results.	68.4% (26) HCW: inadequate resources as a barrier to HTN management. Documentation: baseline tests rarely done.
Adherence to Hypertension Management	Follow-up adherence	Skipped clinics due to finances, work schedules,	HCW: 81.6% (31): non-adherence as the biggest challenge. None counseled on return to clinic

plan		long ques and stigma.	if unwell
	Lifestyle modification	Participant mentioned challenges to adherence, like forgetfulness, denial, financial constraints, and work-related issues.	Only 2/80 records: lifestyle counselling, 30 counseled on exercise/diet, 9 on medication adherence, 21 on BP self-monitoring, 2 on management of HTN, on stopping alcohol and tobacco 1, 0 on return to clinic while unwell, 64% no BMI taken HCW: 47.4% (18) counsel the patient after every encounter. Documentation: treatment of HTN only 31% (25) of patients were put on both AHM and lifestyle modifications.
	Medication adherence	Barriers mentioned by participants: forgetfulness, financial hardship, work-related issues, and lack of supply of resources in the hospital or drug side effects.	HCW: 81.6% (31), cited non-adherence as barrier to HTN management. Documentation: 9 out of 80 patients counseled on medication adherence, 32.5%(26) only screened on medication adherence.

Barriers and facilitators to self-management	Barriers to self-care	Barriers: work-related, financial constraints, long waiting times at the hospital, denial and so on.	HCW: 81.6%(31) cited non-adherence, 68.4%(26) inadequate resources, denial 31.6%(12), financial challenges 23.7% (9), fragmented care 18.4% (7), limited access to healthcare 23.7% (9), knowledge gap 28.9% (11)
	Self-monitoring of BP	Most participants lacked the equipment/ knowledge to monitor BP at home, and others monitored by CHP.	Documentation: only 21 out of 80 were counseled on BP monitoring.
	Stress management	Coping: Avoiding anger, keeping calm, withdrawal, praying to God.	Documentation: only 2 out of 80 patients 80 were counselled on hypertension management, where stress is part of it. Treatment of HTN; 31 % (25) participant put on both HTN and lifestyle Management. HCW: 63% believe that patients moderately understand on management of HTN where stress is

			part of it.
	Financial constraints	Lack of money led to missed medication, transport, follow-up, poor nutrition.	HCW assessment on barriers to self-care, financial constraints 23.7% (9) cited as one of the barriers.

Source; Researcher (2025)

4.7.2 Integration of qualitative and quantitative data divergence of "determinants evidence"

Table 4.27 below highlights areas where there are contradictions, inconsistencies, or differing perspectives on determinants, either between qualitative and quantitative data.

Table 4:27

Divergence of "Determinants Evidence"

THEME	SUB-THEME	QUALITATIVE DATA	QUANTITATIVE DATA
Hypertension Health Education	Structured Learning	Patients reported minimal but inconsistent counseling. The doctors were too busy and long que waiting.	47.4% HCWs counsel at every encounter, 34.2% often. 100% aware of lifestyle modifications. HCW strong awareness of the major complications of stroke.

Adherence to Hypertension Management plan	Follow-up adherence	Missed visits due to long ques and financial barriers.	Good evidence of follow-up visits at 97.5% (78) documented.
	Lifestyle modification adherence	Patient cited Difficulties with diet/exercise due to poverty, lack of support, low motivation, lack of enough counselling, and forgetting advice.	HCWs report high knowledge on recommended lifestyle modification, 47.4% (18) counsel the patient after every encounter and 34.21% (13) counsel often.
	Medication adherence	Skipped doses due to side effects, forgetfulness, denial, cost, work related issues, cultural beliefs, and supply issues.	HCW assessed drug adherence 84.2% (32) through BP monitoring, 36.8% (14) use drug count, 44.7% (17) by use of history taking. 47.2% counseled patient after every encounter.

Source; Researcher (2025)

4.7.3 Areas of divergence of determinants of evidence for quantitative data from medical records and healthcare workers

Table 4.28 below highlights areas where there are contradictions, inconsistencies, or differing perspectives on determinants, either between Medical records quantitative data and Healthcare workers' quantitative data.

Table 4:28

Areas of Quantitative Data Divergence of "Determinants of Evidence

THEME	SUBTHEME	QUANTITATIVE DATA (MEDICAL RECORDS)	QUANTITATIVE DATA (HCW)
Hypertension Health Education	Structured Learning	Only 2 counseled on HTN management, 1 on stopping alcohol and tobacco use, 30 on daily exercise at least, diet and nutrition 9 medical adherence, 21 on BP self-monitoring, none on returning to clinic upon new symptoms.	82.6% HCWs reported frequent counselling; 74% perceived patients
Integration	Healthcare	Incomplete	Most HCW aware of risk factors,

and people-centricity of care.	system improvement	assessment (BMI, risk factors, crisis evaluation), basic investigations rarely done, most started on AHM drugs only without lifestyle modification.	87% reported use of guideline, 80% of them are confident and very confident in management of HTN.
Adherence to hypertension management plan	Medication Adherence	9 out of 80 patients counseled on medication, and 32.5% (26) assessed on the same.	84.2% (32) assess adherence though BP monitoring, 36.8% (14) use drug count, involvement, 44.7% (17) by use of history

Source; Researcher (2025)

CHAPTER FIVE: DISCUSSION

5.1 Introduction

This chapter presents a discussion of the study findings in relation to the three research objectives, highlighting areas of convergence and divergence where relevant. It interprets the results in the context of existing literature, exploring the factors influencing high blood pressure management among patients who experienced stroke complications. The discussion focuses on understanding the determinants at the patient, provider, and health system levels, with an emphasis on their implications for practice and policy.

5.2 Summary of the Study

The study addressed the research questions through systematic data collection, analysis, discussion, and formulation of conclusions. A mixed-methods approach was adopted, whereby quantitative and qualitative data were collected concurrently to allow clarification and triangulation of findings, ensuring that data collected directly addressed the research questions. Phased data analysis was employed, with quantitative data analyzed first, followed by qualitative data analysis, after which the findings were integrated to provide a comprehensive narrative aligned with the study objectives.

The quantitative findings presented extensive results on patients' demographic characteristics, hypertension management practices, lifestyle modification counselling, and healthcare workers' knowledge, attitudes, and practices. The qualitative findings generated five key themes: hypertension health education; integration and people-centred care; adherence to hypertension management; support systems; and barriers and facilitators to self-care. These themes were closely aligned with the study objectives.

The discussion of findings was conducted according to the study objectives, highlighting areas of convergence and divergence between quantitative and qualitative results. The conclusions summarized the multiple factors influencing hypertension management,

including patient-related factors, provider-related determinants, and health system gaps, which contribute to the development of stroke among hypertensive patients. The study further emphasized the World Health Organization self-care framework as a guiding principle for effective hypertension management.

Overall, the mixed-methods approach, integrated analysis, and comprehensive discussion demonstrated that the study successfully met its stated ojectives.

5.3 Key Findings

This comprehensive analysis reveals that despite being enrolled in care, many hypertensive patients at MeTRH developed stroke, and this results from multiple interconnected factors, including patient-related factors such as low health literacy, poor adherence, and inconsistent self-care routines contribute to this burden. Equally, provider and systemic issues such as guideline inconsistency, inadequate diagnostics, inconsistencies in supply, knowledge gap, and poor follow-up, hamper effective hypertension control. The five key themes from qualitative data illustrate a complex, interwoven reality where individual behavior and systemic gaps both contribute to health outcomes. Addressing these determinants requires coordinated interventions targeting healthcare delivery improvements, provider capacity building, patient education enhancement, and system-level policy changes. The findings provide a foundation for developing targeted strategies to prevent stroke complications among hypertensive patients in similar resource-constrained settings. The WHO Self-Care Framework served as a useful lens, revealing that both the “individual capacity” and “enabling environment” must be strengthened simultaneously to improve blood pressure control and reduce stroke risk.

5.4 Prevalence of Stroke as a Complication Among Hypertension Patients Attending Meru Teaching and Referral Hospital.

The first objective was to determine the prevalence of hypertension stroke comorbidity revealed that hypertension is high in Kenya, with a significant number of these cases progressing to severe complications like stroke. This is reflected in the anecdotal data cited from the 3648 hypertensive patients on follow-up at MeTRH (2023), showing that 386 (10.6%) of hypertension patients followed at the NCD clinic had developed stroke, which is an indication of the significant burden of uncontrolled hypertension. This prevalence aligns with literature suggesting that approximately 10–15% of hypertensive patients may develop cerebrovascular complications if not effectively managed.

The disproportionately higher prevalence among females (67.5%) for quantitative data and 70% (7) for qualitative data, and individuals above 60 years (43.8%), reflects global and regional trends showing increased stroke risk with age and gender-specific as a primary non-modifiable risk factor for both hypertension and stroke. This supports existing evidence that ageing increases the risk of cerebrovascular events in hypertensive patients with stroke (Hany et al., 2024). The higher prevalence in females (67.5%) also aligns with some studies that indicate a higher lifetime risk of stroke in women than men, often due to hormonal changes post-menopause and other gender-specific health factors.

According to the data from medical records, 70% of patients were unemployed, and 45% had only primary education, suggesting socioeconomic barriers to effective hypertension management (Naanyu et al., 2019). The quantitative data revealed that 91.3% of patients had consistently uncontrolled blood pressure before stroke onset. The poor control despite frequent follow-up (97.5%) suggests issues beyond mere attendance, including gaps in medication adherence, patient education, and healthcare system readiness. The study's results reinforce the critical need for targeted and aggressive

hypertension management strategies, particularly for older female patients, patients of the lower income class, to prevent stroke onset.

5.5 Patients' Experiences and Determinants of Self-Management Practices in Controlling High Blood Pressure.

On the second objective, which focused on exploration of patients' experiences with self-management programs, several themes were identified: Hypertension health education, integration and people centricity of care, adherence to hypertension management plan, barriers and facilitators to self-management, and support system. Patients had mixed experiences with hypertension health education. Some recalled receiving helpful information on salt reduction, stress management, and exercise from church health talks and clinics (Participant 05:

"Eat a lot of greens and beans...",

while others cited inconsistent or limited counseling from overburdened healthcare providers (Participant 02:

"There is no time he has ever explained to me about drugs").

This inconsistency in educational outreach may hinder self-management, confirming studies by (Pahria et al., 2022) that found limited knowledge is a barrier to hypertension control. The participants also indicated that no counselling was done on return to the clinic in case of experiencing new symptoms.

In a quantitative study, there was limited guidance on medication, lifestyle changes, adherence and self-monitoring that was documented. This reveals a significant gap in structured patient counselling. The lack of systematic health education might have weakened patients' ability to engage in meaningful self-care.

The issue of adherence to follow-up clinic, drugs and lifestyle changes was seen to have posed a major concern to most of the participants. Although most patients understood

medication routines, lifestyle changes, and follow-up clinic dates, patients seemed to face implementation challenges often due to inadequate reinforcement or support from healthcare staff and family members. This gap contradicts with findings that adherence improves with continuous reinforcement and structured programs (Irwan et al., 2022), as well as this contradicts the evidence that lifestyle interventions, though effective, must be supported by social and environmental structures to be sustainable (Charchar et al., 2024). Others cited financial constraints limiting access to recommended dietary modifications, purchase of drugs and transport to go to the hospital as a major challenge, inconsistent supply of resources at the hospital like drugs, investigations and blood pressure machines, work related issues interfering with medication adherence, clinic follow-up, exercises and stress management strategies, forgetfulness due to lack of systematic reminders or support systems, and limited family and community support for lifestyle changes. Other Participants reported receiving valuable encouragement from family and community members, including peer-to-peer learning and stress-coping mechanisms such as talking to others and engaging in group activities. These findings underscore the multifaceted nature of self-management, which is not solely dependent on the patient's individual will but is deeply influenced by socioeconomic factors and social support.

Some patients felt uncomfortable telling the doctor the truth about medication adherence. Many participants admitted to struggling with medication adherence due to side effects, misunderstanding of their condition/denial, or the belief that medication could be stopped once they felt better, and unclear instructions. This confirms that structural and psycho-social factors affect self-management capacity (Aljofan et al., 2023). Only 27.5% of reviewed records showed documented follow-up on medication adherence. Non-adherence can be deeply influenced by both internal motivation and external

support. Lack of proper counselling of participants contributes to erratic medication use, which increases the risk of stroke despite clinical diagnosis and enrollment in care.

Participants shared their experiences with self-care practices and their effectiveness in managing high blood pressure, providing insights into the strategies they used and challenges they faced. While participants understood the importance of lifestyle modifications, implementation could have been hindered by socioeconomic constraints and limited support systems. Lifestyle modification adherence is determined by the social support from families, friends and healthcare workers (Lauffenburger et al., 2019). Economic factors often determine the extent of lifestyle modification (Smachew et al., 2022). However, those who successfully implemented changes reported noticeable benefits.

Participant recognized the need to reduce salt intake, eat healthily, and manage stress. However, behavioral change was mostly self-directed or based on community hearsay, but was limited by poverty, cultural habits, and lack of continuous education, suggesting weak institutional reinforcement of self-care guidelines. This is consistent with the quantitative findings, where less than one-third of healthcare workers reported evaluating patients' lifestyle behaviors regularly, and records lacked documentation on follow-up counselling for diet, exercise, stress management, or weight management. Healthcare professionals' guidance by promoting and monitoring lifestyle changes, providing clear guidance and encouragement, results in better adherence among their patients (Tsiampalis et al., 2023). This underscores the need for personalized education programs rooted in the Kenya National Guidelines for Cardiovascular Disease (Ministry of Health, 2018). Self-care is a dynamic and ongoing behavior, requiring continuous reinforcement through education, reminders, and motivational support. In the absence of structured

health education programs, patient-led self-care remains minimal, particularly in low-resource settings.

5.6 Determinants Influencing Delivery of Hypertension Healthcare Services at Meru Teaching and Referral Hospital.

Further exploration was conducted to evaluate the delivery of hypertension healthcare at Meru Teaching and Referral Hospital. The research identified significant gaps in healthcare delivery that likely contributed to stroke development. Participants highlighted challenges within the healthcare system, such as long queues, few healthcare workers, and inconsistent drug supply, forcing patients to purchase drugs privately. Participants also mentioned of lack of BP measurement machines, weight measurement not done every clinic visit and a lack of or missing laboratory investigations in the hospital. These systemic bottlenecks discouraged frequent hospital visits, even when patients were aware of the need for regular monitoring.

Minimal counselling on lifestyle modifications was provided to participants during clinic visits, and no patients were counseled about returning to the clinic if experiencing new symptoms. This was confirmed by quantitative data for medical records, where limited guidance on medication adherence and self-monitoring was documented. Participants also cited fear of the doctor mocking or quarreling with them, hence did not disclose to them of non-adherence, and sometimes the doctor was also busy and lacked time to comprehensively assess the progress of the participant.

Quantitative data from healthcare workers and medical records confirmed the qualitative data from the patients. Data from healthcare workers showed a lack of standardized guideline use; 13.2% did not use any formal guideline, and the rest relied on varied external protocols. Only 34.2% supported the adoption of standard treatment protocols. This fragmentation weakens the quality of care and aligns with WHO's health systems building blocks (Stockton et al., 2021), which emphasize guideline-based care.

Health infrastructure deficiencies and a shortage of healthcare workers lead to a lack of diagnostic tools and poorly equipped facilities, preventing timely detection and follow-up of hypertensive patients, hence increasing the risk of stroke (Bhattarai et al., 2023). Screening was often routine (95%), but only 0% of cases had assessments for hypertensive crises documented, highlighting poor risk-stratification practices. Similarly, while follow-up appointments were consistently scheduled (98.8%), there was an inadequate clinical response to early warning signs. This was confirmed by the data from medical records, where they lacked documentation on blood pressure classifications in 99% of cases, lipid profile tests were done in only 28.7%, and ECGs in just 22.5%. Additionally, 71% of healthcare workers pointed to drug stock-outs and infrastructure limitations as challenges, 63% emphasized the need for education, and only 34.2 recommended standard protocols. The gaps in diagnostics, medication supply and clinical standardization reflect a weak enabling environment, as per the WHO framework , which is essential for successful chronic disease management (Bhattarai et al., 2023).

The disconnect between policy and practice results in missed opportunities for intervention, particularly in primary care and stroke prevention. A knowledge gap was evident among healthcare workers, where only 26.3% correctly identified the recommended daily salt intake for hypertensive patients, and had variable awareness of target blood pressure goals for treatment. There was a limited systematic approach to patient education and counselling. When there are poor-quality health services, patients are not educated about their condition, lifestyle modifications, medication adherence, or the importance of regular monitoring, exacerbating the condition (Bhattarai et al., 2023).

The evaluation on support systems to assess healthcare delivery in MeTRH, participants consistently cited that family support, peer-to-peer and informal group support were

valuable to patients, especially in settings like churches and support groups. Some participants mentioned the only support they receive from the hospital is treatment, but counselling is not done continuously, weight measurement is done once, and lacked drugs in the hospital, as well as the hospital is not flexible to sell drugs according to the money one has. There was a notable absence of structured support systems from within the hospital. As found by (Konlan & Shin, 2023), support networks, especially family and community-based, can enhance self-care adherence when leveraged within a healthcare model. Their omission in the formal healthcare process is a missed opportunity for holistic, community-based hypertension management.

5.7 Integration of Findings

Focusing on patients' experiences with self-management of high blood pressure and evaluation of the delivery of hypertension healthcare at MeTRH, the discussion integrates quantitative and qualitative findings using convergent and divergent analysis within the WHO Self-care framework and health system building blocks, emphasized with the literature to contextualize results.

In the context of "determinants evidence", several themes were identified and discussed: Hypertension health education, adherence to hypertension management plan, Integration and people-centricity of care, support system and barriers and facilitators of self-management.

It provides a comprehensive understanding of determinants impacting blood pressure management among patients who developed stroke while under hypertension management. On hypertension health education, structured learning emerged as a significant gap, with quantitative data indicating 63% of healthcare workers acknowledged insufficient structured education during interactions.

Qualitative data reinforced this, as patients reported rarely receiving systematic education on hypertension, medication use, and lifestyle modifications, instead depending on fragmented, informal learning through peers, churches, or brief remarks from clinicians. One participant noted,

"*There is no time he has ever explained to me about drugs*,"

highlighting the absence of structured patient education. This align with WHO's argument that structured health education is essential for building patient self-efficacy in managing chronic conditions like hypertension (Konlan & Shin, 2023). The literature indicates that structured education improves patients' understanding of their disease, adherence to medication, and lifestyle change efforts, which are essential in preventing complications such as stroke (Irwan et al., 2022). The lack of structured health education in MeTRH thus directly undermines patients' ability to effectively self-manage hypertension.

Un-structured learning was evident in-patient reliance on community and family for hypertension management advice, leading to inconsistencies and myths about hypertension control. Unstructured learning can perpetuate misinformation, leading to poor adherence and lifestyle practices, which may contribute to persistent high blood pressure and increased stroke risk (Pahria et al., 2022).

In divergence findings, while healthcare workers reported frequent counselling and education provision during patient encounters, patients consistently described a lack of structured education, noting that their interactions were often brief and did not provide comprehensive information about hypertension management. This divergence suggests that healthcare workers may overestimate the education provided, while patients perceive the sessions as inadequate, aligning with an argument that structured, repeated education is essential for effective self-management (Konlan & Shin, 2023).

In the area of adherence to hypertension management plan, medication adherence challenges were prevalent, with quantitative findings indicating that consistent adherence counselling was documented in only 11% of patient records, while qualitative interviews highlighted issues such as missed doses due to financial constraints, forgetfulness, or fear of side effects. A participant shared,

> "*Sometimes I missed (drugs)... I stay like one month before getting money to buy drugs*."

This supports study findings that in LMIC settings, medication adherence is heavily influenced by economic factors, patient beliefs, and the accessibility of healthcare services (Smachew et al., 2022). Medication adherence is essential for blood pressure control, and its absence increases the risk of stroke among hypertensive patients. Follow-up adherence was also a concern, as patients described difficulties attending routine clinic appointments due to transport costs or lack of support, which was supported by healthcare workers who noted missed follow-ups among patients, often without systematic tracing mechanisms. Regular follow-up is crucial for monitoring blood pressure and reinforcing adherence, and missed appointments contribute to uncontrolled hypertension (Bhattarai et al., 2023). Lifestyle modification adherence, including diet, exercise, and salt reduction, was inconsistently practiced among patients, with qualitative evidence revealing that financial limitations and household dynamics hindered lifestyle adherence. One participant explained,

> *"It is difficult to avoid salt when everyone in the house uses it."*

lifestyle modification adherence requires sustained patient education and supportive environments (Irwan et al., 2022), both of which were lacking in this study setting. In divergent findings indicate that, healthcare workers perceived moderate adherence among patients, attributing non-adherence to patient negligence or cultural practices,

whereas patients attributed poor adherence to systemic factors such as medication costs, stock outs, and lack of counselling support. Lifestyle modifications, while acknowledged by healthcare workers as critical, were challenging for patients who lacked resources and support systems to sustain changes. This divergence highlights the need for system-level interventions to support patient adherence, consistent with (Bhattarai et al., 2023) and (Smachew et al., 2022).

Healthcare accessibility was identified as a challenge, with patients experiencing long waiting times, distance to healthcare facilities, and transport costs, which limited timely care and follow-up. Quantitative data showed gaps in accessibility, with healthcare workers citing patient delays and missed appointments due to transport difficulties. These findings resonate with the (World Health Organisation, 2023), which emphasizes healthcare accessibility as critical for chronic disease management. Healthcare improvement needs were highlighted by systemic weaknesses in medication supply and diagnostic capacity. Both quantitative and qualitative data revealed frequent drug stock outs and a lack of diagnostic tools for routine blood pressure monitoring, with a patient stating,

> "*You go to the place of drugs; you meet they are not there.*" *"Like in our village hospital when you, you are told the machine does not have batteries. So is it the patient who will go to buy batteries?".*

The lack of consistent medication supply and diagnostics undermines the effectiveness of hypertension management and increases the risk of complications, aligning with the need for system strengthening in LMIC healthcare settings (Konlan & Shin, 2023). Healthcare transparency and interaction were also inadequate, with patients expressing that they often felt uninformed about their health status, investigations conducted and treatment plans, while healthcare workers reported limited time for comprehensive patient

interactions. This barrier reduces trust and engagement in care, noting that effective patient-provider interactions improve adherence and health outcomes (Bhattarai et al., 2023). Inconsistent drug and diagnostic supplies were persistent, contributing to poor adherence and delayed intervention for uncontrolled blood pressure. Frequent medication stock outs were documented in 71% of healthcare worker reports, reflecting system-level failures. This is consistent with the WHO that medication availability is critical for managing hypertension and preventing stroke (World Health Organisation, 2021).

Divergent findings indicated that Healthcare workers acknowledged system weaknesses but often emphasized patient responsibility in managing hypertension, while patients highlighted systemic challenges such as unavailability of medications and investigations, lack of diagnostic tools, and financial barriers as primary impediments to effective management. This divergence indicates a need for system accountability and improvement, aligning with the WHO's health system strengthening recommendations to improve hypertension outcomes and reduce stroke risk (World Health Organization, 2023).

Barriers to self-care were evident, with patients citing lack of knowledge, financial constraints, and cultural beliefs as factors limiting their ability to implement lifestyle changes or adhere to medication regimens. These barriers directly affect the ability of patients to self-manage hypertension, a critical aspect of stroke prevention. Barriers to self-care are a significant determinant of hypertension control, requiring targeted interventions to improve patient capacity (Irwan et al., 2022). Self-monitoring of blood pressure was infrequent among patients due to the lack of home monitoring devices and inadequate education on the importance of routine monitoring. A participant noted,

> *"I don't have a machine to check at home, so I just wait until I go to the hospital."*

This gap reduces the ability of patients to identify and address rising blood pressure levels promptly, increasing the risk of stroke, consistent with findings by (Konlan & Shin, 2023). Participants cited different stress management strategies which helped them relieve stress. Stress is a known contributor to hypertension, and failure to manage stress can undermine other self-care practices. Stress management strategies mentioned by most participants were avoiding anger and practicing calmness by moving away from the stressors. In quantitative data, documentation shows, only two patients out of 80 were counselled on hypertension management, where stress is part of it. 63% of HCW believe that patients moderately understand on management of HTN. Stress management is integral to hypertension control, hence the need for structured patient counselling on stress reduction techniques (Irwan et al., 2022).

Financial constraints emerged as a cross-cutting barrier, with patients indicating an inability to afford medications, healthy foods, or transport to the hospital for follow-ups. One patient shared,

"You don't have money for transport to go to Meru Hospital every time."

Quantitative data supported these challenges, with 23.7% of healthcare workers citing financial limitations as a major barrier to hypertension management. Socioeconomic status is a critical determinant of health outcomes in hypertension management, with financial barriers often leading to medication non-adherence and skipped appointments, thereby increasing the risk of stroke (World Health Organisation, 2023) and (Smachew et al., 2022).

Divergence of determinants evidence was noted between quantitative findings from medical records and quantitative data from healthcare workers (HCWs) regarding hypertension management, adherence to hypertension management plan, structured education, and healthcare system improvement. This clarifies gaps that affect self-

management of hypertension and healthcare delivery. In the review of medical records, documentation of structured education and counselling was notably low, with only 11% of patient files indicating any form of education on medication adherence or lifestyle modification.

In contrast, healthcare workers reported high frequencies of patient education during consultations, with 47.4% indicating they offered counselling at every encounter and 34.2% stating they often provided it. This divergence suggests a documentation gap and possible overestimation of counselling delivery by healthcare workers. Structured, repeated, and documented education is critical in building patient capacity for hypertension self-management (Konlan & Shin, 2023), which is currently insufficiently documented and inconsistently practiced at MeTRH.

The absence of clear documentation also limits opportunities for follow-up, evaluation, and reinforcement of education. Medical records indicated a heavy reliance on BP measurements (84.2%) as a proxy for adherence checks, with minimal documentation on actual adherence discussions, lifestyle counselling, or structured medication adherence assessments. Healthcare workers, however, perceived that patients demonstrated moderate adherence to medication and follow-ups, attributing non-adherence primarily to patient-related factors, including beliefs and cultural practices. This divergence highlights systemic limitations in adherence monitoring, as reliance solely on BP measurements may not accurately capture true adherence behaviors (Smachew et al., 2022).

Healthcare workers' perceptions, unsupported by systematic monitoring tools like pill counts, family involvement, history taking, and BP checks, may thus create a false sense of patient compliance, impeding accurate evaluation of hypertension control strategies. Lifestyle modification adherence was poorly captured in medical records, despite HCWs

emphasizing its importance. Objective adherence assessment tools are critical in managing hypertension effectively (Bhattarai et al., 2023); hence, MeTRH should implement structured adherence monitoring and documentation protocols to align healthcare worker perceptions with patient realities.

Medical records frequently lacked entries related to guideline adherence, lifestyle counselling, and structured follow-up plans, indicating a gap in systematic implementation of care protocols for hypertension management. Conversely, healthcare workers reported that they followed hypertension management guidelines, provided necessary counselling, and faced challenges primarily due to patient-level factors rather than systemic issues. This divergence reflects misalignment between reported practice and documented evidence, indicating a need for accountability and standardization within the healthcare system at MeTRH. The WHO underscores that clear documentation is essential for quality improvement, continuity of care, and monitoring adherence to clinical guidelines (World Health Organisation, 2023).

The healthcare workers' focus on patient-related barriers, while underplaying systemic issues such as medication stock outs, long queues, and limited diagnostics, as evidenced by participant narratives and HCW reports on barriers to hypertension management, demonstrates a disconnect in perceptions of responsibility for hypertension outcomes. To improve hypertension management and reduce stroke risk, there is a need for system-level reforms focusing on healthcare improvement, transparent patient-provider interactions, and consistent drug and diagnostic supply, aligning with WHO health system strengthening recommendations.

The integration revealed several consistent patterns, both systemic and individual-level failures, which have contributed to poor hypertension control, which eventually contributed to the development of stroke among patients.

5.7.1 System-level determinants

These have been identified and validated quantitatively and experienced qualitatively as frustrating efficient hypertension management. These are drug stock-outs, lack of guidelines, shortage of staff, poor communication, poor infrastructure, and limited diagnostic use.

5.7.2 Provider-level determinants

shortage of staff, communication gaps and Knowledge gaps are reflected in both the quantitative surveys (e.g., low knowledge scores, failure to counsel or educate patients, HCW cited shortage as one of the barriers) and the interviews (e.g., patients unaware of BP targets, patient reporting doctors have no time to advise them, doctors are few).

5.7.3 Patient-level determinants

Qualitative insights like low literacy, adherence issues and poor lifestyle practices help explain the clinical outcomes seen in medical record audits.

This confirms the hypothesis that challenges in self-management correlate with uncontrolled hypertension and subsequent stroke. The integration confirms that interventions are supposed to be multi-dimensional, targeting the system, provider and patient simultaneously.

In the management of hypertensive patients, nurses are the majority according, even to the data collected, where they play key role in the management of hypertension. Advanced Nurse Practitioners scope in the management of hypertension is broader than general nurses. Advanced nurse practitioner conduct comprehensive assessment of patients, including detailed history taking, physical examination, risk factor stratification, to identify and classify hypertension (Schober, 2020). According to the data. 64.7% of the nurses were able to define hypertension, 85.88% were able to know the common cardiovascular risk stratification, most nurses responded that screening of patient for

hypertension was done every visit at 88.2%, but the target blood pressure knowledge was low at 11.76%.

Many health systems, ANPs are authorized to prescribe and titrate anti-hypertensive medications. Advanced Nurse Practitioners in some health systems, play vital role in medication initiation, dose adjustments, and monitoring side effects, addressing barriers to medication adherence, thereby optimizing treatment outcomes (Schober, 2020). On knowledge of drugs used in management of hypertension, 68% of nurses were aware. They also provide patient education on Self-management of hypertension like lifestyle modification, adherence, management of hypertension which significantly improve blood pressure outcomes.

About counselling of the patient. 52,9% responded they counsel with every encounter, which should be emphasized to all nurses to offer counselling to every client. Advanced Nurse Practitioner ensure there is coordination and continuity of care. They ensure there is multidisciplinary review of hypertensive patients, follow-up adherence and good transition from hospital to home, to avoid re-admissions. Nurses were assessed on the recommended follow-up schedule for newly hypertensive patients, and 100 % of them responded its between 1 to 4 weeks. Advanced Nurse Practitioner are involved in leadership and policy formulation, especially for hypertension management. 100% of the nurses cited using a certain guideline in management of hypertension, though there was no common guideline used in MeTRH for management.

5.8 Limitations

5.8.1 Recall bias

The use of self-reported data and retrospective recall by patients to explore

experiences with self-management. This might have introduced the risk of recall bias, particularly regarding medication adherence, lifestyle modification, and health-seeking

behaviors. Some patients may over- or under report their actions due to memory lapses or a desire to give socially acceptable responses.

5.8.2 Limited generalizability

The research was conducted in a single hospital (MeTRH), which may limit the applicability of findings to other hospitals in the region or country.

5.8.3 Small sample size

Only 10 patients were interviewed qualitatively, which may not capture the diversity of their full experiences.

5.8.4 Potential for selection bias

Patients who were included were those who had no cognitive effects and could give informed consent, excluding the most severely affected or those with communication barriers.

5.9 Strengths

5.9.1 Triangulation

Triangulation of data (medical records, healthcare workers and patient interviews) helped validate the findings, ensuring that the results were not only dependent on potentially biased self-reporting.

5.9.2 Validated checklist

The use of a validated checklist from the Kenya National Cardiovascular guidelines helped standardize data abstraction and ensure the key indicators were assessed consistently. Also, Data triangulation (Quantitative and qualitative data) to ensure accuracy, credibility and comprehensiveness, improving data effectiveness.

5.9.3 Diversity

Based on the location of MeTRH, where it serves as a regional referral hospital, serving populations across diverse counties, may make the findings as generalizable compared to

the patients coming from various counties. The study also provides deep contextual insights into real-world management challenges in a Kenyan referral facility, which may also be a representative of many LMIC healthcare systems, therefore offering useful guidance for similar environments.

5.9.4 Selection criteria

Ethical considerations were considered during the selection criteria, and by excluding patients with cognitive disorders and those unable to give informed consent, and inclusion of healthcare workers and medical records data compensated for potential bias in data from the patient side alone.

5.10 Triangulation

The study employed triangulation, to enhance credibility and trustworthiness. Data triangulation was achieved by collecting information from healthcare workers, hypertensive patients with a complication of stroke, and medical records for hypertensive/stroke patients. Methodological triangulation was applied by integrating qualitative interviews with quantitative surveys, allowing for both statistical measurement and in-depth understanding of determinants of hypertension management. More so, investor triangulation was applied where the researcher had several reviews with the supervisors, research assistants and statistician who helped in coding, analyzing, and validating interpretations. Lastly, theory triangulation where WHO conceptual framework for self-care was applied, to help understand the factors influencing self-care in managing hypertension.

CHAPTER SIX: CONCLUSION, RECOMMENDATIONS AND PUBLICATION

6.1 Introduction

This chapter presents the overall conclusions of the study, highlighting the key insights regarding determinants of hypertension management among patients who experienced stroke at MeTRH. It interprets the study findings in the context of the research objectives, emphasizing their implications for clinical practice, health system improvements, policy, and community engagement. The chapter also outlines practical recommendations and areas for future research, aimed at strengthening hypertension management, reducing stroke risk, and improving patient outcomes in resource constrained settings.

6.2 Conclusion

This study highlights the complex factors contributing to stroke among hypertensive patients at MeTRH. It reveals that despite receiving care, many patients develop stroke due to a combination of patient-related factors (e.g., poor adherence, low health literacy) and systemic challenges (e.g., inconsistent guidelines, inadequate resources, and healthcare worker knowledge gaps). These findings underscore the need for a comprehensive, integrated approach to hypertension management.

The WHO Self-Care Framework proved to be a useful guide, emphasizing that both individual capacity and a supportive healthcare environment are essential for improving outcomes. Addressing these issues requires coordinated efforts across training, policy development, and community engagement to enhance patient education, provider capacity, and resource availability.

The study's recommendations aim to strengthen hypertension management at all levels, from clinical practice to policy. By focusing on these areas, healthcare systems can improve adherence, reduce stroke risk, and enhance the quality of care for hypertensive patients.

In conclusion, this study provides critical insights that can inform future strategies to reduce stroke complications in hypertensive populations, particularly in resource-constrained settings, while offering a solid foundation for future research and policy development.

6.3 Recommendations

6.3.1 Training

Comprehensive, competency-based hypertension management modules

Training institutions should integrate comprehensive, competency-based hypertension management modules into both per-service and in-service curricula for all cadres. Include practicum sessions on accurate blood pressure monitoring, risk factor screening and early identification of stroke symptoms.

Continuous professional development (CPD) for Healthcare workers

The hospital to implement regular CPDs for the nurses, clinical officers, medical officers and physicians on updated hypertension management guidelines, with emphasis on individualized care plans, lifestyle counselling and effective follow-ups.

6.3.2 To policy makers

Policy makers (Ministry of Health and Nursing Council) should develop and enforce policies that support capacity building, task shifting, and expanded scope of practice for trained Advanced Nurse Practitioners. This shall strengthen hypertension management at all levels of the healthcare system.

Policies should support the availability of equipment and essential hypertension medicines and diagnostic tools, promote the use of standardized treatment protocols, and establish effective monitoring systems to track patient outcomes and improve the quality of care.

The study findings provide evidence to guide policymakers and hospital administrators to develop or refine existing policies and clinical guidelines. The study found specific areas of improvement in care, which will help in the creation of standardized treatment protocols that shall ensure care is based on the latest evidence-based practices.

6.3.3 Clinical practice

Healthcare workers should immediately implement structured and documented counselling sessions and integrate them as a standard component for every patient with hypertension visit to the NCD clinic, outpatient and medical ward. The study found a significant gap between the high frequency of counselling reported by healthcare workers and the poor documentation in inpatient files.

6.3.4 For Community Engagement:

The County Government, in collaboration with MeTRH, to establish community-based support programs facilitated by CHPs and trained peer educators, to provide ongoing education, motivation and emotional support to sustain long-term behavioral changes and provide a network of accountability and shared experience.

6.3.5 For Future Research:

The findings identified various gaps in the management of hypertension, which provide researchers and scholars to explore more on gender specific barriers and cultural beliefs influencing hypertension management.

Financial constraints were one of the major barriers mentioned to hinder self-care. The researchers should investigate the cost-effectiveness of different management approaches. More research is needed to evaluate the integrated family support programs on hypertension management, as participants mentioned the effectiveness of family support, and others lacked family support.

6.4 Publication

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APPENDICES

Appendix A: Patients Sampling Matrix

DIMENSIONS							
	1	**2**	**3**	**4**	**5**	**6**	**7**
Age: < 40 Years	1						
41-50 Years	1	1	1				
51-60 Years	1	1	1	1	1		
61-69 Years	0						
> 70 Years	1						
Sex: Male	1	1	1				
Female	1	1	1	1	1	1	1
Others	0						
Socioeconomic Status **a. Education Level:** -Primary	1	1	1	1			
- Secondary	1	1	1	1	1		
- Post-secondary	1						
b. Employment Status: - Employed (Self-employed and formal employment)	1	1	1	1	1	1	1
- Unemployed	1	1	1				

Appendix B: Informed Consent

STUDY TITLE: DETERMINANTS OF HIGH BLOOD PRESSURE MANAGEMENT AMONG PATIENTS EXPERIENCING A COMPLICATION OF STROKE: A CASE OF MERU TEACHING AND REFERRAL HOSPITAL.

Name of Principal Investigator: Purity Kathambi Mathiu

Co-Investigator:

Name of the Institution: Meru Teaching and Referral Hospital, Box 08-60200, Tel No: 0772207572

Informed Consent Form for Healthcare workers attending hypertensive patients and patients with a complication of stroke.

This informed consent has two parts:

- Information sheet (to share information about the study with you).
- Certificate of consent (for signatures if you choose to participate).

You will be given a copy of the signed informed consent.

Part 1: Information Sheet

Introduction

You are requested to take part in the study. Please read this form carefully, as the information provided here is to tell you about the study. If you have any questions, you are allowed to ask. You will be given a copy of this consent form for your records if you decide to be in this study.

It is voluntary to take part in this research study. You can choose not to participate in the study and could still receive other services. Feel free to withdraw from this study at any time if you wish. You can request that the information provided be destroyed under supervision if you wish to quit after data collection and cannot be used in the research

study. If new information is available about the risks or benefits of this research, you will be notified, hence you can decide if you want to stay in the study.

Introduction

I am a student at the school of nursing, Meru University of Science and Technology, pursuing a Master of Science Degree in Nursing (Medical- Surgical Nursing). I am carrying out a study on the determinants of hypertension management in patients with an experience of a complication of stroke among patients visiting Meru Teaching and Referral Hospital Non-Communicable Disease Clinic.

The study will be looking at the determinants of high blood pressure management in patients who have stroke to understand how they were managed before they developed a stroke. To achieve this, the study will look at the prevalence of hypertension/ stroke comorbidity, utilization of lifestyle modifications, and health system delivery in hypertension management. This information will give you, as the participant, details about the study and will enable you to make an informed decision on participation. In case you have any questions or need for more clarification regarding this information or the consent form, feel free to ask. I will ask you questions regarding the study before you sign the consent form to ascertain your clear understanding of the information provided.

The research questions are: how many people who have had hypertension developed a complication of stroke in MeTRH? Were you following the teachings you got from the doctor on what to do and not do so as to lower the high blood pressure? What are some of the things in the hospital that help you in the treatment of high blood pressure?

Type of Research Project/ Intervention:

This project will involve the collection of data from healthcare workers who have been attending hypertensive patients in outpatient, medical wards and Non-Communicable Disease (NCD) clinics using self-administered questionnaires. Information from the

patients will be collected using in-depth interviews, and participants will be allowed to express themselves and share their experiences.

The reason why you have been chosen to participate in this study is that you manage hypertensive patients, or you have a primary diagnosis of hypertension and later developed stroke, and you have no cognitive disorder.

The researcher is requesting a few hours of your time to ask a few questions and clarify, and in case of further clarification, the researcher might call you.

Brief introduction of the study: The researcher requests you to assist her in learning more about determinants of hypertension management, as now most patients who are on follow-up for hypertension develop stroke. The healthcare workers have been selected as per cadre, and then those to participate in the study have been sampled using stratified random sampling. 8 patients will be picked from the stroke patient population and added until data saturation is achieved. An audio recording will be done so as not to miss any information.

Some of the questions to be asked of healthcare workers are about knowledge, practices of hypertension management and professional development. For patients, it is about their experiences in management and control of blood pressure and more so on lifestyle medications.

Risks. There will be no physical or economic risk involved in undertaking the study. However, you will take your time off the busy schedule to respond to some of the interviewer-administered questionnaires, interviews and surveys. Some questions might require you to give some personal information that might trigger some anxiety or negative feelings. In case of such an occurrence, the researcher will refer you to a hospital counsellor. The researcher shall be there to support you throughout the research process.

Benefits. There are no direct monetary benefits in participating in this study. However, the results of the study will; help improve patient care and reduce the rate of stroke among patients where health care workers shall use the guidelines in the management of hypertensive patients, guide the hospital in developing policies for management of hypertensive patients which are applicable in their hospital setting, the competencies achieved can be used for further training of healthcare workers where Continuous Medical Educations shall be conducted and updates shared, as well as it will form a basis for more research to be conducted after the gaps in management of hypertensive patients are identified.

In case you have any questions about the study, please contact me using this number: 0712879273. In case you have any questions about your rights as a research subject, please contact the Institutional Review Ethics Committee (IREC) 05333471 Ext 3008.

Efforts will be made to keep your information private and confidential. Using or sharing this information must follow the National privacy guidelines. By signing the consent form for this study, you are authorizing the use and disclosure of your personal information. Agreeing to take part in the study means that you agree to let the research team use and share your protected information as described below:

As part of the study, (Name of participant) and the researcher study team may share the results of your information. These may be study or not study related. They may also share portions of your medical record with groups named below:

- The National Bioethics Committee.
- The Institutional Review and Ethics Committee.

The above committees have policies and guidelines to ensure that all reasonable efforts will be made to keep your personal information private and confidential.

After the research is completed, the study results will be retained in the researcher's research record for at least six years. Any research record entered into your medical record will be kept indefinitely.

The permission to use or share your personal information has no expiry date. If you decide to withdraw your permission, please contact Purity Kathambi, the researcher, to let her know that you are withdrawing your permission. Use this email also for contacting me: pkathambi@ymail.com. At that time, we will stop further collecting any information about you. However, the health information collected before withdrawal may continue to be used for reporting and research quality.

If you decide not to take part, your treatment, payment or enrollment in any health plans will not be affected. A copy of the signed consent form will be given to you.

The feedback for the patients shall be shared through brochures, summarizing the findings and recommendations. It will be written in simple language and shall be accessible at the health facilities. Health care workers shall get their feedback reports, which they can review and discuss during meetings or Continuous Medical Education sessions. Also, share findings through WhatsApp groups for the non-communicable disease management teams. Also, follow-up interviews with the participants to share findings and gather their perspectives on potential interventions.

Part II: Consent of subject

I have read or have been read to me in clear language so that I can understand the above information before signing this consent form. The content and its meaning have been explained to me. I have been given an opportunity to ask questions and seek clarification, and I am satisfied that they have been answered as per my expectations. It is clear to me that the results of the study, including personal details, will be processed into the

research reports anonymously. I understand that there is no penalty should I wish to discontinue with the study. I hereby volunteer to take part in this study.

Name of the participant Signature/Thumbprint……. Date/ time

Name of representative/witness Relationship to the subject…….

Name of the person obtaining consent Signature Date & Time……

Purity Kathambi Mathiu

Name of the investigator Signature of investigator Date……

Appendix C: Interview Guide

English Version

Interviewer Name…….

Date of the Interview…….

Consent has been obtained

Contact Phone number of the interviewee (where possible)

Introduction:

Thank you for agreeing to participate in this interview. We are interested in understanding your self-care (blood pressure-related) and lifestyle management before you developed a stroke. There are no wrong or right answers. Please feel free to share your thoughts and feelings openly. If any question makes you uncomfortable, you do not have to answer it, and you can stop the interview at any time. All the information you provide will be kept confidential and will be used for research purposes only.

Since it's not possible to write all the information we shall discuss, I request that I record our discussions using this gadget [show the participant audio recorder]. I promise that it's only my supervisor and I who will listen to this audio recording. Is this okay with you?

Section 1: Socio-Demographic information

1. Could you briefly introduce yourself?
    - How old are you?
    - Gender
    - Marital status
    - Occupation
    - Level of education
    - Employment status

Section 2: General Information

I. Experience with hypertension.

- Tell us your story on hypertension

II. Health Education on Hypertension Management.

How did you learn about hypertension management and self-care practices? What content was taught, and how often were you taught?

III. Home-based management.

- —Tell us how you manage your blood pressure at home from the time you were diagnosed.
- —Importance of effective self-management at home

Section 3: Medication Adherence

I. Medication Routine

II. Challenges in adherence

III. Missed doses

Section 4: Lifestyle Modifications

I. Smoking and alcohol consumption

II. Weight management and diet

Dietary practices

Dietary changes

Challenges in diet maintenance

III. Physical activity

- Exercise routine
- Changes in physical activity
- Challenges in maintaining the activity.

Section 5: Self-Monitoring of blood pressure

- Monitoring Frequency
- Tools and techniques
- Response to readings

Section 6: Stress reduction and coping strategies

- Stress management techniques
- Effectiveness of strategies
- Support system

- Describe any support systems (family, community, healthcare providers) that helped you cope with hypertension.

Section 7: Barriers and Facilitators to Self-Care

- Challenges in Self-care
- What has helped you to care for yourself concerning BP

Conclusion

Is there anything else you would like to share about your experience with hypertension self-care and home-based management?

Do you have suggestions for healthcare providers to better support patients like yourself?

<u>Kimeru Version</u>

Riitwa ria Muciaria……..

Ntariki cia rwaria……..

Ruutha kweejanwa……..

Namba ya thimu ya mwarirua…….

Mwambirio.

Nibwega niuntu bwa gwitikiiria kugwatanira nani kiri rwaria ruru. Turienda mono kumenya wimenyeeri bwaku (kiri mantu ja gwitia kwa tharike) na muturire jwaku mbele

ya kugwata stroke. Guti icokio ria umma kana urongo. Ugakira kuuga mathuganio jaku kana uria ukwigua. Gukethira kwina kiuria gituma wigua uting'aniri, ti mwanka ugicokie, na no urungike rwaria ruru igita rionthe. Mantu jaria jonthe tukaria jagekwa jari ja siri na jagatumirika kiri utaguti bubu aki.

Tontu no kwithirwe kuri bubumo kwaandika mantu jaria jonthe tukaria, ngakuromba umbitikirie kujukia migambo iu tukwaria na gantu gaka (onia mwarirua kiria ukajukua migambo iu nakio). Ndikwira migambo iji ikathikirwa ni uni na mwalimu wakwa aki. Ukanganirwa ni untu buu/ugetikiria nthithia uu?

Gacunci 1: Mantu jaku na ja muturire jwaku.

1. Twire na ukui mantu jaku.
    - Wina ukuru bung'ana?
    - Muumbire.
    - Mantu ja Kugurwa/kugurana.
    - Ngugi iria uritaga.
    - Kithomo mwanka ariku
    - Kwaandikwa.

Gacunci 2: Rwaria rwa withire.

I. Muturire uri na gwitia kwa damu.

II. Twire rugono rwaku kuuma ureerwa uri na gwitia kwa tharike.

III. Mataaro niuntu bwa gutungatira gwitia kwa tharike.

IV. Niatia wameyere mantu ja gwitia kwa tharike na mantu jaria ubati kuthithia kwimenyeera, nimbi waritanirwe na ni maita jariku uritanagwa?

V. Utungatiri bwa gwitia kwa tharike uri nja.

- Twire uria umbaga gutungatira gwitia kwa tharike uri nja kuuma ririra werwirwe tharike niititie.

- —Mawega ja umenyeeri bubwega bwa gwitia kwa tharike uri nja.

Gacunci 3: Kunywa dawa/mithega uria kubaterie.

I. Unyunyaga dawa atia?

II. Mathina jaria ukurukagira niuntu bwa kuthingatiria dawa uria kubaterie.

III. Worirua/ wakurukira dawa.

Gacunci 4: Kugarura mukarire/muturire.

I. Kunywa thigara na ncoobi.

II. Gutungatira kilo na murire.

III. Murire jwaku.

IV. Kugarura Murire.

V. Mathina jaria wonaga gukurukira kumenyeera murire.

Miceetho.

- Mutaratara jwa miceetho.
- Kugarura mantu ja miceetho.
- Mathina jaria wonaga niuntu bwa kuthingatira mutarara jwa miceetho.

Gacunci 5: Gutungatira Kuthima gwitia kwa tharike wengwa.

- Kuthingatiria kuthima.
- Niatia na nimbi utumagira kuthima.
- Uria uthomaga na kuthithia na ithimi.

Gacunci 6: Kunyiyia gucumbuka mathuganio na njira cia uria umba kuthithia.

- Njira cia gutungatira gucumbuka kwa mathuganio.
- Mawega ja njira iu.
- Mpang'i cia utethio/ kugwatwa mbaru.

- Mbereca mpang'i cia utethio (nja yaku, antu ba ntuura, ariti ngugi ba ugima bwa mwiri) iria withiritwe uri nacio iria igutetheretie kumenyeria gukara na gwitia kwa tharike.

Gacunci 7: Biria brigagiria na bitethagiria kuumba kwimenyeera wengwa.

- Mithangiko gukurukira kwimenyeera.
- Nimbi igutetheretie womba kwimenyeera wengwa kiri manu ja gwitia kwa tharike?

Kuthiria Conclusion

Kuri mantu jangi uringienda kwaria gukurukira kwimenyera igita igita ria gwitia kwa tharike na utungata bwa nja?

Kuri u urinigienda kwira ariti ngugiba ugima bwa mwiri kenda bomba gutungatira bwega antu baria bari na gwitia kwa tharike ta ugwe?

Appendix D: Health Care Workers' Questionnaire

Section 1: Demographic information

1. Gender
    - Male
    - Female
    - Other
2. Age Group
    - 21-30 years
    - 31-40 years
    - 41-50 years
    - 51-60 years
    - 61 years and above
3. Profession
    - Physician
    - Medical Officer
    - Nurse
    - Clinical Officer
    - Others (please specify):
4. Years of experience in managing hypertension
    - Less than 1 year
    - 1-5 years
    - 6-10 years
    - more than 10 years
5. What is your primary location of work?
    - Outpatient

- Medical Ward
- Non- Non-Communicable Disease (NCD) Clinic

Section 2: Knowledge on hypertension management

1. What is the current definition of hypertension?
    a) Systolic BP >140mmHg and/or diastolic blood pressure >90mmHg
    b) Systolic BP of >130mmHg and/or diastolic BP >80mmHg
    c) Systolic BP >120mmHg and Diastolic BP >80mmHg
2. What are some of the cardiovascular risk factors associated with hypertension? (Select all that apply).
    a) Family history of premature CVD.
    b) Smoking
    c) Obesity
    d) High salt intake
    e) Physical inactivity.
3. What are the lifestyle modifications recommended for the management of hypertension? (Select all that apply).
    a) Reduce salt intake
    b) Increase physical activity.
    c) Maintain a healthy weight.
    d) Limit alcohol consumption
    e) Quit smoking
    f) Eat a healthy diet.
4. What is the recommended daily salt intake for patients with hypertension?
    a) <1000mg
    b) <1500mg

c) <2000mg

d) <2300mg

5. What are some common medications used to treat hypertension? (Select all that apply).

   a) ACE inhibitors

   b) ARBs

   c) Beta Blockers.

   d) Calcium channel blockers.

   e) Diuretics

6. What is the most recommended first-line medication for hypertension?

   a) ACE inhibitor

   b) ARB

   c) Thiazide diuretics

   d) Calcium-channel blockers.

7. What are some potential complications of uncontrolled blood pressure? (Select all that apply).

   a) Stroke

   b) Heart attack

   c) Kidney disease

   d) Vision loss

   e) Peripheral artery disease.

8. Give the recommended follow-up schedule for a patient with newly diagnosed hypertension.

9. What is the recommended target blood pressure for patients with hypertension on treatment?

a) <120/80mmHg

b) <130/80mmHg

c) <140/90mmHg

d) <160/100mmHg

Section 3: Attitude Assessment

a) To what extent do you agree or disagree with these statements? (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree).

- Hypertension is a serious condition that requires medical attention.
- Lifestyle modifications alone are sufficient to manage hypertension.
- Hypertension is a common condition, but it's not a major health concern.
- Patients with hypertension are encouraged to self-medicate.
- Regular blood pressure monitoring is important for managing hypertension.
- Hypertension management is a shared responsibility between healthcare workers and patients.

b) To what extent do you think patients understand the importance of managing their hypertension? (Not at all, somewhat, moderately, very much).

Section 4: Practices in managing hypertensive patients?

1. How frequently are patients screened for hypertension in your facility?
    - Every visit
    - Only when symptomatic
    - Occasionally
    - Rarely
    - Never
2. When you suspect a patient has hypertension, what are the first steps you take?

3. What resources do you use to stay up-to-date on hypertension management guidelines?
4. How often do you counsel patients on lifestyle modifications for hypertension?
    - Never
    - Rarely
    - Sometimes
    - Often
    - Every encounter with the patient.
5. What are the most common methods you use to assess a patient's blood pressure?
6. What are the most common medications you prescribe for hypertension?
7. How do you assess patients' adherence to their hypertension management?
8. How confident are you in your ability to diagnose and manage hypertension? (1-10 scale, 1 being not confident at all, 10 being very confident).
9. What are some of the barriers you face in effectively managing hypertension in your practice?
10. What are your biggest challenges in managing hypertension in your practice?
11. Which guidelines do you use in managing hypertension in your facility? ----------

    ---

    ---
12. What suggestions would you have for improving hypertension management in your healthcare setting?

Thank you for your participation.

Appendix E: Medical Records Checklist

Patient Clinic Number/Record Number:

Date of data collection: _____

Collected by: _____

STEP 1. Demographic Information

1. Age

2. Gender

- Male
- Female
- Other

. 3. Marital status

- Single
- Married
- Widowed/widower
- Divorced/separated
- Other

4. Education status

- Primary
- Secondary
- Post-Secondary
- None

5. Employment status

- Employed
- Self employed
- Unemployed

- Other

1. Body Mass Index

- BMI >25
- BMI < 25

Section 2: Diagnosis of Hypertension

1. Blood pressure measurement recorded for both arms at most 1 to 2 minutes apart. Yes No

2. BP measurements recorded in the last three visits before the development of stroke. Yes No

3. BP readings each visit:

- 1st Visit----------
- 2nd Visit----------
- 3rd Visit……..

iv. BP is classified according to the guidelines. A. Normal B. Optimal C. Elevated

D. Grade 1 HTN E. Grade 2 HTN F. Grade 3 HTN

Section 3: Cardiovascular disease risk factor stratification for hypertension management.

- Levels of systolic and diastolic BP
- Smoking
- Alcohol use
- Dyslipidemia
- Total Cholesterol >5.1mmol/l or LDL > 3mmol/l or HDL men < 1mmol/l, women <1.2mmol/l
- Diabetes mellitus men >55 yeas, women > 65 years

- Family history of early onset of CVD: Men aged < 55 years, women aged <65 years
- Waist circumference: abdominal obesity, men≥102cm, women ≥88cm

Section 4: Laboratory and diagnostic tests

- Lipid profile. Done Not Done
- Blood Sugar (fasting/ Random). Done Not Done
- Renal Function tests (electrolytes, creatinine, and urinalysis). Done Not Done
- ECG if indicated.

Section 5: Management of Hypertension

- Type of treatment

- Lifestyle medication only
- Antihypertensive medications (Specify)
- Both

- Medication Adherence Documented. Yes No
- Presence of side effects noted and managed. Yes No
- Referral to a specialist if indicated. Yes No

Section 6: Patient education and follow-up

- Counselling is provided at every visit:
  - Hypertension and management.
  - Stop alcohol use.
  - Stop all forms of tobacco use.
  - Daily exercise, at least 30 minutes of moderate to intense dynamic aerobic exercise.
  - Diet and nutrition

- Medication adherence.
- BP self-monitoring.
- Return to the clinic if unwell or experience new symptoms.

- Duration of follow-up visits
- Assessment of hypertensive crisis (BP >180mmHg/120mmHg) and appropriate management.
- Evidence of follow-up visits and continuity of care. Yes No
- Next appointment dates given. Yes No

Comments----------

Appendix F:Code Book

Code & sub codes #	Short code description	Detailed Code description	Typical verbatim exemplary
1.0	**Patient adherence**		
1.1	**Follow-up adherence**	Making sure the participant keeps going back to the clinic as advised by the doctor.	Participant 01: "I can follow this month, two months, then the other month you miss money and it follows with the other month. Participant 01: "I go to general and I attend clinic even now, unless when there is no money, I refuse (fail) to go, when I get money I go"

1.2	**Lifestyle Modification Adherence**	Participant doing what he was taught on changes in the way of living	Particpant 04: "..but I was told to stop drinking alcohol or smoking cigarette. But I reduced not to stop completely…" Participant 04: "…, I changed because even as they eat other food, they cook for me food special, with no salt, no much fat, like that" pant 03: "Cooking many sufurias because at times firewood is becoming a problem and eating habits becomes a problem, so I cook together and we eat the same food.

	Medication Adherence	Participant taking drugs a advised	Participant 03: “If I forget in the morning I drink in the evening. If I take today in the morning and I know I forgot today without taking, I take in the evening and know that rather than taking tomorrow morning, it is the following evening that I will drink so that they flow”. Participant 02: “sometimes due to work when I come at night I forget to take and other times in the morning, when the customer wakes me while I am asleep (calls me early for work), I get out faster. I can’t say I was correct, sometimes I passed (missed) those drug”
2.0	**Health education**		

2.1	**Un-structured Learning**	Participants report on community coming together to share health practices.	Participant 01: “Yes we tell each other a lot in the group. There are some who say when you are travelling always have biscuit or sweet the way you won’t get late with time to throw something in your mouth (eat something)”

2.2	**Structured Learning**	Any advice the participant has received for managing BP from healthcare worker	Participant 02: “He had told me that when it is normal, it is supposed to be 140/80, but he has never told me in-case it was high what I am supposed to do”. Participant 01: “When I knew I have pressure, the doctor stopped me from getting angry, he told me to take a lot of water, and I take water normally and sometimes I do forget but I try so much to take water because of pressure. I should not eat much late” Participant 01: “There are some who say when you are travelling always have biscuit or sweet the way you won’t get late with time to throw something in your mouth (eat something), because someone with pressure also gets hungry, acid, so we try a lot. Some say even their pressure got finished (healed), because of taking care of her body.
3.0	**Healthcare systems**		

3.1	**Healthcare accessibility**	Ability of the participants to reach or receive the service sought at the hospital	Participant 01: “”There are these village hospitals that don’t have measurements (BP and laboratory)”.
3.2	**Healthcare improvement**	Participants' input on how to better healthcare system	Participant 02: “The government or the hospital can assist to have these measurements (BP checks) in the village, and there are some people measuring (checking BP)and they are not charging, they do it for free”
	Inconsistent Drug and diagnostic supply/access	Having no drugs or measurement at the hospital	Participant 01: “we see someone has used fare and is coming from far, drugs are missing, investigations does not come well (some missing…” pant 01: “sometimes drugs are not at the hospital, they are written (prescribed) and one goes to buy”.

3.4	**Healthcare Transparency**	Healthcare worker and participant giving clear, honest and easy to understand information about healthcare services.	Participant 02: “I have never told the doctor I do forget, but was telling him I drink drugs well as expected”.
3.5	**Healthcare workers Shortage**	Lack of enough healthcare workers to meet the demand of the participants.	Participant 01: “Sometimes the doctor are pressed by so many people’’. Participant 4: “…..at least they have enough doctors, because you go and get the doctor is one, you stay there for long….”
4.0	**Self-Management**		
4.1	Barriers to self-care	Things that make the participant not to strictly follow what he has been instructed	Participant 02: “There was too much work, hence I didn’t get time to do some of the things the doctor told me to do”.

4.2	Self-care facilitators	Things that make the participant to exactly follow what he has been instructed.	Participant 01: “For me the work that I do at home, I cook well and we keep on eating, I will not be getting tired asking where they will come from, I see (get) all what I want my husband is okay, so BP will not go high and I won’t feel tired”.
4.3	Self-monitoring of BP	Participants' checking of blood pressure by self at home.	Participant 03: **Interviewer:** “You were not measuring?” **Interviewee:** “No” when I was given drugs that time, I was not told. I was told only that I have pressure, was given drugs and that’s all.” Participant 03
4.5	Stress Management	Ways the participant use to handle disturbing issues	Participant 02: “When I was getting annoyed by something, there is nothing I was doing but was keeping quiet and cooling my mind
4.6	Benefits to self-care	The good things that the Participants' get from taking care of themselves.	Participant 08: “You will fail to do them because, for example, you are from work and not that you have anything a lot, vou don’t have monev to buv

5.0	**Support Systems**		
5.1	Community Support	Help or care the participant received from people or group in a community the time he had hypertension.	Participant 01: "Lydia (neighbor) could tell me to stop joking with drugs they are not good. So we kept on talking and with that woman, they gave me strength and that is when I took time to use
5.3	Family support	Family assistance in participants management of hypertension	Participant 03: "Yah, it is trying to look for myself because the children were small and there is no one who could help me."
5.4	Healthcare workers support	Health professionals role in assisting the participant manage Hypertension.	Participant 02: "Only when I am in the hospital, I am helped to be explained what am supposed to do"
	Socioeconomic Status		

	Financial Constraints	of money that makes It hard for the participant to buy medicine, eat healthy, go for go for check-ups, or follow doctor's advice	Not Not all of them, you get half and the ones that are expensive you will go to buy outside. And as you buy expensive, you don't have cash, so you will try and buy half. Now for example, there are some drugs I was told to drink (take) another day, I bought for two weeks, then I send someone for the other two weeks. So I drank for two weeks, I stayed for two days and got someone to send and the cost is high, and going myself to buy I won't get the transport, so you will try and see how you send someone. You bypass (skip) several days before you reach (get) them." Participant 05

Appendix G:Mustic Conference Presentation Abstract

NAME: PURITY KATHAMBI MATHIU

REG NO: NS401/203067/22

SUBTHEME: NURSING

TOPIC: DETERMINANTS OF HIGH BLOOD PRESSURE MANAGEMENT AMONG PATIENTS EXPERIENCING STROKE: A CASE OF MERU TEACHING AND REFERRAL HOSPITAL

SUPERVISORS: DR MARYJOY KAIMURI & DR PETER KAILEMIA.

ABSTRACT

Introduction: Non-communicable diseases (NCDs) are a major cause of illness globally, with 77% of NCD-related deaths occurring in low- and middle-income countries. Hypertension is a key contributor to cardiovascular diseases and a leading cause of mortality in Kenya. The risk of stroke has increased significantly, with 1 in 4 people expected to experience one in their lifetime (World Stroke Day 2022). This study aimed to identify determinants affecting blood pressure management among hypertensive patients experiencing stroke at Meru Teaching and Referral Hospital (MeTRH), and to evaluate current management strategies. The objectives were to determine the prevalence of hypertension/stroke comorbidity, explore patient experiences with self-management programs, and determine the quality of hypertension healthcare delivery at MeTRH.

Methods: A mixed-methods approach with a convergent design was used. The study was conducted at MeTRH's outpatient department, medical wards, and non-communicable disease clinic. Participants included 42 healthcare workers, 80 stroke patient files, and 10 hypertensive patients who later developed stroke. Data was collected using medical checklists for patient files, questionnaires for healthcare workers, and interviews for qualitative insights.

Findings: The prevalence of stroke as complication of uncontrolled hypertension was higher in females and the elderly (mean age 58.6). Many healthcare workers at MeTRH had limited experience in hypertension management (47.4% with less than five years). Knowledge gaps existed among healthcare workers regarding hypertension management (only 18.4% knew the current definition). Regular blood pressure screening was common (94.7%), and lifestyle modification counselling was frequently provided. However, non-adherence was a major barrier to effective management, with self-care practices hindered by work demands and financial constraints.

Conclusion: Stroke as a complication of hypertension is more prevalent among females and the elderly, compounded by limited experience and knowledge among healthcare workers. Despite regular screening and counselling, patient adherence to self-care is a significant challenge due to work and financial constraints, hindering effective hypertension management. Addressing these factors is crucial for improving blood pressure control and preventing stroke.

Keywords: Hypertension, stroke, comorbidity, self-care management, Healthcare workers.

Appendix H: Publication

AFRICAN JOURNAL OF SCIENCE, TECHNOLOGY AND SOCIAL SCIENCES, 4 (2) 2025, PAS 117-127 OPEN ACCESS

AFRICAN JOURNAL OF SCIENCE, TECHNOLOGY AND SOCIAL SCIENCES

Journal website: https://journals.must.ac.ke

A publication of Meru University of Science and Technology

Determinants of high blood pressure management among patients experiencing stroke: a case of Meru Teaching and Referral Hospital

Purity Kathambi Mathiu[1], Maryjoy Kaimuri[1], Peter N. Kailemia[1]

[1]Meru University of Science and Technology, Meru, Kenya

ARTICLE INFO

Keywords:

Hypertension

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Blood pressure management

ABSTRACT

Hypertension remains the most significant modifiable risk factor for stroke worldwide, accounting for nearly half of all stroke cases. In Kenya, hypertension prevalence has steadily increased, contributing to a high burden of stroke-related disability and mortality. This study investigated the determinants of high blood pressure management among patients with hypertension who developed stroke in MeTRH. Using a mixed-methods convergent design, data was drawn from 80 systematically sampled stroke patient records, 42 stratified sampled healthcare workers, and 10 purposively selected hypertensive stroke patients. Data collection employed medical record checklists, self-administered questionnaires, and interview guides. Quantitative data was analyzed using SPSS V25, and thematic analysis via NVIVO for qualitative interviews and integrated with quantitative findings. The findings revealed, prevalence of hypertension-stroke comorbidity was significantly higher among older adults (mean age= 58.6) and females (67.5%), with poor adherence to treatment and lifestyle modification serving as key risk factors. Healthcare system delivery was constrained by inadequate diagnostic resources, shortages of antihypertensive drugs, and limited provider expertise, with nearly half of healthcare workers reporting less than five years of experience in hypertension management, and only 18.4% identified correct definition of hypertension. No statistically significant association between healthcare delivery and blood pressure control (p=0.308). In conclusion, effective hypertension management is hindered by poor patient adherence, inadequate health system delivery, and insufficient provider experience. Strengthening counselling, standardizing care guidelines, and improving access to diagnostics and affordable medications are recommended. Improving both patient-level and system-level determinants of hypertension control is crucial to reducing stroke burden in resource-limited settings

Introduction

Hypertension is a global public health concern, affecting approximately 1.28 billion adults worldwide, with nearly two-thirds residing in low- and middle-income countries (World Health Organization, 2021). It remains the most important risk factor for cardiovascular diseases, particularly stroke, contributing to over 9.4 million deaths annually (Adomako et al., 2021). Stroke is the second leading cause of death globally and the leading cause of disability, with 1 in 4 people expected to experience a stroke in their lifetime (Feigin et al., 2021)

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Appendix I: Plagiarism report

DrillBit

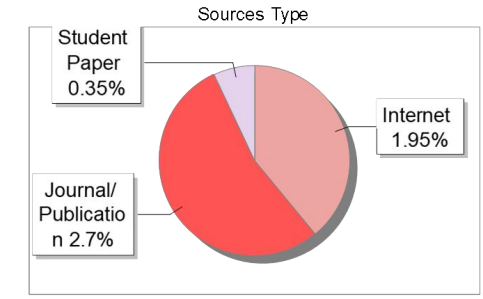
The Report is Generated by DrillBit Plagiarism Detection Software

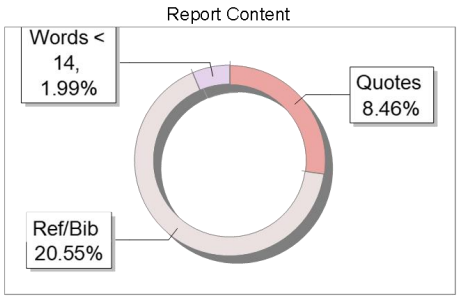
Submission Information

Author Name	PURITY KATHAMBI MATHIU
Title	DETERMINANTS OF HIGH BLOOD PRESSURE MANAGEMENT AMONG PATIENTS EXPERIENCING STROKE: A CASE OF MERU TEACHING AND REFERRAL HOSPITAL.
Paper/Submission ID	4282636
Submitted by	mmusungu@must.ac.ke
Submission Date	2025-08-26 16:15:05
Total Pages, Total Words	199, 40276
Document type	Thesis

Result Information

Similarity **5 %**





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Internet or Web	Yes
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APPENDIX J: NACOSTI research permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **102609**

Date of Issue: **15/April/2025**

RESEARCH LICENSE

This is to Certify that Ms.. PURITY KATHAMBI MATHIU of Meru University of Science and Technology, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Meru on the topic: Determinants of high blood pressure management among patients experiencing stroke: A case of Meru Teaching and Referral Hospital for the period ending : 15/April/2026.

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APPENDIX K: MIRERC approval letter

MERU UNIVERSITY INSTITUTIONAL RESEARCH & ETHICS REVIEW COMMITTEE
(MIRERC)
Email: mirerc@must.ac.ke ***Website:*** *https://research.must.ac.ke/research-ethics/*

Ref: MU/1/39/28 Vol.3 (151) Date: 7th March 2025

To: **Purity Kathambi Mathiu** (MSc. Nursing - MUST)

Dear Sir/madam

RE: Determinants of High Blood Pressure Management Among Patients Experiencing Stroke: A Case of Meru Teaching and Referral Hospital.

This is to inform you that ***MIRERC*** has reviewed and approved your above research proposal. Your application approval number is ***MIRERC 056/2024.*** The approval period is ***7th March 2025 – 6th March 2026.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***MIRERC***.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***MIRERC*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***MIRERC*** within 72 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***MIRERC***.

You may also be required to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI), visit: https://research-portal.nacosti.go.ke and also obtain other clearances that your study may require.

Yours sincerely

Prof. Peter Masinde, Ph.D.
Chairperson, MIRERC