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THE ROLE OF HEALTH LITERACY ON HYPERTENSION AND MEDICATION ADHERENCE IN BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS IN EASTERN HARARE

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BY

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Abstract

Hypertension is a leading cause of non-communicable disease mortality and morbidity globally. This is despite that blood pressure can be controlled optimally through lifestyle modification and good medication adherence. Knowledge of disease and medication adherence are key factors in hypertension control. However, the knowledge of disease and adherence in hypertension patients treated at City of Harare clinics is not known. Harare faces a heightened burden of hypertension. An analytical cross-sectional study was conducted among adults(>18years) with hypertension receiving treatment in Harare East clinics from December 2024 to February 2025. Systematic sampling was used to select study participants, and a pre-tested interviewer administered questionnaire was used to collect data-on demographics, hypertension knowledge, and medication adherence. Patient clinical records were used to obtain blood pressure values and chi-squared tests were used to determine associations between study variables. Among 161 participants (mean age 57.7 years, 75.8% female), 52.8% had good hypertension knowledge, and 31.7% demonstrated good medication adherence. While most knew hypertension symptoms (95%), knowledge gaps existed regarding the nature of hypertension as well as lifestyle factors. A significant association was found between employment status ($p=0.024$) and educational attainment ($p=0.003$) with medication adherence, where higher education and being employed correlated with better adherence. Significantly, medication adherence was strongly associated with good BP control ($p<0.001$) There was a significant association between knowledge of hypertension disease, and medication adherence. No significant association however was observed between hypertension knowledge and BP control ($p=0.300$). Hypertensive patients in the Eastern District of Harare generally possess good knowledge of hypertension symptoms but exhibit knowledge deficits regarding the nature of hypertension including normal blood pressure values and lifestyle management factors. Whilst good medication adherence significantly impacts BP control, most participants showed average medication adherence. Good adherence is influenced by employment and education. Interventions targeting improved medication adherence, particularly among unemployed and less educated individuals, are crucial for effective hypertension management.

Key words

Hypertension; medication adherence; blood pressure control; lifestyle modification; health literacy

Declaration

I, Hilda Wandayi, do hereby declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another University for the award of the degree.

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List of Abbreviations and Acronyms

BP	Blood Pressure
DNO	District Nursing Officer
HL	Health Literacy
HPT	Hypertension
LMC	Low Middle-Income Countries
MMAS	Morisky Medication Adherence Scale
NCD	Non-Communicable Diseases
NGO	Non-Governmental Organization
PHC	Public Health Care
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

Definition of key terms

Hypertension (high blood pressure)- This is when the pressure in your blood vessels is too high (140/90mmHg or higher)

Hypertension knowledge- Understanding of what hypertension is, its causes, risks, symptoms, diagnosis, treatment and management

Medication adherence -The degree to which a person's behavior corresponds with taking medication optimally as prescribed by health practitioner

Lifestyle modification -Compliance with a healthy lifestyle including weight control, engagement in physical exercises, salt restriction, smoking cessation and restriction of alcohol consumption.

Non communicable disease- A disease that is not transmissible from one person to another

Health literacy-The ability of individuals to gain access to and use information in ways which promote and maintain good health for themselves, their families and communities (WHO, 2024)

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CHAPTER 1 INTRODUCTION

1.1. Introduction

Knowledge of hypertension disease condition, as well as knowledge of prescribed drugs and lifestyle modification is critical to achieve blood pressure control among people living with hypertension. Hypertension, also known as high blood pressure, is a specifically defined chronic clinical syndrome whose effective control requires adherence to defined pharmacological and non-pharmacological interventions (WHO, 2021). Adherence, however, depends on one's understanding of the disease condition.

The likelihood of improved adherence to medicines and lifestyle modifications is increased when patients have good understanding of the disease affecting them (Paczkowska, 2021). Assessments of knowledge of the disease condition, prescribed drugs and lifestyle modification are therefore a plausible way to gauge the impact of hypertension management services at health facilities.

Various studies point to a relationship between knowledge of hypertension and adherence to medication leading to improved blood pressure control for patients (Asgedom et al., 2018; Jhaj et al, 2018; Adomako et al, 2021). Patients who have a good knowledge of hypertension are expected to have a better understanding of essential aspects of the disease such as its asymptomatic nature, need for adherence to long term lifestyle changes, and importance of persistence with medication. These patients are therefore more likely to be compliant with management and have better treatment outcomes. (Akoko et al., 2017).

The aim of this study was to determine the role of patients' knowledge of hypertension, including its nature, treatment, and lifestyle factors that influence disease management. The study explored the relationship between this hypertension knowledge and treatment outcomes, with the view that better understanding correlates with improved adherence to management strategies, which in turn lead to improved treatment outcomes.

The study focused on adult patients attending outpatient primary health care facilities in the eastern district of the City of Harare, to determine how hypertension disease literacy and medication adherence may impact blood pressure control. Understanding patients' comprehension of their disease condition and medicines, is essential for preventing hypertension related health risks as well as for improving blood pressure control outcomes.

1.2 Background to Study

Despite global health efforts to detect and control hypertension, the condition is the leading preventable risk factor for death in adults. Globally 1·28 billion adults aged between 30 and 79 have hypertension (HTN), (WHO,2010). Hypertension is the commonest modifiable risk factor for stroke (cerebrovascular accident), ischemic heart disease, retinopathy, nephropathy, and peripheral vascular disease accounting for 10·8 million deaths (Law et al 2003; WHO, 2010; Gafamane-Matemane et al, 2024). The World Health Organization (WHO ,2021) estimates that one in three adults is affected by hypertension, with an alarming four out of five individuals not receiving adequate treatment. In low or middle-income countries (LMIC's) like Zimbabwe, the prevalence of

hypertension correlates with rising NCD rates, disability, reduced quality of life and escalating health care costs.

Zimbabwe faces the challenge of overcoming the dual burden of communicable diseases whilst addressing rapidly rising non-communicable disease (NCD) rates including hypertension. The estimated disease prevalence of 46% in the country exceeds the global prevalence of 19% (WHO, 2019). The rapid rise of lifestyle related diseases such as hypertension can be attributed to the epidemiological transition and rapid urbanization occurring in developing urban cities including Harare. These unavoidable elements of population growth are proponents of lifestyle factors such as poor dietary habits, sedentary lifestyles, increased stress and limited physical activity which increase disease rates globally, and in Zimbabwe (Sabapathy et al,2024).

Management protocols of hypertension are well established, and control of hypertension involves the use of one or more antihypertensive drugs and adoption of indicated lifestyle factors. Both lifestyle modifications and hypertension drug therapy need to be adhered to throughout one's life for effective disease control (Akoko et al, 2017). However, despite overall global improvements in hypertension management, and the presence of medicines and cost-effective lifestyle measures to control the disease, disease control rates remain poor.

Health literacy is central to the management of all diseases including NCD's such as hypertension, and improvement of knowledge and behaviors is often the focus of different public health campaigns. In the management and control of HTN, patient's knowledge

about their condition plays a pivotal role in adherence to prescribed medication regimens. However, most people with hypertension have inadequate knowledge about their condition and do not control their blood pressure (BP) optimally (Hendricks, 2012; Mugomeri et al, 2013). Findings from a study in Zimbabwe carried out in Matabeleland South, by Chimberengwa and Naidoo (2019) further cement that the biggest barrier to HTN prevention, diagnosis, and control is the lack of knowledge and awareness among hypertensive patients.

Knowledge influences behavior, and evidence indicates that patients with a robust understanding of hypertension are more likely to engage in proactive health behaviors, adhere to medication schedules, and maintain regular follow-ups with healthcare providers. (Asgedom et al, 2018; Jhaj et al, 2018; Adomako et al, 2021). Conversely, lack of knowledge often results in poor adherence, leading to suboptimal blood pressure control and increased risk of cardiovascular events (Chimberengwa and Naidoo, 2019; Mutowo et al, 2015).

For better management and control of HTN, the knowledge status of hypertensive patients should be studied and understood well. However, in Harare, Zimbabwe's most populous city, a research gap was noted. Little was known about the levels of knowledge on hypertension disease, medication adherence, and their impact on blood pressure control among hypertensive patients who receive treatment at primary care clinics in the city of Harare City. This is against the background of a large population facing the risk of hypertension and its effects.

In 2022, municipal primary care clinics in the City of Harare attended to approximately 43,000 adults aged between 18 and 79 with hypertension (City of Harare Annual Health Report, 2022). Despite this the city lacks a dedicated NCD department or established formal program to manage NCD's or hypertension despite the burden imposed on patients, local communities and public health services. It is therefore paramount to address factors that contribute to poor hypertension control by addressing preliminary determinants such as knowledge of disease and related factors.

This study sought to assess the role of health literacy on hypertension, and medication adherence on blood pressure control among hypertensive patients in Harare Zimbabwe. The study also aimed to determine the relationship between this literacy and treatment outcomes, hypothesizing that better knowledge correlates with improved adherence to management strategies. Additionally, the study sought to evaluate socio-demographic factors related to patients' knowledge and propose strategic recommendations to enhance hypertension literacy among patients in Harare

1.3 Statement of the Problem

Hypertension is the most common NCD presenting to outpatient departments, and the leading cause of cardiovascular diseases and death in Zimbabwe (Mutowo et al, 2015). Hypertension is a lifelong condition with debilitating effects on physical and mental health as well as quality of life. Appropriate pharmacological therapy, as well as modification of identified lifestyle risk factors, are key to reducing disease related morbidity.

The evidence points to African countries facing the highest disease burden globally including in Zimbabwe. This is despite notable global advancements in hypertension management and the availability of effective pharmaceutical interventions along with lifestyle modifications strategies. In City of Harare clinics, NCD's including hypertension are the leading cause of death in the 45-64 years and 65+ age groups accounting for 17% of total deaths in both age groups respectively in 2022 (City of Harare, 2022).

Hypertension disease risk is high in Harare, experiencing rapid urban and population growth as well as increased adoption of lifestyle factors that increase disease susceptibility. For timely interventions in the management of this growing public health concern, particularly in LMIC's with struggling health systems, addressing immediate factors such as health literacy and patient knowledge of disease, and medication adherence could have greater impact on blood pressure control within populations.

Despite the continued rise in hypertension there exists a gap in Zimbabwe, and particularly Harare, on the role of hypertension disease knowledge levels and medication adherence on blood pressure control amongst patients accessing treatment services. Knowledge is an important determinant of hypertension (HPT) related habits and activities. Understanding patient knowledge and literacy is therefore vital to drive evidence-based interventions, including national policies to tackle this impending public health crisis.

This study aimed to bridge the mentioned knowledge gap by investigating the role of patient hypertension literacy, and medication adherence on blood pressure control among hypertensive patients in City of Harare clinics. By assessing current knowledge levels of patients on hypertension disease and current medication adherence patterns, this research provided insights into how knowledge and health literacy can be leveraged as a tool for better management of hypertension

1.4 Research Objectives

1.4.1. Broad Objective

The broad objective of this study was to evaluate the role of health literacy on hypertension and medication adherence in blood pressure control among hypertensive patients in Eastern Harare, December 2024- February 2025.

1.4.2. Specific Objectives

This study specifically sought to:

i. To determine the levels of knowledge of hypertension disease among patients receiving treatment at Eastern district City of Harare clinics from December 2024 to February 2025.

ii. To determine the levels of hypertension medication adherence among patients receiving treatment at Eastern district, City of Harare clinics from December 2024 to February 2025.

iii. To examine the relationship between knowledge of hypertension disease and blood pressure control among patients receiving treatment at Eastern district, City of Harare clinics during the period December 2024 to February 2025.

iv. To examine the relationship between medication adherence and blood pressure control among patients receiving treatment at Eastern district City of Harare clinics during the period December 2024 to February 2025.

v. To examine the relationship between knowledge of hypertension disease, and medication adherence, among patients receiving treatment at Eastern district City of Harare clinics during the period December 2024 to February 2025.

1.5. Research Questions

The study sought to answer the following questions:

i. What were the levels of knowledge about hypertension disease among patients being treated at Eastern district City of Harare clinics between December 2024 and February 2025?

ii. What were the levels of knowledge about medication adherence among patients being treated at Eastern district City of Harare clinics between December 2024 and February 2025?

iii. What was the relationship between knowledge of hypertension disease and blood pressure control among hypertensive patients attending Eastern district City of Harare clinics during the period December 2024 to February 2025?

iv. What was the relationship between medication adherence and blood pressure control among hypertensive patients attending Eastern district City of Harare clinics during the period December 2024 to February 2025?

v. What was the relationship between knowledge of hypertension disease and medication adherence among hypertensive patients attending Eastern district City of Harare clinics during the period December 2024 to February 2025?

1.5.1. Assumption

This study assumed that higher levels of knowledge about hypertension disease and higher medication adherence levels correlate positively with improved blood pressure control. Limited knowledge of the condition and adherence will result in poor treatment outcomes.

1.6 Significance of study

Hypertension has emerged as a significant public health concern globally and in African cities such as Harare. The condition has the potential to cause serious health complications if left untreated. This study aimed to give possible insight on factors influencing patients' knowledge of hypertension, adherence to prescribed medications, and treatment outcomes,contributing to the development of targeted interventions to improve disease management and prevention.

1.6.1. Patients

Through understanding the factors that influence hypertension knowledge and medication, this study informed the development of evidence-based strategies to enhance patient outcomes. Improved knowledge of hypertension empower patients to make

informed decisions about their health and seek appropriate medical care. Through understanding the causes, symptoms, and potential complications of hypertension, patients can take proactive steps to manage their condition and reduce their risk of adverse events. Furthermore, by taking their prescribed medications as directed, patients can help to control their blood pressure, reduce the risk of complications, and improve their overall health.

1.6.2. Policy makers

The findings were shared with City Health policy makers to inform the development of public health policies, and health literacy programs aimed at addressing the burden of hypertension in Harare. Through identifying the key factors influencing level of knowledge, and assessing this against treatment outcomes, policymakers were able to implement evidence-based interventions that target knowledge and literacy, to improve hypertension management and prevention at a population level.

1.6.3. National and global knowledge base.

To the knowledge of the researcher there were no studies that assessed hypertension literacy or blood pressure outcomes in Harare, particularly in patients who accessed primary health care facilities in the city. Through providing insights into the experiences of patients in Harare, the study informed research and interventions in other Zimbabwean urban settings and African cities with similar demographic makeup.

1.7 Delimitations of the study

1.7.1. Time Frame

The study was conducted over a period of two months, from December 2024 to February 2025. The findings may not be representative of the situation at other times due to changes in healthcare policies, socioeconomic conditions, or cultural norms.

1.7.2. Focus of the study

This study specifically examined knowledge levels pertaining to hypertension disease condition and medications. Other factors that could influence hypertension management, such as access to healthcare services and the quality of care provided were not analyzed.

1.7.3. Geographical Scope

This study focused exclusively on adults attending outpatient clinic services in the Eastern district of the city of Harare, Zimbabwe, and did not extend to other districts within the city. The findings are not generalized to areas beyond the study geographical scope.

1.8 Limitations of the study

This study represented findings from one urban geographical setting in Harare, and did not represent areas with different socioeconomic settings, health care systems or levels of development. The study included only patients accessing primary health care (PHC) clinics and did not include private, non-governmental organization (NGO) funded, or other types of clinics. This study assessed the health literacy of hypertension in patients with an established clinical diagnosis, and did not capture the knowledge of patients living

with undiagnosed hypertension. Financial and time constraints related to the Africa University academic timetable limited the scope of the study.

1.9 Summary

This chapter outlined the magnitude of the hypertension epidemic and the need to advance hypertension specific public health initiatives in LMIC urban settings. The lack of knowledge of this condition can further exacerbate existing morbidity and mortality rates; thus, understanding the factors influencing patients' knowledge is essential for developing tailored interventions aimed at improving disease outcomes and reducing its associated public health consequences.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

This literature review investigated the effect of hypertension literacy and medication adherence on blood pressure control by focusing on key areas; knowledge and hypertension, medication adherence, factors associated with knowledge, and knowledge and blood pressure control. This review synthesized findings from both Zimbabwean and international literature.

This researcher gathered relevant literature using the Google search engine from PubMed, CINAHL, and Scopus, using several different search terms “hypertension, knowledge, hypertension in Zimbabwe, health literacy, medication adherence, hypertension medicine, blood pressure control, barriers and facilitators of hypertension control. The search revealed numerous articles, but also showed a lack of local studies that specifically assess the link between knowledge and treatment outcomes amongst hypertensive patients in Harare revealing a gap in literature. Table 1 below shows search engines and search terms.

Table 1: Search engines and search terms

Search Engines	**Search Terms/Codes**
Google	"hypertension," "knowledge of hypertension," "hypertension in Zimbabwe," "health literacy," "medication adherence," "blood pressure control," "barriers and facilitators of hypertension control"
PubMed	"hypertension," "hypertension in Zimbabwe," "medication adherence," "blood pressure control," "knowledge and treatment outcomes"
CINAHL	"hypertension knowledge," "hypertension in Zimbabwe," "health literacy," "medication adherence," "treatment outcomes in hypertension"
Scopus	"hypertension," "health literacy in Zimbabwe," "blood pressure control," "treatment outcomes in hypertension," "barriers to hypertension treatment"

2.2 Theoretical Framework

This section focused on the theoretical framework for the study on the role of knowledge on disease condition, and medication adherence on blood pressure control among patients on hypertension treatment at Eastern district City of Harare clinics. This research began by conceptualizing the Integrated model of health literacy formulated by Sorensen et al (2012), which was the selected theoretical framework for this study.

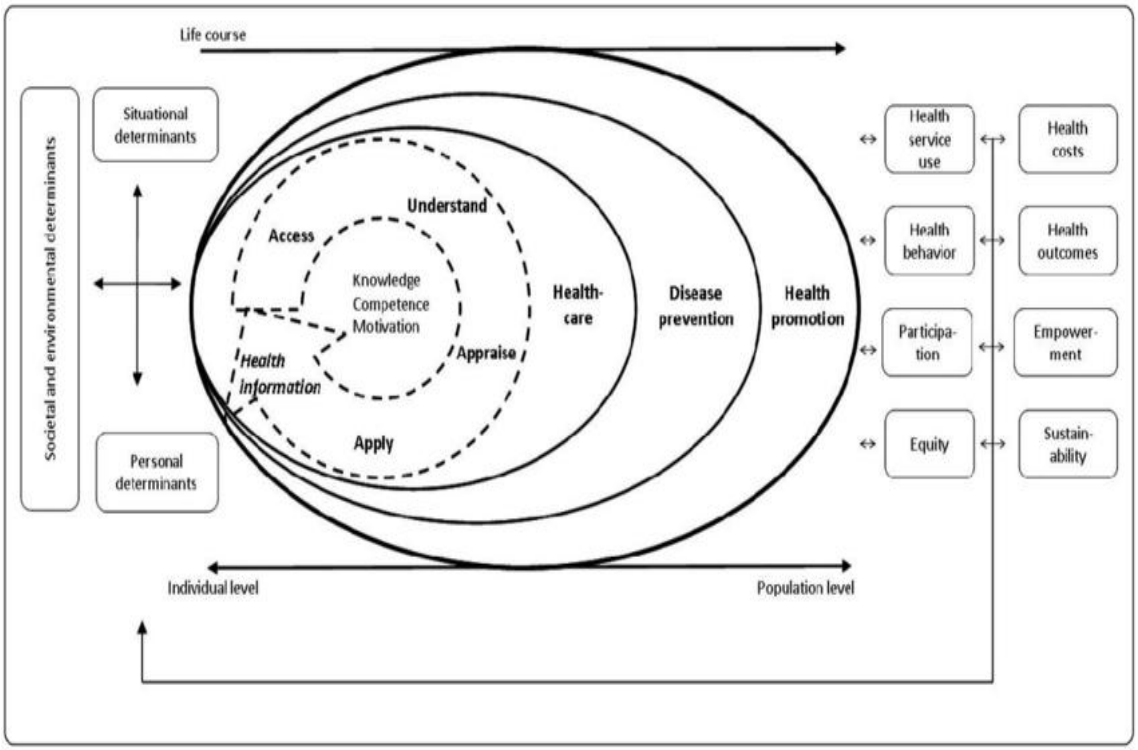

Figure 1: Sørensen et al.'s Integrated model of health literacy 2012

This model resulted from the integration of different definitions of and conceptual models of health literacy. The model outlines the core dimensions of health literacy coupled with a logical model outlining proximal and distal determinants of health literacy and a pathway that connects health literacy to health outcomes (Sorensen et al 2012). Health literacy is therefore a process linked to an individual's cognitive and psychological capabilities as well as the quality of information the individual receives (Sorensen et al ibid). This process also integrates the well-known functional, interactive and critical levels of health literacy defined in 2000 by Nutbeam.

The Nutbeam model acknowledges knowledge as a critical element of health literacy, the presence or lack thereof being influential in attaining health related goals. HL is a competency that allows individuals to perform knowledge-based tasks for increased autonomy and personal empowerment in health matters (Nutbeam, 2017). Health Literacy (HL) is strongly associated with knowledge, competence and motivation to obtain, understand, evaluate and apply health information. Knowledge involves acquiring, processing and appraisal of information to build competencies that enable people to navigate different domains of healthcare. Health related contextual demands change with time resulting in increased health literacy competencies that are applied through life course.

This model also factors in the impact of societal and environmental determinants such as culture and language and personal determinants such as gender, age, the development of health literacy including external influences like peers, family and media. Limitations in knowledge and literacy can therefore be tackled by increasing patient education, simplifying health related activities for patients including medication instructions, exercise and diet prescriptions.

In sub-Saharan Africa, Chimberengwa and Naidoo (2019) noted that health literacy remains a pressing concern due to varying levels of education, socioeconomic disparities, and culturally influenced health beliefs. The applicability of the integrated health literacy model in these settings is strengthened by its focus on empowering patients through education and engagement, addressing not just clinical knowledge but also cultural factors

that may affect health behaviors. By understanding and addressing these diverse literacies, targeted interventions aimed at enhancing patients' knowledge about hypertension can be implemented.

The choice of the integrated literacy model as the theoretical framework is advocated due to its comprehensive approach to understanding the interdependence of the relationship between knowledge, patient engagement, social determinants and health outcomes (Baumeister et al 2021) Harare is a city where cultural and socio- economic contexts play significant roles in health management. Applying this theory can yield meaningful insights into how health literacy improvement initiatives directly translate to better health outcomes for hypertensive patients.

The concept of literacy in hypertension has been noted to bring together knowledge of hypertension and the action of behavior change (Konlan et al, 2023). Knowledge issues are just a component of health literacy, but important enough to be the first point of action in managing hypertension and ensuring good treatment outcomes. Keeping cognizant of the objectives of this research, which are to assess the impact of knowledge on disease and medication adherence on hypertension treatment outcomes, the integrated model of health literacy acknowledges the significance of knowledge in managing disease, serving as a valuable guiding framework.

Extent of knowledge has numerous determinants which place the individual at a certain knowledge level. The model outlines the existence of a pathway between knowledge and

literacy during the life course, and the role of environmental and social determinants on knowledge and motivation at the core of the model.

2.3 Knowledge of hypertension disease

Across studies similar themes occur in the components of what constitutes knowledge of hypertension. Different instruments have been used for assessment of knowledge, but recurring components include knowledge of above normal blood pressure values, knowledge of symptoms, and knowledge of risk factors (Wolde et al, 2024). Other variables assessed in determining knowledge include the need for drug adherence, chronicity of disease, lifestyle risk factors, missed doses as well as consequences of unmanaged hypertension including heart attack and cardiovascular accidents (Lugo Mata et al, 2017, Abu et al, 2018). This knowledge in patients with hypertension regarding their condition plays a pivotal role in effectively managing chronic illness, and in fostering self-care behaviors including adherence to pharmacological therapy (Giakoumides et al, 2014).

Knowledge is a critical component because it allows patients to identify and manage risk factors, and to make informed decisions with regards to drug adherence and lifestyle modification. Knowledge helps patients to recognize signs of developing disease and drug related complications. At the community level, knowledge allows patients to take a participatory approach to community health interventions related to hypertension. It is an attribute that can be regarded as important to empowering patients to manage disease through dispelling myths and inaccurate information and through allowing hypertensive patients to play a key role in community preventive and educational programs.

Numerous studies show that levels of disease knowledge vary amongst hypertensive patients with a tendency to lower levels amongst patients in low-income countries. In Maryland USA, Abu et al (2018) found that most patients in their study were knowledgeable about hypertension. However, in Ethiopia Wolde et al (2024), found that over half of participants in their study had poor hypertension knowledge, whilst in Zimbabwe Katsinde and Katsinde (2006) found low knowledge levels in Bindura (82.5%), whilst Chimberengwa et al (2019) found low levels of knowledge in a study in rural Matabeleland South.

In Poland 63% of patients in a study by Jankowska – Polanska et al (2016), showed poor knowledge of HPT, whilst in Cameroon Akoko et al (2017), found only 14% of participants to have good knowledge of hypertension. In a) Pakistan study, Saleem et al (2011), found only 0.8 % of their study participants to have sufficient hypertension knowledge. In Pakistan where lower levels of knowledge were noted, patients scored low on questions pertaining to systolic blood pressure versus diastolic blood pressure, symptoms of high blood pressure, and the effect of aging on development of hypertension (Almas et al, 2016).

Similarly in Venezuela low knowledge was found on the symptoms of hypertension, though patients scored well on the consequences of hypertension such as myocardial infarction and blindness. Patients were wrong in their belief that hypertension is curable, and that medication can be stopped when one feels better or that it should be taken only

during exacerbations (Lugo-Mata et al, 2017, Malik et al, 2014). These authors stated that many patients with hypertension do not understand that hypotensive medications should be taken throughout the course of life, as opposed to taking medication only during symptom exacerbations. Some of the reasons suggested for low awareness are low health and educational literacy levels, skepticism of medical advice, lack of counselling on hypertension and lack of credible health related information sources (Almatouq, et al 2023).

Socio-demographic variables influence hypertension knowledge although the findings on this vary within populations. Increased age, urban residence, length of disease duration, and fewer prescribed medications correlate strongly with elevated knowledge levels among patients with hypertension (Giakoumidikas, 2024), whilst others point to gender and income level as being related to knowledge (Elnaem et al, 2021). In an Ethiopian study by Kassahun et al (2020), the authors found that only 26.8% of patients had high knowledge about hypertension. Knowledge was higher in individuals working in government roles, who had higher educational literacy as well as in participants who had been on treatment for a longer duration of time. This is an important finding which can help policy makers draft appropriate messages tailored to the literacy levels of different populations.

Studies to ascertain knowledge of hypertension in Zimbabwe are limited, hence the knowledge level within the population is not clear. In one study in a rural Zimbabwean setting, Chimberengwa and Naidoo (2019) found low levels of knowledge among

participants, with knowledge deficits on the causes and symptoms of hypertension, with increased knowledge related to higher level of formal education. In contrast Mushamba and Salissou (2023), found a significantly high level of knowledge with 80% of participants in an urban setting showing good knowledge of hypertension. The disparity between an urban and rural setting could be due to educational literacy in patients, or to the knowledge and professional skills of health workers attending to these patients and the quality of information they give to patients. The amount of knowledge and education imparted to patients could be linked to volumes of patients attending health facilities, which could determine the amount of time spent on health education by health professionals.

Health literacy is a vital component in disease management, and knowledge of disease is central to literacy. In management of hypertension, knowledge influences health literacy and adherence to treatment. A strong relationship exists between clients' level of health literacy and adherence to treatment. Knowledge of the many factors of the disease and of control measures may be helpful in minimizing catastrophic complications such as stroke and cardiac failure. A lack of knowledge may impact the effectiveness of health care interventions on hypertension. Positively equipping hypertensive clients with knowledge and skills for self-care encourages them to actively take full responsibility of their own health and lifestyles. The patient must therefore have sufficient health literacy to be involved in making important health related treatment decisions (Brown and Bussell, 2011)

2.4 Medication Adherence.

Adherence has been described as the extent to which the patient complies with doctor's advice and follows a prescribed medication protocol. Adherence is a multifactorial component in blood pressure control encompassing the ability to name recommended drugs and their purpose, frequency, as well as awareness of possible side effects and interactions. Failing to name recommended drugs, their strength and purpose are factors that can impact treatment compliance (Rahman et al,2020). Medication adherence therefore encompasses several health literacy skills which are important in the long-term control of blood pressure. (Malik et al, 2014).

Studies have analyzed compliance through dropout rates from treatment, missed appointments, and proxy measures such as valuations in blood pressure and attainment of target blood pressure values (WHO,2003). The term adherence is used interchangeably with terms such as compliance, and the general evidence points up to 80% of patients being considered non compliers. The vast number of hypertension patients quit medication within a year of diagnosis, resulting in approximately 75% of patients not reaching optimum control of the condition, with high default rates.

Management of hypertension is hampered by poor medication adherence related to poor knowledge of drugs taken as well poor knowledge of hypertension disease. A higher level of knowledge about hypertension correlates positively with medication adherence. Jankowska-Polańska et al. (2016) conducted a study involving 233 patients diagnosed with hypertension, revealing that 63% had a low level of knowledge about their condition.

The study utilized the Morisky Medication Adherence Scale (MMAS-8) and found that patients with higher knowledge scores had significantly better adherence to their medication regimens (mean MMAS-8 score of 7.08 for high knowledge vs. 6.45 for low knowledge; P=0.038).

Hypertension treatment involves taking antihypertensives, as well as lifestyle modifications and adherence to a defined set of therapeutic recommendations including reduced salt and fat intake, weight reduction, and regular exercise. Poor knowledge of adherence to the treatment plan therefore negatively affects patient awareness and behaviors and poses a significant problem in hypertension control. Effective control of hypertension requires taking hypertension medication for life, a factor that patients can struggle with for several reasons including lack of funds for medication refills, barriers to health service access such as distance to health facilities, as well as simply lacking understanding of the need for adherence. This has resulted in high drug default rates of even up to 50% especially in older patients (Marcum et al, 2013).

Adherence in some parts of Zimbabwe has been noted to be low, particularly with regards to medications. Mukora- Mutseyekwa and Chadambuka (2011), noted a drug adherence level of 40% within their study in Mutare Zimbabwe. Participants, however, had better understanding of lifestyle factors that impact hypertension. Sustained campaigns on alcohol and smoking conducted in the country were attributed to better knowledge of the detrimental effects of these practices on health, highlighting the value of targeted and specific health education in lifestyle and subsequently medication compliance.

Mugomeri et al (2016), found low knowledge of medications (44%), and low knowledge of disease condition (36 %) within their study in Lesotho and alluded the low values to possible health literacy deficits within the study population. Almas et al., (2012) in Pakistan also found poor blood pressure control in patients with poor disease knowledge and recommended focused educational interventions on target blood pressures to conscientize patients on the need to take medications for life.

From the literature it is clear that numerous factors such as longevity of taking hypertension medications, demographic factors, health system influences, complexity of anti-hypertension medications, knowledge of the disease condition and medications have a key role in influencing compliance with hypertension specific behaviors that lead to either good or poor disease control. Successful hypertension management therefore hinges not on complex medical knowledge of drugs, but on the simple identification of drugs and taking them as prescribed. Adherence is a crucial factor in hypertension management and is the bridge between what the patient knows and understands about their disease, and the action they will take to successfully control disease.

2.5 Knowledge, adherence and blood pressure control

Despite the presence of a plethora of hypertension medications globally, studies show poor blood pressure control ranging from 76% in Lesotho (Mugomeri et al, 2016), 65% in Italy, 37 % in South Africa and just 6 % in primary care facilities in Pakistan. Studies have linked poor control of hypertension with low knowledge of the disease (Almas et al,

2015). However, the relationship between sufficient knowledge about hypertension in patients and treatment outcomes is not conclusive.

A South African study found moderate knowledge of hypertension to be linked to moderate adherence. However, no significant association was found between levels of knowledge and disease outcome. In this study, over 90% of the study population had fair hypertension knowledge but blood pressure was only well controlled in 50% of the study population (Olowe and Ross, 2017). Whilst studies have not explicitly linked poor treatment outcomes to low knowledge, it is interesting to note that in studies where participants exhibit low level of knowledge, poor control of blood pressure is reported as well (Okai et al, 2020).

Studies in Zimbabwe have shown suboptimal control of BP in populations studied (Mundagowa et al, 2024, Mukori - Mutseyekwa and Chadambuka, 2011). In a Zimbabwean study determining the association between adherence to lifestyle factors and BP control in hypertensive patients, the authors found a high prevalence of uncontrolled blood pressure and poor adherence to drugs, diet and physical activity. In this same study, up to 36% of participants were noted to be non-adherent to antihypertensive drugs, although the relationship between this factor and blood pressure control was not significant (Tozivepi et al, 2018).

Reasons associated with not taking drugs included forgetting, missing doses and failing to take medications as prescribed. In another study in the same country, only 42% of participants in a study on drug adherence reported taking hypertension medications as

instructed, whilst blood pressure control was noted in 52% of participants (Mukora-Mutseyekwa and Chadambuka, 2011).

Despite the benefits of knowledge on drug and lifestyle adherence, the barriers that hinder patients from full compliance, including the adequacy and quality of health information about hypertension and its management need to be examined. Further exploration of factors related to adherence to hypertension drug treatments in Zimbabwe is needed, and this study seeks to contribute to the body of knowledge by assessing knowledge of disease conditions and medication in the eastern district of Zimbabwe's capital city, through analyzing the knowledge disease and medication adherence among patients attending primary health care clinics.

2.6 Conclusion

The literature reviewed highlighted significant knowledge gaps in hypertension management, particularly in low- and middle-income countries (LMICs). The literature showed differing levels of knowledge, sometimes within the same country. Notably, research in Zimbabwe indicated inconsistent findings on hypertension knowledge levels, with some studies showing low awareness while others suggest better understanding among urban populations.

In addition, it was noted that the factors that affect knowledge are heterogeneous, and it is important to understand these factors specifically within the local context. The review of literature showed a gap in Zimbabwe on knowledge of hypertension patient adherence, which was limited to studies from a few geographical settings excluding Harare.

Hypertension treatment outcomes were not well documented, specifically with relation to patient knowledge and medication adherence.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter outlined the methodology employed in this study, which examined the relationship between knowledge about hypertension and effective blood pressure control among patients undergoing treatment for hypertension in eastern district of the city of Harare, Zimbabwe. The selected research design, operational procedures, and analytical frameworks were justified and aligned with the study's objectives.

3.2 Research Design

The study was guided by an analytical cross-sectional design**,** which provided a structured approach to systematically collect, analyze, and interpret data to address the research objectives. Creswell (2014) defines research design as a "plan or proposal to conduct research," and the analytical cross-sectional design ensured that the research plan aligns with the data collection process, allowing the study to effectively investigate the relationship between knowledge of hypertension and medication adherence, and blood pressure control outcomes. This design organized key variables such as knowledge of hypertension and medication adherence, and blood pressure outcomes, and examined how these variables interact with one another.

3.3 Study Setting

The study setting refers to the specific physical, geographical, and socio-cultural context where the research will take place. This study, which investigated the impact of patient

knowledge and medication adherence on blood pressure control, was conducted in the Eastern District of Harare, the capital city of Zimbabwe. Harare is the largest urban center in the country, with a population of nearly 2 million people (City of Harare, 2022) and serves as a vibrant metropolitan area where public health issues like hypertension are increasingly relevant.

The research focused on primary healthcare clinics operated by the City of Harare Health Department, which manages the largest network of healthcare facilities in the city. The Eastern District, encompassing both high- and low-density areas, provided access to a socio-economically diverse population. This diversity was crucial for capturing a broad spectrum of experiences related to hypertension management, particularly in terms of how knowledge and medication adherence may vary among different demographic groups.

The Eastern District was selected as the study site because it accounted for the second-highest number of follow-up consultations for hypertension in the city (City of Harare Annual Health Report, 2022). The study was conducted at Mabvuku Polyclinic and Hatcliffe Polyclinic, which are the largest clinics in the Eastern District. These clinics handle a high volume of hypertensive patients, making them ideal locations for gathering relevant data. The socio-economic diversity in this district allowed the study to explore whether factors such as education level and employment status influence patient knowledge and adherence to hypertension treatment.

3.4. Target Population

The target population for this study was 500 adult outpatients diagnosed with hypertension who have been on antihypertensive medication for at least three months prior to the study. According to analysis of City of Harare data of approximate hypertension patients per month in the Eastern district. Patients were drawn from Mabvuku and Hatcliffe Polyclinic in the Eastern District of Harare, where they regularly attend follow-up consultations for hypertension management. Focusing on this group ensured that the study evaluated individuals who have had sufficient experience with their treatment regimens, making it possible to assess the impact of their knowledge and medication adherence on blood pressure control. Patients were selected based on their clinical diagnosis of hypertension, and their reported use of antihypertensive medication. Limiting the study to patients who have been on treatment for at least three months provided a reliable basis for analyzing their knowledge retention and adherence behaviors. Specifically focusing on hypertensive outpatients attending these two clinics allowed for a thorough investigation into the factors influencing blood pressure management within this population.

3.4.1. Inclusion Criteria

Participants included in this study were adult patients aged 18 years and older, diagnosed with hypertension for three months and above, who actively sought health services from Mabvuku Polyclinic and Hatcliffe Polyclinic during the study period. The selection method ensured that all participants met the specific criteria of having been diagnosed with hypertension and attending the clinic regularly for hypertension treatment. This

ensured that the study captured individuals with sufficient experience in managing their condition, allowing for a meaningful analysis of the impact of knowledge and adherence on treatment outcomes.

3.4.2. Exclusion Criteria

In this study, patients diagnosed with hypertension for less than three months, as well as pregnant individuals and those under 18 years of age, were excluded. Excluding patients with a more recent diagnosis ensured that the study focused on individuals who had adequately engaged with their treatment plan and had the necessary experience to comment on their medication knowledge. Pregnant individuals and minors were excluded due to unique physiological and psychological factors that can affect their blood pressure control and medication adherence differently from the greater population.

3.5. Sample Size

The study targeted approximately 500 patients at Mabvuku and Hatcliffe Polyclinic. The selection of these clinics took into account logistical considerations, such as accessibility and patient flow, ensuring that the data collection process was both efficient and manageable.

Given this population size, the sample size for the study was calculated using Dobson's formula, which is suitable for determining sample sizes in cross-sectional studies. With a target population of 500 patients, this calculation ensured that the study included a sufficient number of participants to yield meaningful and statistically valid insights into

the relationship between patient knowledge, medication adherence, and blood pressure control.

The formula for sample size in a cross-sectional study for a finite population is:

$$n = N \cdot Z2 \cdot p \cdot (1-p)$$

$$e2 \cdot (N-1) + Z2 \cdot p \cdot (1-p)$$

Where:

- N=500 (population size),
- Z=1.96 (for a 95% confidence interval),
- p=0.30p (prevalence rate of hypertension from the referenced study),
- e=0.05e (margin of error).

Calculation:

$$n = \frac{N \cdot Z^2 \cdot p(1-p)}{E^2 \cdot (N-1) + Z^2 p(1-p)}$$

$$n = \frac{500 \cdot 1.96^2 \cdot 0.30(0.7)}{0.05^2(500) + 1.96^2 \cdot 0.3(0.7)}$$

$$n = 197$$

Type equation here.

Therefore, the required sample size was 197 participants

3.6 Sampling Procedure

The sampling procedure for this study involved selecting participants from the population of adult hypertensive patients attending follow-up clinics at Mabvuku and Hatcliffe Polyclinic in the Eastern District of Harare. Given that the total population of hypertensive patients attending these clinics is approximately 500 per month, the study selected a sample size of approximately 197 participants. The selection process was based on the specific inclusion criteria of adults aged 18 years and older, with an established diagnosis of hypertension, who had been on antihypertensive medication for at least three months. The sampling procedure ensured that the study included individuals who met the necessary criteria for evaluating the relationship between patient knowledge, medication adherence, and blood pressure control.

3.6.1. Systematic Sampling

Systematic sampling is a method where researchers select subjects systematically from a larger population following a predetermined interval after a random start. This method stands apart from simple random sampling due to its structured approach, making it easier to ensure that the sample is representative of the population (Fink,2006).

The sample size of 197 was determined using the intention to capture a representative subset of the target population of 500 patients. By employing the formula for sampling interval, the researcher divided the total number of patients (500) by the desired sample size (197), resulting in a sampling interval of 3.

The method ensured that samples were not only random but also evenly distributed across the target population. By choosing every third sample from the purposive sample of hypertensive patients presenting daily for hypertension follow ups the researcher minimized selection bias enhancing reliability of results. By using every third patient, the sample covered diverse characteristics alleviating the potential for clustering, which may occur with random sampling. This was especially important for this study whose goal was to understand the impact of knowledge on disease and medication adherence on blood pressure control across a wide range of individuals.

3.8 Data Collection Instruments

The study utilized a structured questionnaire, and patient records as data collection instruments.

3.8.1 Structured Questionnaire

The study utilized a structured interviewer administered questionnaire as a data collection instrument to gather essential information regarding patients' knowledge of hypertension and medication adherence. This questionnaire was designed to ensure that it captured accurate, relevant, and comprehensive data aligned with the study's objectives. In addition to the questionnaire, the study also used patients' medical records to obtain objective measures of the dependent variable, which is blood pressure control, derived from measured blood pressure readings taken by health workers in follow ups done prior to the study. This combination of self-reported data from the questionnaire and objective data

from medical records offers a holistic view of the factors influencing blood pressure control among hypertensive patients.

The structured questionnaire ensured that data was consistently collected across all participants, making it both valid and reliable. De Vellis (2016) highlights that the quality of data collection instruments has a significant impact on the research outcomes and subsequent analysis, underscoring the need for a well-designed tool. Through integrating both subjective responses and objective medical data, the study was able to analyze the relationship between patient knowledge on disease and medication adherence, and blood pressure outcomes.

The structured questionnaire was divided into three key sections to ensure comprehensive data collection.

Section A focused on demographic data, gathering essential background information such as participants' age, gender, education level, occupation, and socio-economic status. Demographic information is crucial for contextualizing findings and understanding how different demographic factors might influence hypertension management practices among the participants.

Section B assessed participants' knowledge of hypertension, including their understanding of the nature and definitions of the disease, symptoms, complications and influencing lifestyle factors. This section aimed to evaluate the patient’s awareness of key factors of hypertension disease that could on patient self-care behaviors.

Section C examined participants' medication adherence. This included their ability to correctly name their drugs, frequency of taking them, and self-report on instances of missed doses. The ability to correctly identify chronic drugs and take them at specified intervals reduces medication errors and enhances drug adherence (Rahman et al, 2020), whilst assessment of consistency of taking drugs is crucial to prevent preventable disease complications.

Responses to the questions on patient knowledge, and medication adherence were scored and classified as poor, adequate and good levels depending on score outcome.

3.8.2. Patient clinical record form

The classification of patients was based on information from clinic records. Participants were categorized into 2 groups. One group with controlled hypertension (blood pressure less than or equal to 140/90 mmHg) and another with uncontrolled hypertension (blood pressure greater than 140/90 mmHg), according to WHO (2023) standards. This classification was determined using data from at least two previous measurements taken in patients on treatment, recorded prior to the study. Through using existing patient records, the researcher incorporated objective data on hypertension control alongside subjective data collected through the questionnaire, ensuring a comprehensive approach to understanding the relationships between patient knowledge, adherence, and health outcomes. The clinical record form also provided data on current patient diagnosis, duration of hypertension diagnosis as well as current hypertension medications.

3.8.3. Pretesting of the Tool

Pretesting of the data collection tool for this study, which investigated the impact of knowledge on disease and medication adherence on blood pressure control among adult patients in Harare, was conducted at Kuwadzana polyclinic, located in the Western district of Harare. The researcher administered the questionnaire to 10% of the sample size, with 19 participants involved in the pretest.

The pretest allowed the researcher to evaluate whether participants fully understood the questions, and if they provided the intended responses. It also helped determine the amount of time needed to complete the questionnaire, ensuring that the final tool was practical for use in a busy clinical setting.

3.9 Data Collection Procedure

Data collection procedure refers to the systematic process through which data is gathered for a study. In this study data was collected through structured interviews utilizing an interviewer-administered questionnaire. The researcher approached participants within predetermined clinics and secured informed consent prior to participating in the study. This process includes an explanation of the study's purpose, the nature of participation, and the measures taken to ensure confidentiality and privacy. Informed consent is vital, as it allows participants to make informed decisions about their involvement and fosters trust between researchers and subjects.

Data collection took place over a designated period of three months. December 2024 to February 2025. Interviews were conducted in a private room within the clinics assigned

by the Sister-in- Charge to maintain confidentiality and encourage open and honest responses. Each interview lasted approximately 5 to 15 minutes, allowing sufficient time to cover all aspects of the questionnaire while also being considered of participants' schedules. Interview duration allowed time to collect comprehensive data without imposing excessive time demands on participants. Measures to ensure confidentiality included assuring patients that no personal information was going to be shared with other people, no names were going to be put on questionnaires, and that questionnaires coding would be done using numbers. Furthermore, data was stored in a locked cabinet in an office accessible only to authorized personnel to ensure confidentiality and security of information.

3.10 Data Analysis and Organization

Data analysis for this study involved systematically organizing and interpreting the collected data to extract meaningful insights and address the research objectives. Quantitative data gathered from the questionnaire was analyzed using statistical software, STATA to ensure accuracy and reliability in processing the data.

Descriptive statistics were used to summarize the demographic characteristics of the participants, providing a clear overview of the study population. This included basic measures such as means, frequencies, and percentages to present the data in an easily understandable format. To explore the relationships between patient knowledge, medication adherence, and blood pressure control, inferential statistics were employed.

Chi-square tests were used to determine the significance of the associations between the variables.

3.11 Dissemination of results

Study findings were shared with Africa University, City of Harare Health Directorate, City of Harare health workers, Harare Provincial Medical Directorate, the community and the general public.

3.12 Ethical Considerations in Research

Ethical considerations in research encompass the guidelines and principles that researchers must adhere to when conducting studies involving human participants. These considerations ensure that the rights, dignity, and welfare of participants are respected and protected throughout the research process.

In this study, prior to initiating the research, permission was sought from the Africa University Research Ethics Committee and the City of Harare Health Directorate, ensuring compliance with local regulations and ethical guidelines. Written informed consent was acquired from all participants in their preferred language, reinforcing ethical standards surrounding participation and ensuring that participants are fully informed about the study's purpose, procedures, risks, and benefits. All the participants were assured that they could withdraw from the process whenever they wanted with no consequences for them.

Furthermore, privacy and confidentiality were strictly maintained throughout the study process to protect participants' rights and personal information. Patients were assured that

no personal details were shared, and no names were used on the questionnaires. The researcher ensured that data was anonymized and securely stored in a lockable cabinet, allowing only authorized personnel access to the office where data is stored.

3.13 Summary

This chapter detailed the methodology employed in investigating the relationship between patient knowledge and medication adherence on blood pressure control among hypertensive patients in Harare's Eastern District. The research design, an analytical cross-sectional approach, was selected for its suitability in evaluating associations between variables at a single point in time. The study was conducted at Mabvuku and Hatcliffe Polyclinic, focusing on a target population of approximately 500 hypertensive patients, with a calculated sample size of 197 participants.

Data was collected using a structured questionnaire divided into sections covering demographics, knowledge of hypertension and medication adherence, along with clinical data from patient medical records. The data collection tool was pretested to refine its clarity and effectiveness. Data analysis was conducted using STATA version 16 software, with both descriptive and inferential statistics applied to explore relationships between key variables. Ethical considerations, such as obtaining consent, maintaining confidentiality, and securing institutional approvals, guided the study to ensure participant welfare and compliance with research standards.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4. 1 Introduction

This chapter presented the data collected from the respondents regarding various aspects of hypertension management and medication adherence. It provided an in-depth analysis of the findings from the survey, focusing on key variables such as respondents' knowledge of hypertension, the medications they are taking, their understanding of proper medication usage, and their blood pressure control status. The chapter highlighted trends, patterns, and significant observations that emerged from the data, helping to provide insights into the effectiveness of current hypertension treatment and the factors influencing patient outcomes.

Through this analysis, the study aimed to identify areas where interventions may be necessary to improve hypertension control and patient health outcomes. One hundred and sixty-one (161) hypertensive participants out of a targeted sample size of 197 patients participated in this study, giving a response rate of 81.7 %. Ninety-seven (97) patients came from Mabvuku polyclinic and 64 patients from Hatcliffe polyclinic. The high response rate enabled a thorough examination of patient demographics, including age, educational attainment, gender distribution and how they impacted hypertension knowledge adherence as well as blood pressure control.

4.2 Socio-demographic characteristics of participants

A total of 161 hypertensive patients were enrolled in this study. Table 1 shows the sociodemographic data of the patients who participated in the study. The sample consisted

of 122 females (75.8%) and 39 males. One hundred and six (106), making up 65.8% of the participants were unemployed, 26.1% employed while 8.1% of these participants highlighted that they were self-employed. The mean age of the participants was found to be 57.7 years (Q1-Q3; 47-68). 50.9% of the participants indicated to have reached secondary school education, while only 0.6 % indicated to have completed their Advanced level education. 14.3% (23) highlighted that they have no formal education whilst 30.4% (49) have completed only their primary education

on. On the other hand, only 3.7% (6) of participants indicated to have completed their tertiary education.

Table 1: Socio-demographic characteristics of study population N=161

Characteristic	**Variables**	**Frequency**
Gender	Female	122(75.8)
	Male	39(24.3)
Age Intervals	0-29	3(1.9)
	30-45	27 (16.8)
	46-59	65(40.4)
	60+	66 (41)
Level of education	None	23(14.3)
	Primary	49 (30.4)
	Secondary	83(51.6)
	Tertiary	6(3.8)
Employment status	Unemployed	106 (65.8)
	Employed	42(26.1)
	Self – employed	13 (8.1)

4.3 Hypertension knowledge levels of participants

In this study hypertension knowledge was scored out of just over half of participants' questions that examined different components of hypertension. A score between 11 and 15 indicated good knowledge, whilst a score of 6 to 10 indicated moderate knowledge. Scores of 5 and below indicated poor knowledge. Just over half (52.8%) had good knowledge regarding hypertension, whereas 37.9% had average knowledge as shown in Fig 2.

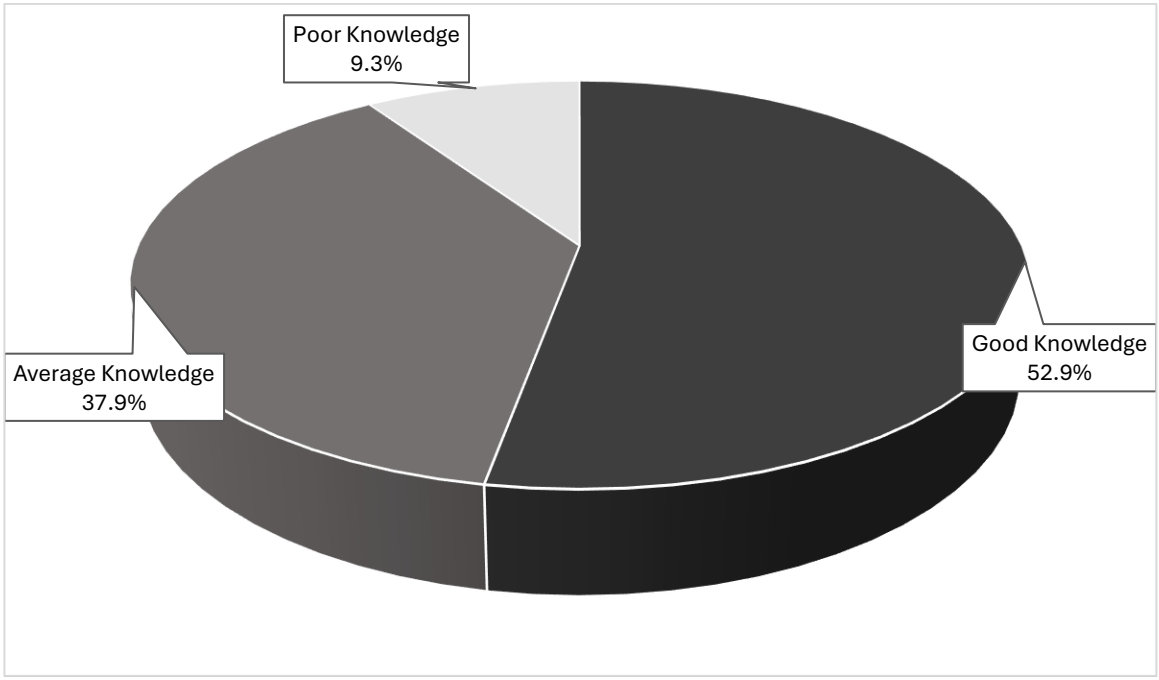

Fig 2: Hypertension knowledge levels

Most participants 54 % (87) stated they did not know what hypertension is whilst 52.2% (84) stated they did not know that hypertension is more common in older adults. Whilst most participants 69.6% (112) could recognize an abnormal blood pressure value 36.7%

(59) could not recognize a normal blood pressure value. Overall, 57.8% of participants had good knowledge of the lifestyle factors associated with improving or worsening hypertension status, whereas 37.9% had average knowledge regarding these lifestyle factors.

Table 2 Knowledge on specific components of hypertension knowledge N=161

	Good Knowledge %	**Average Knowledge %**	**Poor Knowledge %**
Knowledge of definition and nature of disease	40.9	49.1	10.0
Knowledge of symptoms	95.0	0	5.0
Knowledge of complications	73.3	0	26.7
Knowledge of lifestyle factors	57.8	37.9	4.4

Most of the participants (95%) demonstrated a good understanding of the symptoms of hypertension. However fewer participants, 73.3% (118) showed understanding of the complications associated with hypertension as shown in Table 2. The three questions asked on complications were to do with knowledge of stroke, heart failure and premature death. Four questions on knowledge of the effect of salt, fat, obesity and regular exercises were asked to assess knowledge of lifestyle factors.

Out of the 4 questions, 74.5% (120) knew that regular exercise mitigates against hypertension. From the sample 20.5% (33) participants did not know that being overweight can cause high blood pressure. With regards to the definition and nature of hypertension, overall good knowledge was found in 49.1% of the participants, whereas 41% (66) had average knowledge. Table 3 shows participants responses to selected hypertension knowledge questions.

Table 3 Knowledge on selected hypertension questions

Knowledge Variables	**Number who answered correctly n (%)**	**Number who answered incorrectly n (%)**
Meaning of hypertension	74 (46)	87 (54)
Hypertension is a lifelong disease	125 (77.6)	36 (22.4)
Hypertension is common in older adults	77 (47.8)	84 (52.2)
If BP is 160/100 it is normal	112 (69.6)	49 (30.4)
If BP is 125 /83 it is normal	102 (63.4)	59 (36.7)
Knowledge of lifestyle factors		
Regular exercise can improve or protect against hypertension	120(74.5)	41 (25.5)
Being overweight can increase blood pressure	128 (79.5)	33(20.5)

4.4 Adherence levels among participants

Medication adherence levels were scored out of 8. A score of 6 to 8 indicated good adherence, 5 to 6 moderate adherence and 0 to 4 poor adherences. Less than half of participants demonstrated good hypertension adherence -31.7%, whilst 47.8% of the participants had average adherence levels, with the rest demonstrating poor hypertension medication adherence. Most participants (78.3%) knew the names of hypertension medication they are supposed to take, and 99.4% of the participants indicated that they know how to take their medication (number of pills and frequency per day).

More than three quarters of the participants (130) highlighted that they take their medication daily, whilst 56.5% of the participants indicated that sometimes they forget to take their medications at regular times. Most of the participants (77%) highlighted that they never skipped taking their medication, whilst 9.32% highlighted that they had stopped taking their medication at least once because they were feeling better. 11.8% indicated that they had stopped taking their medication at some point because it made them feel worse.

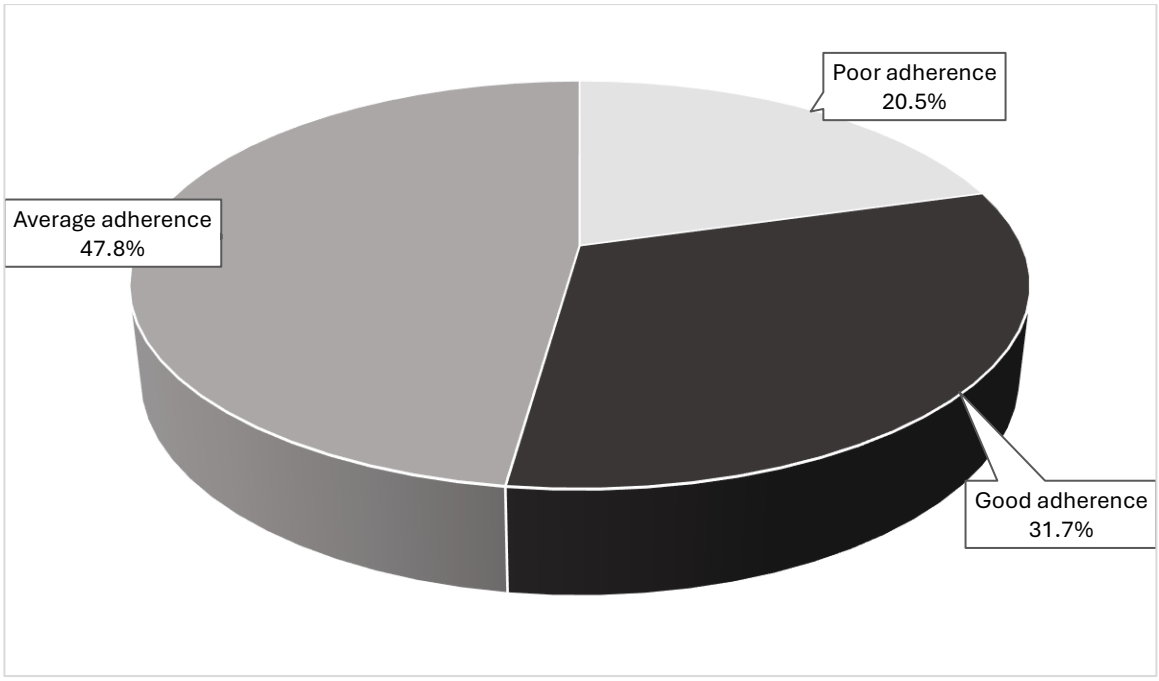

Fig 3 Prevalence of medication adherence

4.5 Blood pressure outcomes

Blood pressure outcomes were analyzed for at least 2 different readings taken prior to the date of data collection. Blood pressure with a value range of 120/80 to 140/90 was considered as well controlled hypertension, whilst a blood pressure value greater than 140/90 was considered as poorly controlled hypertension. The majority of participants, 55.3%, were observed to have well controlled blood pressure.

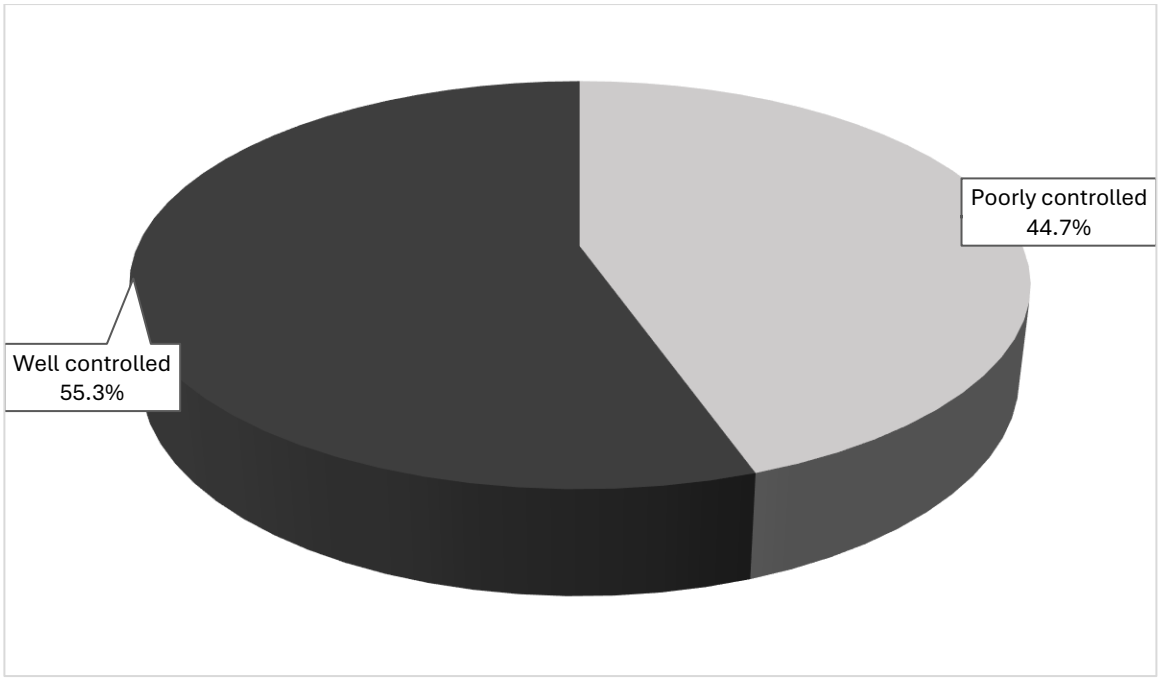

Fig 4 Participants blood pressure control

4.6 Association between knowledge level and blood pressure outcome

A chi squared test was performed to assess the association between knowledge level and blood pressure outcome. Table 4 shows the results of the analysis. Blood pressure outcomes and knowledge levels did not significantly correlate. A p-value of 0.300 and a Pearson chi-square statistic of 2.4 were determined. The likelihood-ratio chi-square test also produced a p-value of 0.285 and a test statistic of 2.5. This clearly indicated that there is no statistically significant correlation between knowledge level and blood pressure outcomes, because both p-values are higher than 0.05 level of significance.

Table 4: Analysis for hypertension disease knowledge level and blood pressure control (N= 161)

	Knowledge rating			
Hypertension level	**Good**	**Average**	**Poor**	**Total**
Well controlled	44	34	11	89
Poorly controlled	41	27	4	72
Total	85	61	15	161

Pearson chi2(2)=2.4;Pr=0.300; Likelihood ratio chi(2)=2.5;Pr =0.285; Cramer's V =0.122

4.7 Association between adherence levels and blood pressure outcome

Table 5 shows results of chi squared analysis of the relationship between medication adherence and blood pressure control. The results showed a p-value of *Pr* = 0.000 and a Pearson chi-square statistic of 47.8. The likelihood ratio chi-square test also produced a p-value of 0.000 and a statistic of 54.2. The results suggested that patients' ability to effectively control their blood pressure and their degree of compliance with their recommended medication schedules are significantly correlated.

Table 5: Analysis for adherence and blood pressure control (N= 161)

	Adherence level			
Hypertension level	**Good**	**Average**	**Poor**	**Total**
Well controlled	42	45	2	89
Poorly controlled	9	32	31	72
Total	51	77	33	161

Pearson chi2(2)=47.8;Pr=0.000;Likelihood ratio chi(2)=54.3; Pr =0.000; Cramer's=0.545

4.8. Association between knowledge level and medication adherence

Results showed that 34(40%) of participants with good hypertension knowledge also had good adherence levels, whilst 19(22,4%) had poor medication adherence levels. Table 6 shows that from the participants with poor knowledge, 10(66.7%) had average adherence levels whilst 4(26.7%) had good adherence levels. Out of the 61 participants with average adherence, 35(57.4%) had average medication adherence levels whilst only 14(21.3%) had good adherence levels. Pearson's chi square test value was 9.7, p=0.045, likelihood ratio 10.3, p=0.035 whilst Cramer's V was 0.174

Table 6: Analysis for knowledge level and medication adherence (N=161)

		Adherence		
Knowledge level	**Good**	**Average**	**Poor**	**Total**
Good	34	32	19	85
Average	14	35	12	61
Poor	4	10	1	15
Total	52	67	32	161

Pearson (chi2) (2) = 9.72; Pr = 0.0045; Likelihood ratio chi (2) =10.3; Pr – 0.035; Cramer's 0.174; Fishers 0.045

4.9 Association between sociodemographic factors and knowledge of hypertension

Table 6 outlines the association of knowledge levels of hypertension with different sociodemographic factors. In this study good hypertension knowledge was significantly associated with age, employment status and level of education. 85.2% of patients between 30 and 45 years showed good knowledge whereas only one participant had poor knowledge of hypertension. Of the 65 participants aged 46 to 59 years, 53.9% had good knowledge while 40% had average knowledge. Among the 66 participants aged 60 years

and above, 37.9% had good knowledge whereas 13.6% had poor knowledge and the rest had average knowledge.

Out of 106 unemployed participants 45 (42.5%) had good knowledge levels, while 47.7% had moderate knowledge whilst the rest (10.4%) had poor knowledge levels. The majority (69.1%) of the employees had good knowledge levels whilst 9.5% had poor knowledge levels. Out of the 13 self-employed patients (84.6%) had good knowledge levels whilst 15.4% had average knowledge levels.

Out of the 23 participants who had no formal education, only 5 (21.8%) had good knowledge whilst 13 (56.5%) had moderate hypertension knowledge levels. With regards to education levels 20 (40.8%) of the participants who completed their primary education had good knowledge levels, whilst 49% of the participants had average knowledge levels. The majority (57) of the 82 participants who completed their secondary education had good knowledge levels whilst only 2.4% (2) of these participants had poor knowledge levels. 3 of the 6 participants who completed their tertiary education had good knowledge whilst the other half had poor knowledge levels.

Table 7 Analysis for sociodemographic factors and knowledge of hypertension (N= 161)

	Hypertension knowledge				
Factor	**Good**	**Moderate**	**Poor**	**Pearson $Chi^{2,}$**	**P-value**
Gender				5.6	0.061
Male	16	16	7		
Female	45	69	8		
Age				21.3	0.002
0-29	2	0	1		
30-45	23	3	1		
46-59	35	26	4		
60+	25	32	9		
Employment status				15.2	0.004
Unemployed	45	50	11		
Employed	29	9	4		
Self – employed	11	2	0		
Level of education				38.23	0.000
No formal education	5	13	5		
Primary	20	24	5		
Secondary	57	23	2		
A level	1	0	0		
Tertiary	3	0	0		

p-values are from chi-squared test and bold faces represent significant at 5% significance level

4.10 Association between sociodemographic factors and medication adherence

Table 8 outlines the results of analysis of the association of medication adherence with different sociodemographic factors. these variables employment status and level of education were noted to be significantly associated with hypertension medication adherence.

Out of the 106 unemployed participants only 27 (26.7%) had good adherence levels, while 58.4% had moderate adherence and the rest (19.8%) had poor adherence levels. 47.6% of the employed participants had good adherence levels whilst 26.2% had poor adherence levels. Out of the 13 self-employed patients, 7 individuals (53.9%) had average adherence levels whilst 4(30.8%) had good adherence and 15.4% had poor adherence levels. Chi squared results (Pearson chi2(4) = 11.2 Pr = 0.024), show there is a statistically significant correlation between employment status and adherence levels.

4.4% of the 23 participants who had no formal education had good adherence, whereas 82.6% had moderate adherence. Among those who finished primary school, 26.5% demonstrated good adherence whilst 40.2% of those who completed secondary education showed good adherence. Higher educational attainment is linked to better adherence, according to the results of the chi-square test for educational attainment (Pearson chi2 = 23.2, Pr = 0.003).

Table 8: Analysis for sociodemographic factors and medication adherence (N=161).

Factor	Adherence knowledge			Pearson Chi^2	P-value
	Good	Average	Poor		
Gender				1.8	0.415
Male	9	21	9		
Female	45	56	24		
Age range				11.9	0.063
0-29	1	1	1		
30-45	11	10	6		
46-59	26	24	15		
60+	13	42	11		
Employment status				11.2	0.024
Unemployed	27	59	20		
Employed	20	11	11		
Self-employed	4	7	2		
Level education				23.2	0.003
No formal education	1	19	3		
Primary	13	28	8		
Secondary	33	29	20		
A level	1	0	0		
Tertiary	3	1	2		

CHAPTER 5 DISCUSSION AND CONCLUSION

5.1 Introduction

This chapter discusses the findings of the study on the impact of knowledge of hypertension disease, and medication adherence on blood pressure control amongst patients attending clinics in the Eastern district of the City of Harare from December 2024 to February 2025. Recommendations based on study findings will be given to improve treatment and health outcomes among patients in the district and city.

5.2 Discussion

The gender distribution of the study population reveals significant insights into the demographics of hypertensive patients. Globally, studies have shown that hypertension is more prevalent in males (Gillis and Sullivan, 2016; Cornell et at, 2022). In this study however there were significantly more women than males. This implies that women in this sample may have a higher prevalence of, or likelihood of reporting hypertension than male counterparts.

The lower male representation in this study indicates that disease prevalence or health-seeking behavior may be influenced by gender. Vaidya, Partha, and Karmakar (2012) highlighted that women are typically more proactive than males when it comes to obtaining healthcare services, whilst Thompson et al. (2016) pointed out that men are underrepresented in populations seeking primary health care in response to various health concerns. Women may have better chances of receiving diagnosis and treatment protocols to control their hypertension. There is a need to therefore to consider hypertension

screening services within the district targeting males, through the polyclinics or through community-based programs with educational messages targeting this demographic.

The average age of participants was 57.7 years, similar to Northern Bangladesh where a mean age of 51.3 years for hypertensive patients was found (Hossain et al., 2025). The data suggests that most hypertension patients are middle-aged compared to older adults. In a study on the impact of hypertension knowledge on medication adherence in Nigeria, Asgedom et al (2018) found the mean age of participants to be 55.0 years, whilst in Poland Paczkowska et al (2021) found a mean age of 63.7 years. Pinto (2007) highlighted that increasing age is one of the factors that is correlated with hypertension diagnosis.

The employment status of the participants in this study provides a crucial context for understanding the socioeconomic factors that may influence hypertension literacy and treatment adherence. Most participants in the study reported they did not have a job. This is similar to findings by Rahimi and Nkombua (2022) in Mpumalanga South Africa where most participants were noted to be unemployed. Health status and access to medical treatment may be impacted in several ways by this high unemployment rate.

Zheng et al (2020) noted that social determinants status has a detectable association with hypertension. Nagamine (2023), further highlighted that financial instability brought on by unemployment frequently makes it more difficult for people to afford prescribed drugs, routine checkups and a healthy lifestyle, all of which are essential for properly treating hypertension. Only a small proportion of participants in this study were employed, suggesting that a relatively small portion of this population has a stable income. Financial

stability is essential for regular and continued access to health services in Zimbabwe, where most of the population funds health care out of pocket.

Just over half of the participants reported having achieved secondary school education, reflecting a moderate level of educational attainment. Advanced level and tertiary level education was attained by a small fraction of respondents. Zacher et al (2023) noted that less educated and older adults are more likely to be hypertensive and have uncontrolled blood pressure in comparison to those with higher levels of schooling. A low level of higher education may hinder health literacy and understanding of hypertension management, impacting medication adherence (Cooper et al., 1998).

In this study 14.2% of the participants reported having no formal education. This raises concerns about the extent to which this group comprehends health information, follows treatment plans effectively and navigates healthcare services when receiving hypertension treatment services. Overall, demographic characteristics are essential in understanding the broader context of the research findings and identifying specific areas for intervention to improve blood pressure control among hypertensive patients.

5.2.1 Knowledge of disease

This study observed that just over half of participants had good knowledge of hypertension while 37.9% had average knowledge. This is consistent with findings in Karachi, Pakistan, in which the majority of the participants had adequate knowledge of hypertension (Nadeem et al., 2019) and in the USA where 56% of the participants were knowledgeable about hypertension (Abu et al.,2018). In other areas of Zimbabwe, Katsinde and Katsinde

(2006), and Chimberengwa et al (2016) found that most participants in their study had poor knowledge of hypertension. Our study was done in urban participants who interface regularly with their local clinic. This may give them the opportunity to probe and ask hypertension-related questions, as well as to continuously receive reinforcing messages at different visits contributing to greater knowledge.

Study results showed that almost all participants showed solid comprehension of signs and symptoms of hypertension. Most patients were able to recognize that hypertension can present asymptomatically, and to point to headache as an indicator of increased blood pressure. A study in Ethiopia produced similar findings in which nearly all the participants had a good understanding of the signs and symptoms of hypertension (Mekonnen, Mekonnen, & Mekonnen, 2019).

This degree of awareness is essential and can result in increased vigilance on disease control through early symptom recognition. In addition, knowledge of symptoms can influence early health seeking behavior, facilitating timely treatment and improving health outcomes. Participants who can recognize the symptoms of hypertension are more likely to seek medical attention when they appear, contributing to improved blood pressure control (Mungati et al., 2014).

Whilst most participants were correct on hypertension symptoms, fewer had knowledge of the consequences and complications of hypertension. This disparity suggests that although participants may be aware of the symptoms of hypertension, including the fact that it is often asymptomatic, they might not completely understand the severity of

complications, the risk they pose on health as well as the effect on quality of life. Health literacy programs must therefore highlight the long-term risks and challenges of uncontrolled hypertension, to encourage people to stick to their treatment plans and modify their lifestyles.

Results from this study show that though half of participants showed strong understanding of lifestyle factors, a significant proportion of participants still lacked thorough understanding of the significance of non-pharmacological factors such as diet and exercise on blood pressure control. Evidence has established that it is essential to adopt healthy lifestyle factors in combination with medication to manage hypertension effectively (Amoah et al, 2004). Factors such as weight loss and regular intentional physical activity have been noted to have a protective effect on blood pressure (Shimbo, 2016). Consequently, practical information on how lifestyle decisions can directly affect blood pressure control should be the focus of educational programs (Tozivepi et al., 2021).

To assess the knowledge of nature and definition of hypertension participants in this study participants were asked if they understood what hypertension was, and to differentiate normal and abnormal BP values. Less than half of participants showed a good understanding of this, indicating a key knowledge gap. Previous studies in Sri Lanka found similar results. Pirasath and Sundaresan (2021) found that most patients could not identify correct blood pressure values and cut off values. Understanding how to monitor blood pressure enhances self-care in disease management, and is critical for patients to know when hypertension is under control and when to seek medical attention. These

findings highlight the value of health literacy in enabling people to better understand their conditions to take charge of their own health management. There is still a need to implement strategies for health literacy improvement to ensure that all patients fully comprehend hypertension monitoring which is lifelong in affected patients.

5.2.2 Medication adherence

Information gathered in this study indicates both patients' treatment management strengths and opportunities for development. A key finding from the results is that only approximately a third of participants demonstrated good medication adherence, with only slightly more showing average adherence. Mukora-Muteseyekwa et al (2011) found similar results in Mutare city where good hypertension drug adherence was found in less than half of participants. Poor adherence is predominant in hypertensive patients. Whilst some patients take their medications as prescribed, a considerable portion still have some challenges with some aspects of medication adherence which may impact adversely on blood pressure control.

To manage blood pressure levels, most participants indicated they took their medicine daily. However, according to the data, more than half of patients sometimes fail to take their prescription drugs at regular times. This is consistent with the findings of a study conducted in Lupane in which most of the participants indicated that they often forget to take their prescriptions on time (Goverwa et al., 2014). This disparity draws attention to a frequent issue that many patients encounter: the challenge of continuously remembering to take medications. Busy schedules, insufficient mechanisms for reminders, poor social

support and cognitive decline are some factors that contribute to forgetfulness (Wood et al, 2010). Practical measures such as pill organizers, telehealth reminders, community follow ups and improved social support mechanisms need to be implemented to manage this dilemma.

Forgetting to take medication can result in skipped doses, raising the risk of heart attacks and stroke (Brown and Bussell, 2011). From this study most participants indicated they had never skipped a medication dose. However, a small proportion of participants admitted to stopping their medicine at least once at some point because they felt better. Furthermore, some of participants also indicated skipping prescription medication at some point because of side effects, emphasizing how crucial it is for patients and healthcare professionals to communicate effectively on the importance of adherence.

Patients should be involved in treatment decision making processes and must be made aware of possible drug side effects, and the importance of contacting health personnel rather than stopping their medicine on their own. Public health specialists must therefore strive to breakdown communication barriers during health care provision to empower patients to make informed health related decisions. A collaborative approach can add to not only improved adherence but patient satisfaction as well (Al-Hazmi et al.,2025).

Most study participants showed excellent comprehension of their drugs, which is an important result from the study. Almost all participants understood when and how to take their medicine correctly, and 78.3% could correctly state the names of hypertension medication they were required to take. This degree of health literacy is significant because

it indicates that patient education initiatives in this area have been generally successful. Patients are more likely to actively participate in their health management when they are informed about the medications they are prescribed and how to take them (Mundagowa et al., 2024).

Despite demonstrated knowledge on drugs, public health strategies are still needed to improve identified gaps that hinder drug adherence. These include literacy initiatives that emphasize the significance of consistent medication compliance, especially in cases where patients are feeling well or experience side effects. Patients from this study indicated an understanding of the chronicity of hypertension, and so greater understanding of other factors that can influence adherence such as treatment fatigue, complexity of medication and treatment costs is crucial.

It is also critical to address drug side effects through enhanced educational messages including at points where drugs are dispensed. Instead of stopping hypertension drugs on their own, patients should feel empowered to talk to their healthcare practitioners about any negative reactions. Setting up frequent check-ins /follow ups as well as support groups can give patients a forum to talk about challenges with medication conditions, share treatment journeys and get support from their peers. These kinds of support networks can increase adherence by fostering a sense of belonging, responsibility and identity with peers.

5.2.3 Blood pressure control outcomes

To lower the risk of cardiovascular illnesses and other health complications, hypertension must be effectively managed. Well-controlled hypertension was defined in this study as having at least two distinct values between 120/80 mmHg and 140/90 mmHg whilst on medication measured prior to the study. A blood pressure measurement of more than 140/90 mmHg, on the other hand, was categorized as poorly controlled hypertension. This definition is similar to the one used in various studies and maintains consistency in data analysis within research (Mukora-Mutseyekwa and Chadambuka, 2013; Mundagowa et al., 2024).

The results showed that more than half of the subjects had well-controlled hypertension. Mukora-Mutseyekwa et al, (2013) found similar results in Manicaland. This is encouraging since it shows that over half of the study participants are effectively controlling their blood pressure within the advised range. This kind of control is essential because it can dramatically lower the risk of hypertension-related consequences such as heart attacks, strokes, and renal disease.

Adherence to medicine, lifestyle changes, and routine blood pressure checks are elements necessary to achieve well-controlled hypertension. Whilst the greater portion of participants had well-controlled hypertension, almost half of individuals did not have good blood pressure control. There is a need for increased patient support and instructional mechanisms offered to individuals with poorly controlled hypertension.

Poor blood pressure control can be caused by various factors, that include poor drug adherence due to various factors, poor hypertension health literacy, and other underlying medical conditions that make treatment more difficult (Abu et al., 2018; Tozivepi et al., 2021). As a result, healthcare professionals should implement comprehensive health strategies aimed at improving patient health literacy and medication adherence, to address the difficulties faced by people with poorly managed hypertension. Individualized treatment strategies and regular blood pressure monitoring can also help these patients achieve better results.

5.2.4 Association between knowledge of disease and blood pressure control

Results from this study showed that blood pressure and hypertension knowledge levels did not significantly correlate. In Turkey Kilic, Uzunçakmak, and Ede (2016) also observed that there was no correlation between knowledge of hypertension and blood pressure control level, similar to findings by Nadeem at al. (2019) in Pakistan. In contrast Paczkowska etal (2021) found significant association between good knowledge and good blood pressure control. Their study sample differed from this study. Patients with good knowledge in their study not only had a higher level of education but were employed and treated at specialist inpatient hypertension clinics. Notably outpatients in their study had poor hypertension knowledge levels.

Knowledge about hypertension is certainly crucial, but to effectively manage blood pressure, it may also be necessary to integrate it with other factors including regular monitoring, medication adherence, lifestyle changes, and access to health services and medication.

5.2.5 Association between medication adherence and blood pressure control

Improving patient blood pressure control requires an understanding of the connection between blood pressure outcomes and adherence levels. Results from this study show that good blood pressure control and patients' degree of compliance with their recommended medication schedules are significantly correlated. Hossain et al (2025) obtained similar results in their study which observed that the risk of uncontrolled BP was significantly lower for patients with moderate to good medication adherence levels than for those with poor adherence. In a cross-sectional study conducted in Mutare Tozivepi et al. (2021), it showed that a significant number of people who had poor medication adherence had uncontrolled blood pressure. Nonadherence to blood pressure medication undermines effectiveness of drug therapy contributing to persistently high blood pressure.

To sum up, improving the management of hypertension and lowering related health risks requires better medication adherence. Healthcare professionals can better assist patients in reaching ideal blood pressure control and improving their general health outcomes by focusing on factors that enhance medication adherence.

5.2.6. Association between knowledge of disease and medication adherence

Improving health outcomes for people with hypertension requires an understanding of the connection between medication adherence and knowledge of the condition. Results from this study show that those who have a solid understanding of hypertension show noticeably greater drug adherence. This is a crucial, similar to findings by Al-Hazmi et al (2025) in Saudi Arabia and Giakoumidikas et al (2024) in Greece, who found higher levels of good adherence in patients with good hypertension knowledge

In this study most participants with poor hypertension knowledge showed average levels of adherence. Of interest was that 26.7% of the poor hypertension group were still able to maintain good adherence, whereas the remaining participants were classified as having poor adherence. Although the figures are far lower than those of their knowledgeable counterparts, this pattern shows that there are other factors in addition to knowledge that affect adherence since some people still take their medications as prescribed, despite having limited understanding of a condition.

With a p-value of less than 0.05, this result shows a statistically significant association between knowledge and adherence. However, Cramér's V value of 0.174 indicates a weak to moderate correlation between medication adherence and knowledge, suggesting that although knowledge has an impact, there may be other determinants of adherence behavior that require further investigation.

The data unequivocally shows that enhanced medication adherence is associated with greater understanding of hypertension. Participants are more likely to adhere to their treatment plans successfully if they are knowledgeable about their condition. On the other hand, adherence rates are typically lower among people with inadequate understanding, underscoring the necessity of focused educational efforts.

5.2.7 Association between sociodemographic factors and knowledge of disease

Hypertension is linked to several severe cardiovascular disorders, making effective blood pressure control crucial. Recognition of the elements that contribute to good hypertension literacy is essential to implement specific educational measures tailored towards specific demographic groups exhibiting poor health literacy.

Results from this study show that age is an important factor influencing understanding about hypertension. Younger age groups showed good knowledge of hypertension, with knowledge levels highest among people between the ages of 30 and 45. There was a discernible drop in knowledge levels with age in those between the ages of 46 and 59, and in participants 60 and older. This contrasts with other studies that have shown improved hypertension knowledge in older age groups. Melnikov (2019) in their study observed better knowledge in older adults who were more educated.

Our study however noted lower educational and employment status in older participants, which could explain the lower hypertension knowledge levels. In our study sample, younger age group participants might be more engaged in health-related conversations or

have better access to hypertension knowledge sources. It is worthwhile to ascertain whether the methods of knowledge dissemination used in the Eastern district of the city of Harare are relevant to, or easily comprehensible to older age groups.

According to findings from this study, another important factor affecting understanding of hypertension is employment status. The highest knowledge levels were reported by employed participants. Employment status can improve access to quality health information through access to different healthcare providers, workplace wellness initiatives, or health insurer benefits that promote awareness.

This study also found that level of education is a key factor noted to influence the level of understanding of hypertension. The highest percentage of participants with good knowledge were those who had completed secondary school. This is consistent with the results of a study conducted in Mazowe by Mungati et al. (2014) in which higher education levels were noted to amount to better knowledge of health-related issues including hypertension.

Another study conducted in Matabeleland South province highlighted that individuals who attained tertiary education and secondary education were more likely to have better hypertension knowledge than those who had no formal education respectively (Chimberengwa et al., 2019). Health literacy interventions must therefore suit literacy levels of target populations. City Health in addition to existing face to face interactions

between health providers and patients, can add educational materials that are language and literacy level appropriate, use visual aids and electronic devices to ensure hypertension knowledge is effectively disseminated.

Findings from this study show that gender is not significantly associated with hypertension knowledge levels. Although a larger proportion of women in this study showed good hypertension knowledge, the chi square test result was not statistically significant ($p>0.05$). Of note however is that more men had low hypertension knowledge compared to women, implying that women may have better health literacy. Wariva et al (2014) noted that women tend to have more health service interactions due to gender based health seeking behaviour leading to better knowledge and literacy levels

5.2.8 Association between sociodemographic factors and adherence levels

Adherence levels are strongly impacted by employment position. Most study participants were unemployed and only a small proportion of these participants who indicated good adherence. Conversely whist employed participants were the minority in this study, the majority scored well on medication adherence. According to the study results employment status is significantly correlated with medication adherence levels. This is similar to findings by Nagamine et al. (2023) in which adherence was very low among the unemployed groups as compared to those who were employed. Individuals who are employed may have easier access to health care services and may find health costs and medications more affordable, thereby contributing to improved adherence levels.

Furthermore, the regularity and discipline that frequently come with work may motivate people to follow treatment plans and put their health first. On the other hand, those without jobs can experience socioeconomic difficulties that make it difficult for them to obtain prescription drugs and medical care, which would result in lower levels of adherence.

Another important aspect influencing adherence levels is educational attainment. Higher educational attainment is linked to better adherence. Just 4.35% of the participants who had no formal education had good adherence, with adherence improving with higher educational status. These findings are similar to results from a study conducted in Matabeleland South province. Individuals who completed secondary and tertiary education were more likely to have good hypertension adherence than those who were not educated (Chimberengwa et al., 2019).

The importance of education in comprehending and treating medical disorders is shown by these findings. Higher levels of education are linked to improved health literacy, which enables people to understand their treatment regimens and the significance of taking their prescriptions as directed. Poorer outcomes could arise from persons with lower educational levels finding it difficult to navigate health systems, comprehend health demands and the consequences of non-adherence (Nagamine et al., 2023).

Although not statistically significant, the age-related trend in the chi-square test results ($p = 0.063$) suggests that age may affect adherence levels. Younger participants are more

likely than older ones to follow their prescription schedules. Several variables, such as the existence of comorbidities, cognitive decline, and a possible lack of motivation to properly manage own health, could be responsible for this drop in adherence among older adults. The intricacy of a person's health issues tends to rise with age, which might make it difficult to adhere to recommended treatment regimens (Nagamine et al., 2023).

Whilst medication adherence levels were not ideal in both males and females, females demonstrated better adherence levels. However statistical testing showed no significance between gender and adherence This has also been pointed out by Rahman et al. (2017) who noted no association between gender and adherence levels.

5.3 Conclusion

The results from this study show that hypertensive patients in the Eastern district of the City of Harare are typically aware of the symptoms of hypertension, but they also point to health literacy gaps on other aspects such as the nature of hypertension, normal blood pressure values, as well as lifestyle variables. Lifestyle modification is a key component of the management of hypertension and non-communicable diseases.

This study found that participants' blood pressure outcomes are substantially correlated with their level of adherence. Individuals who regularly follow their prescription schedules have a higher chance of having their hypertension under control, underscoring the vital role that adherence plays in effective illness management. Given these findings,

it is imperative that public health professionals concentrate on tactics that improve patients' adherence to their prescription regimens.

5.4 Recommendations

Table 9 Study recommendations

Recommendation	Time Frame	Responsible Authority
Enhanced hypertension screening for males	3 months	Risk Communication and Community Engagement Officer, DNO
Development of targeted demographic specific hypertension educational messages	3 months	Risk Communication and Community Engagement Officer
Establish community hypertension social support groups as a means of information sharing to improve knowledge	1 month	District Health Information Officer, Health Promotion Officer
Consider use of technology including tele-health interventions for BP monitoring, adherence reminders and regular patient disease related interface	6 months	Director of Health Services, RCCE

This study noted that only a small proportion of males were utilizing the polyclinic hypertension services as evidenced by the low number of males in the study. There is need

to effectively identify male hypertensive patients to enable timely treatment and prevention of complications. This can be done through enhanced screening at clinics in conjunction with existing services such as prostate cancer screening. Community screening can also be done by community health workers or through outreaches so that those living with the disease are aware and can take relevant action.

City Health Department can create and implement demographic specific educational programs that highlight and address identified knowledge gaps and obstacles to adherence. Efforts are also required to raise participants' health literacy, so they not only understand what hypertension is, but also how important it is to follow treatment instructions and engage in health care systems when facing challenges.

To strengthen awareness and medication adherence, health authorities can consider implementing strategies such as peer support groups, with monitoring by community health workers particularly for elderly patients. This bottom-up approach can encourage sharing of experiences, peer support, encourage proactive health behavior and foster positive health related behaviors

City clinics can offer increased support mechanisms like follow-up including telehealth consultations and reminder notifications. In addition, community health workers to follow up the more vulnerable elderly population to provide health related support. In order to enable patients to actively participate in their treatments, and to address any issues they may have regarding their medication, healthcare providers should also avail accessible and open communication channels with patients.

5.5 Suggestions for further study

Further research can be done to determine how the specific factors associated with knowledge and adherence in this study influence these variables in blood pressure control. In addition, further studies can be done to see how other determinants such socio-economic and geopolitical factors could influence hypertension knowledge, adherence and blood pressure control within the City of Harare population. Future research may examine additional factors that influence blood pressure control to provide a comprehensive understanding of how to assist hypertensive persons in attaining improved health outcomes.

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Appendix 1: Informed Consent Form

Study Title: The impact of knowledge on disease and medication adherence on blood pressure control amongst patients with hypertension in the Eastern District of the City of Harare, 2024-2025

Researcher: Hilda Wandayi

Contact Information: 0772870957

Good day,

My name is Hilda Wandayi, and I am a student at Africa University. I would like to invite you to participate in a research study titled "The impact of knowledge on disease and medication adherence on blood pressure control amongst patients with hypertension in the Eastern District of the City of Harare, 2024 -2025" This study is part of my master's degree in public health at Africa University. I kindly ask for your participation by responding to interview questions.

Purpose of the Study:

The primary objective of this study is to explore the relationship between the level of knowledge about hypertension and medication adherence among 197 patients attending clinics in the Eastern Harare district. This study is for academic purposes only. The results

of this study will help inform interventions and recommendations to improve hypertension treatment services in the City of Harare. This form gives you information about the study and will be used to document your willingness to take part should you choose to do so.

Duration of the Study

The study will take place from December 2024 to February 2025. Participation involves a single interview session lasting approximately 5 to 15 minutes.

Eligibility:

Eligible participants will be 197 hypertensive patients 18 years and older, who have been on treatment for at least three (3) months attending clinics during the specified study period of December 2024 to February 2025.

Procedures:

Interview Details: Participants will be taken to a quiet room where I or a trained assistant will administer the questionnaire. For participants who are unable to read or write, we will provide assistance by reading the questions aloud and recording your responses on the form.

Risks and Discomforts:

The risks of participating in this study are minimal. However, some questions may cause discomfort. You may choose to skip any question or withdraw from the study at any time without any penalty.

Benefits:

There are no direct benefits to you from participating in this study. However, the findings may help enhance hypertension intervention strategies in the community and at health facilities.

Confidentiality:

If you agree to participate, you will be assigned a participant ID to protect your identity. All personal information will be kept confidential and stored securely in lockable units accessible to the researcher and authorized personnel. Your name will not appear in any reports or publications resulting from this study

Voluntary Participation:

Your participation is entirely voluntary. You may choose not to participate or withdraw at any time without any negative consequences for you or your relationship with City of Harare or Africa University.

Compensation:

Participants will not receive any monetary or material compensation for their involvement in this study.

Alternatives to Participation:

If you choose not to participate, there is no obligation to provide a reason, and your decision will not affect your access to healthcare.

Incapacity to Consent:

If you are unable to read or provide personal consent, a trusted representative can assist you in providing consent on your behalf.

Outcome of Research:

Participants will be informed of the study's general findings upon request. A summary of the results will be made available to all participants once the research is concluded.

Questions:

Please ask any questions about this study before signing this form. It is important that you fully understand your involvement.

Authorization:

If you have read and understood the information provided above and agree to participate, please sign or make a mark in the space provided below. If you are unable to sign, a representative of your choice may sign on your behalf as an indication of your consent**.**

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Signature of respondent or authorised representative Date

If you have any questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Comm on telephone (020)60075 or 60026 extension 1156 or email aurec@africau.edu.

Appendix 2: English Questionnaire

HYPERTENSION KNOWLEDGE QUESTIONNAIRRE

Title of the study : The impact of knowledge on disease and medication adherence on blood pressure control among patients with hypertension in the |Eastern district, City of Harare 2024-2025

Instructions : This will be a face to face interview process. The researcher will ask questions as you respond and they will be documented. Please respond truthfully and answer as many questions as you can. If you do not know or remember the answer , it is okay to say so. Remember that your input matters, and accurate responses contributr to valuable research insights. Thank you for paticipating.

Section A: Demographic data

Questionnaire Number _____ Date _____

	Question	**Response**
1.	Clinic	
2.	District	
3.	Date of Birth	
4.	Age	
5.	**Gender (Please tick):**	
a.	Male	
b.	Female	
6.	**Employment Status (Please tick):**	
a.	Unemployed	
b.	Employed	
c.	Self-Employed	
d.	Occupation	
7.	**Level of Education (Please tick):**	
a.	No formal education	
b.	Primary	
c.	Secondary	
d.	Advanced level	
e.	Tertiary	

Section B: Knowledge of Hypertension Disease

	Questions	Yes	No
8.	Do you know what hypertension means?		
9.	Regular BP checkups are important in managing BP if you have hypertension?		
10.	Hypertension is a life long disease?		
11.	Hypertension is more common in older adults?		
12.	If blood pressure is 160/100 it is normal?		
13.	If blood pressure 125/83 it is normal?		
14.	High BP always has symptoms?		
15.	Experiencing headache may mean that your blood pressure is high?		
16.	Eating foods with a lot of fat causes hypertension?		
17.	Eating foods with lots of salt has an effect on hypertension?		
18.	Regular exercise can improve or protect against hyperten-sion?		
19.	Being overweight can increase blood pressure?		
20.	Stroke can be caused by uncontrolled blood pressure?		
21.	Uncontrolled blood pressure can cause heart failure?		
22.	Hypertension is more common in older adults?		

Section C: Knowledge and Adherence to Medication

	Questions	Yes	No	Sometimes
23	a. Do you know the type of hypertension medication you are currently taking? b. If yes, please list the medications (e.g., Amlodipine, Losartan, Hydrochlorothiazide): ……			
24	a. Do you know how to take your hypertension medication? b. If yes, please explain how: …… ……			
25	Do you sometimes forget to take your HPT medication?			
26	If you forget to take your medication, do you take it as soon as you remember?			
27	Do you ever intentionally skip taking your medication?			
28	Have you ever stopped taking your medication because you felt better?			
29	Have you ever stopped taking your medication because it made you feel worse?			
30	Do you take your medication at the same time every day?			

Clinical Data record form

Medical History: (To be completed from the medical records). The interviewer will review the medical records (individual patient clinic booklet or card) and review the last 2 blood pressure recordings taken on days other than the on the day of the study.

Questionnaire number……..

Date…….

Number of years with hypertension diagnosis……

Other Diagnosis……

Age range

<1-5 years ☐

6-10 years ☐

>10 years ☐

Date of Visit	BP Value	Current meds for hypertension	Current medications prescribed

Appendix 3: Informed Consent for Patients -Shona

Gwaro remvumo

Chidzidzo Chekudzidza: The impact of knowledge on disease and medication adherence on blood pressure control amongst patients with hypertension in the Eastern District of the City of Harare, 2024-2025

Mutsvakurudzi: Hilda Wandayi

Runhare: 0772870957

Nhanganyaya:

Zuva rakanaka,

Zita rangu ndinonzi Hilda Wandayi, ndiri mudzidzi pachikoro chezvidzidzo zvepamusoro che Africa university. Ndinokumbira maonero enyu patsvakurudzo yandirikuita inova inooongorora zvinokonzerwa ne ruzivo pamusoro pechirwere cheBP pane varwere zana namakumi mapfumbamwe nenomwe(197)uye kuteedzerwa kwematorerwo emishonga yeBP kune avo vane chirwere che BP kuzvipatara zvekumabvazuva muguta re Harare.

Tsvakurudzo iyi ndirikuiita sezvinodiwa muzvidzidzo zvepamusoro zvehutano hweveruzhinji pa Africa University. Ndinokumbira kunzwa maonero enyu pane mibvunzo yandichakubvunzai.

Chinangwa cheChidzidzo:

Tsvakurudzo ino yakanangana nekutsvaka sungaviririrano iripo pakati peruzivo rweBP, mashandisirwo nematorerwo emushonga ye BP nevarwere pazvipatara zvekumabvazuvo kwe Harare. Zvichawanikwa mutsvakurudzo dzino zvichabatsira mukuwana zvingaitwe kuitira kuti kurapwa kwe BP kuvandudzike muguta re Harare.

Nguva Yechidzidzo:

Chidzidzo ichi chichaitika kubva muna Zvita 2024 kusvika Kukadzi 2025. Kutora chikamu kunosanganisira chikamu chebvunzurudzo chinotora nguva ingangoita maminetsi mashanu kusvika gumi nemashanu.

Kukodzera kupindura mibvunzo

Vanokodzera kupinda muchikamu, varwere zana namakumi mapfumbamwe nenomwe(197) vanemakore gumi nesere nekudarika vakabatwa nechirwerwe cheBP vari kuenda kumakiriniki panguva yakatarwa yeongororo

Maitiro:

Avo vane BP chete ndivo vanotarisirwa kupindura mibvunzo ino uye vachirapirwa pachipatara chino. Ndichakutorai ndoenda nemi muimba yakahwandika kuitira kuti musununguke pakupindura mibvunzo uye pasave neanonzwa zvamuchapindura. Kana musingakwanise kuverenga kana kunyora , mubatsiri akadzidzira tsvarukudzo anenge aripo kuti averenge mibvunzo uye kunyora mhinduro yenyu. Kana muchida rubatsiro

rwakwawedzera, ndapota tizivisei,isu tichava nechokwadi kuti mawana rubatsiro runodikanwa panguva yebvunzurudzo.

Kusagadzikana munguva yetsvakurudzo

Hapana chakanyanyoipira kupinda mutsvakurudzo ino. Munogona kusanzwa kugadzikana nemibvunzo imwe yandichabvunza. Makasununguka kujamba kana kuti tidarike mibvunzo iyoyo pasina kana tsananguro yamungape.

Zvinopiwa kana mibairo

Hapana mibairo yakananga kwauri kubva pakutora chikamu tsvakurudzo iyi. Zvichawanikwa zvinogona kubatsira kusimudzira nzira dzinokwanisa kudzivirira chirwere cheBP munharaunda uye munzvimbo dzehutano

Kuvanzika

Mukapinda mutsvakurudzo ino, muchapihwa nhamba kana zita remadunurirwa kuitira kuti zita renyu risave mukati mezvichabuda musarudzo ino. Zvose zvichabuda mutsvakurudzo ino hazvizokwanise kuzozivikanwa kuti ndiani akazvitaura. Mapepa ose achachengetwa pakanaka uye panoiswa svumbunuro.

Kuzvipira kupinda mutsvakurudzo

Kupinda mutsvakurudzo ino kuri mumaoko enyu. Kana mati hamukwanise kupinda mutsvakurudzo ino, hazvina zvazvinokonzera pazvichawanikwa kana mumarapirwe

enyu. Kana mabvuma kupinda mutsvakurudzo ino, makasununguka kuti hamuchakwanisi kuenderera mberi panguva ipi zvayo hapana mhosva yamuchapihwa.

Zvamuchawana

Hapana chamuchapihwa nekuti mabvuma kupinda mutsvakurudzo ino. Zvakadaro tsvakuridzo ino ichabatsira kuti marapirwe echirwere che BP ave akavandudzika muzvipatara zvemuHarare

Kusakwanisa Kubvuma:

Kana usingakwanisi kuverenga kana kupa mvumo yako pachako, mumiriri waunovimba anogona kukubatsira mukupa mvumo panzvimbo yako.

Mhedzisiro Yetsvagiridzo:

Vatori vechikamu vachaziviswa nezvezviwanikwa zvechidzidzo kana zvakumbirwa. Pfupiso yemhedzisiro ichaitwa kuti iwanikwe kune vese vatori vechikamu kana tsvakiridzo yapera.

Mibvunzo

Musati maisa bharabhadzo yebvumirano, bvunzai mibvunzo yezvamungade kuzwisisa maerano netsvakurudzo ino.

Mvumo

Kana mabvuma kupinda mutsvakurudzo ino, isai bharabhadzo yebvumirano pakatarwa

---------- ----------

Bharabhadzo yebvumirano Zuva

Kana muine mibvunzo kana kuti muchida kunyunyuta nemabatirwo amaita mukuita tsvakurudzo ino, makasununguka kubata vanoona nezvekuchengetedzwa nekuremekedzwa kwevanopnda mutsvakudzo pa Africa University nhare mbozha inotevera dze Africa university (020)60075 kana 60075 extension 1156 kana email aurec@africau.edu.

Zita rangu: Hilda Wandayi 0772870957

Appendix 4:Chikamu Chekutanga: Zvinoenderana nedunga munhu

Questionnaire Number _____ Date _____

Chikamu Chekutanga: Zvinoenderana nedunga munhu

	Mubvunzo	**Mhinduro**
1.	Zita rechipatara	
2.	Dunhu	
3.	Zuva rekubarwa	
4.	Makore enyu	
5.	**Muri munhuyi**	
a.	Murume	
b.	Mukadzi	
6.	**Munoenda kubasa here**	
a.	Handiendi kubasa	
b.	Ndinoshanda	
c.	Ndinozvishandira	
d.	Basa ramunoita	
7.	**Makadzidza kusvika papi**	
a.	Handina kuenda kuchikoro	
b.	Ndakagumira puraimari	
c.	Chidzidzo che sekondari	
d.	Zvidzidzo zve fomu yechitanhatu	
e.	Dzidzo repamusoro	

	Mubvunzo	**Hongu**	**Kwete**
8.	Munoziva zvinoreva BP yakakwira here?		
9.	Kuongororwa BP nguva nenguva kwakakosha kana wakabatwa nechirwerwe cheBP ?		
10	BP chirwere chehupenyu hwese here?		
11	BP inonyanyobata vanhu vechikuru ?		
12	Kana BP iri 160/100 yakanaka here?		
13	Kana BP iri 125/83 yakanaka here?		
14	Kana BP yakakwira inezviratidzo kana zvinonzwika pamuviri ?		
15	Kurwadziwa nemusoro zinoreva here kuti pamwe BP yenyu yakakwira ?		
16	Kudya chikafu chine mafuta akawanda kunokonzera BP yakakwira here?		
17	Kudya chikafu chine munyu wakawandisa kunokonzera BP kuti ikwire here?		
18	Kurovedza muviri kunogona kuderedza BP yakakwira here?		
19	Kuva nemuviri wakasimbisa kunowedzera BP here?		
20	Chirwere chekuomarara kwemutezo chinonzi stroke chinogona kukonzerwa ne BP here?		
21	Chirwere chekusashanda zvakanaka kwemoyo chinogona kukonzerwa ne BP yakakwira here?		
22	BP inogona kukonzera kukasira kufa?		

Chikamu chepiri: kuziva nekutevedzera mapiritsi kana mishonga.

	Kutevedzera mishonga nemapiritsi	**Hongu**	**Kwete**	**Dzimwe Nguva**
23	a. Munoziva mishonga ye BP yamunomwa here? b. Kana mati hongu, ndeipi mishonga ya-munomwa:(sekuti Amilodipine, Losartan, Hydrochlo-rothizide) …… ……			
24	a. Munoziva matorerwo emushonga here? b. Kana mati hongu, unotorwa sei …… …….			
25	Munombokanganwa kutora mapiritsi kana mishonga here?			
26	Kana makanganwa kunwa mishonga, munobva manwa ipapo ipapo pamunorangarira here?			
27	Munombozviregesa mega kunwa mishonga weBP here?			
	Munomboregera kunwa mishonga nekuti murikunzwa mushe?			
	Makamboregera kunwa mishonga here nekuti zvakakuita kuti munyanyise kurwara?			
30.	Munonwa mushonga weBP nguva dzakafanana mazuva ose here?			

Appendix 5: Approval Letters

"Investing in Africa's future"
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 Website: www.africau.edu

Ref: AU 3535/24 6 December, 2024

WANDAYI HILDA
C/O Africa University
Box 1320
MUTARE

RE: ***THE IMPACT OF KNOWLEDGE ON DISEASE AND MEDICATION ADHERENCE ON BLOOD PRESSURE CONTROL AMONG PATIENTS WITH HYPERTENSION IN THE EASTERN DISTRICT CITY OF HARARE 2024-2025***

Thank you for the above-titled proposal you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

- **APPROVAL NUMBER** AUREC 3535/24
  This number should be used on all correspondences, consent forms, and appropriate document
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** December 6, 2024
- **EXPIRATION DATE** December 6, 2025
- **TYPE OF MEETING**: Expedited
  After the expiration date, this research may only continue upon renewal. A progress report on a standard AUREC form should be submitted a month before the expiration date for renewal purposes.
- **SERIOUS ADVERSE EVENTS** All serious problems concerning subject safety must be reported to AUREC within 3 working days on the standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

Yours Faithfully

MARY CHINZOU
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

City of Harare

DEPARTMENTAL MEMORANDUM

Your ref: ..... Vote: ..... Date: 12 September 2024

And Date: ..... Ref:

To: ALL UNITS From: DIRECTOR OF HEALTH SERVICES

==========

Re: **AUTHORISATION FOR HILDA WANDAYI TO COLLECT DATA**

I refer to the above.

The bearer is an MPH Officer attached to City of Harare, City Health Department. She is operating at Senior Management level.

Could you kindly assist her.

Yours sincerely

DIRECTOR OF HEALTH SERVICES

PC/rm

C.C DMO - DR W BARA

CITY HEALTH DEPARTMENT
ROWAN MARTIN BUILDING
DIRECTOR OF HEALTH SERVICES
12 SEP 2024
P.O. BOX 596, HARARE
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All correspondences should be addressed to **The Provincial Medical Director**
Telephone: +263-4-798537-61

ZIMBABWE

Ref:
Ministry of Health and Child Care
Harare Metropolitan Province
P O Box CY1122
Causeway
HARARE

4 November 2024

DMO
Eastern District

RE: Approval to conduct research on Hypertension in Eastern District of Harare City by Hilda Wandayi.

The above subject matter refers:

Hilda Wandayi has been given permission to conduct a study titled: The impact of knowledge on disease and medication adherence on blood pressure outcomes among patients with hypertension in Eastern district of Harare City.

Thank you for your usual cooperation.

PROVINCIAL MEDICAL DIRECTOR
HRE. PROVINCIAL MEDICAL DIRECTORATE
MINISTRY OF HEALTH AND CHILD CARE
04 NOV 2024
P.O. BOX CY 1122, CAUSEWAY
HARARE

Yours Sincerely,

Dr. I. Hove
Provincial Medical Director
HARARE METROPOLITAN PROVINCE