DETERMINANTS OF BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINIC AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA.

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DECLARATION AND APPROVAL

Student Declaration

This thesis is my original work and has not been offered for a degree in this or any other University or for an academic award.

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We approve that the effort described in this thesis was conducted by the student under our observation

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DEDICATION

I dedicate this thesis to the Wachira family, my daughter Neema, and my late husband, who encouraged me to pursue this particular program.

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ABSTRACT

Hypertension, a major risk factor for cardiovascular disease, remains poorly controlled despite its prevalence among patients visiting primary healthcare clinics. An estimated 53.5% of hypertensive individuals, roughly 35.8 million people, have uncontrolled blood pressure. This study aimed to identify factors affecting blood pressure control among hypertensive patients at Thika Level 5 Hospital in Kenya. Using a cross-sectional design with both quantitative and qualitative methods, the study assessed sociodemographic factors, dietary habits, patient behavior, healthcare systems, and the prevalence of uncontrolled hypertension. Researchers employed a structured questionnaire, key informant interviews, and focus group discussions. A sample size of 500 was determined using Cochran's formula, with an additional 30% for non-response. Systematic random sampling was used to select participants from those enrolled in blood pressure management at the hospital. Data collection involved reviewing patient files, administering questionnaires, and conducting interviews with medical staff. Quantitative data was analyzed using SPSS software, while qualitative data was analyzed thematically and then triangulated with the quantitative data. The response rate was a high 98.6% (493 participants). The study revealed a concerningly high prevalence of uncontrolled hypertension, at 73.6%. Notably, the proportion of respondents with poor knowledge about hypertension control was higher among those with uncontrolled blood pressure. Additionally, a significant finding was that a majority (39.8%) lived more than 15 kilometers from the hospital, and over half (57.3%) reported medication unavailability. Through logistic regression analysis, the study identified knowledge about hypertension, choice of transportation, and distance to the health facility as significant predictors of uncontrolled blood pressure. Patients with lower knowledge, limited transportation options, and residing farther from the hospital were more likely to have uncontrolled blood pressure. These findings highlight the importance of patient education by healthcare workers. The study suggests that healthcare providers should routinely address medication adherence, lifestyle modifications, and other factors related to blood pressure control. Furthermore, efforts to improve healthcare infrastructure and accessibility, including ensuring medication availability and providing transportation services, are crucial. Collaboration between healthcare providers, policymakers, and community organizations is essential to develop and implement effective interventions that address the multifaceted challenges associated with hypertension control.

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LIST OF ABBREVIATIONS AND ACRONYMS

BMI	Body Mass Index
BP	Blood pressure
CCM	Chronic Care Model
CVD	Cardiovascular disease
DBP	Diastolic Blood Pressure
FGD	Focused group discussion
FP	Family planning
HCTZ	Hydrochorothiazide
HCW	Health Care Worker
IQR	Interquartile Ratio
KII	Key Informant Interview
mmHg	Millimetres of Mercury
MOH	Ministry of Health
NCDs	Non-communicable diseases
OR	Odds Ratio
PHC	Primary Health Care
PSV	Public Service Vehicle
RCOs	Registered clinical officers
SBP	Systolic blood pressure
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Globally, hypertension (HTN) poses a significant public health challenge. It is characterized by blood pressure levels exceeding thresholds where conventional treatments have shown limited effectiveness in managing and reducing clinical events in controlled trials, typically indicated by a systolic BP ≥140 mmHg and/or a diastolic BP ≥90 mm Hg (Fisher & Curfman, 2018; Mills et al., 2020). According to a World Health Organization report from 2013, HTN is closely associated with cardiovascular diseases (CVD). Worldwide, approximately 1.36 billion individuals suffer from elevated blood pressure, contributing to roughly 17 million deaths annually from cardiovascular ailments. Among these deaths, complications stemming from hypertension are responsible for 9.4 million fatalities globally each year (Mohamed et al., 2018a) . Hypertension is attributed to at least 45% of deaths related to heart disease and 51% of deaths related to stroke (Misgana et al., 2023)

Improvements in the prevention and management of hypertension have been significant, as noted by (Jamie et al., 2019). However, there exists a substantial gap in this domain, highlighted by increasing incidence rates and a high proportion of uncontrolled hypertension, particularly in developing nations. Essential or primary hypertension affects the majority of patients, with the remainder experiencing secondary hypertension, as outlined by (*Hypertension*, 2024). Ensuring long-term optimization and control of blood pressure (BP) is crucial to prevent illness and mortality. Despite treatment, only one-third of patients achieve controlled BP, according to (Carey et al., 2018; Zaman et al., n.d.). The World Health Organization (WHO) reports that approximately one billion people globally live with uncontrolled hypertension (Egan et

al., 2019; *First WHO Report Details Devastating Impact of Hypertension and Ways to Stop It*, n.d.; *Hypertension*, n.d.-a). In the United States, it is estimated that 53.5% of individuals with hypertension have uncontrolled BP, affecting around 35.8 million people (CDC, 2016). Recent research in middle-income countries revealed that approximately 43.3% of hypertensive individuals were uncontrolled (Mohamed et al., 2018b) . In Panama, among hypertensive individuals receiving medication, the rate of uncontrolled hypertension was 47.2% (Guerra et al., 2022).

In China, the prevalence of hypertension (HTN) was found to be 37.2% among adults aged 35 to 74 years, with only 8.1% of them having their blood pressure (BP) under control (Wei et al., 2021; Zhang et al., 2023). In a study of rural Filipinos, the prevalence of HTN was 33%, with only 42% of diagnosed cases receiving treatment, and among those, BP was managed in 35% of individuals treated and in 17% of all hypertensive individuals (Gutierrez & Sakulbumrungsil, 2021). Studies conducted at the primary care level have reported varying levels of BP control, with Chile (59.7%) (Giudice, 2017), Spain (58%) (Ramon & Camano, 2013), Greece (55.6%) (Passi-Solar et al., 2020), Oman (56.4%) (Al-Saadi et al., 2011), Nigeria (45.0%) (Ibrahim et al., 2020), South Africa (42.4%) (Onwukwe & Ngene, 2022), Zimbabwe (32.8%) (Mundagowa et al., 2024), Ethiopia (43.6%) (Kebede et al., 2021), and Kenya (33.4%) (Mbau et al., 2022) experiencing uncontrolled hypertension. In Kenya, observational data shows that deaths due to non-communicable diseases (NCDs) increased from 45% in 2010 to 53% in 2015, with HTN being a primary contributor to this trend. Managing systolic blood pressure (SBP) and diastolic blood pressure (DBP) is associated with a reduction in cardiovascular problems and premature deaths, thus impacting the nation's disease burden (Flint et al., 2019).

Controlling hypertension requires collaboration among various stakeholders. Research has shown strong links between poor blood pressure control and factors like age, weight, alcohol consumption, and high salt intake (Muhihi et al., 2020; Sekhon et al., 2024). Uncontrolled hypertension is challenging to manage and requires comprehensive testing to identify underlying causes. Individuals with uncontrolled blood pressure are more likely to experience organ damage and cardiovascular problems compared to those with controlled blood pressure (Zhou et al., 2018).

Studies investigating sociodemographic factors influencing blood pressure control reveal critical considerations for management strategies. A US study by Lin et al. (2022) identified age, race, socioeconomic status, and education level as significantly impacting blood pressure control. Specifically, older adults and those with lower socioeconomic status faced difficulties accessing healthcare resources and medications, leading to higher rates of uncontrolled hypertension. Furthermore, research by Abrahamowicz et al. (2023) and Gatimu & John (2020) highlighted the profound effects of ethnicity and income inequality on blood pressure regulation, emphasizing the need to address sociodemographic factors to reduce healthcare disparities.

Extensive research in Europe has explored sociodemographic determinants influencing blood pressure control. Choi & Kim (2023) and Liew et al. (2019) identified age, gender, education level, and employment status as key factors. Older age groups and individuals with lower education levels exhibited higher rates of uncontrolled hypertension, often due to limited awareness and healthcare access. Similarly, disparities based on socioeconomic status and ethnic background, as highlighted by Müller et al. (2017) and Klein et al. (2020), underscored the importance of tailored approaches to address diverse population needs.

Studies across Asia have yielded important insights into sociodemographic factors shaping blood pressure control. Elnaem et al. (2021) demonstrated the significance of age, gender, marital status, and educational attainment. Older age groups and males exhibited higher rates of uncontrolled hypertension, while those with higher education levels and stable marital status showed better control. Furthermore, Sakboonyarat et al. (2019) and Sun et al. (2022) shed light on the impact of urbanization and migration, revealing disparities in blood pressure regulation between rural and urban populations.

Investigations in Russia have yielded similar findings. Choi & Kim (2023) and Hosseini et al. (2021) underscored the importance of age, gender, education level, and occupation in shaping blood pressure management strategies. Similarly, Osman et al. (2019) and Venkatesh et al. (2022) highlighted the impact of urbanization and socioeconomic status, revealing disparities in blood pressure control between urban and rural populations and among different income groups. These findings emphasize the need for tailored interventions to address sociodemographic disparities in hypertension management.

Sociodemographic factors have been explored in various African countries to understand their influence on blood pressure control among hypertensive patients. Research in Nigeria by Adeloye et al. (2021) highlighted the roles of age, gender, education level, and occupation in blood pressure management. Similar findings emerged from South Africa, with studies by Mandela et al. (2023) and Sharma et al. (2021) emphasizing the impact of urbanization and socioeconomic status on blood pressure regulation. These studies underscore the importance of addressing these sociodemographic disparities to improve hypertension management and outcomes across diverse African populations.

In contrast, research in the United States has focused on the nutritional aspects of blood pressure management in hypertensive patients. A study by C. D. Filippou et al. (2020) investigated dietary patterns, particularly the DASH (Dietary Approaches to Stop Hypertension) diet, and its effects on lowering blood pressure. Their findings indicated that adherence to a DASH-style diet, rich in fruits, vegetables, whole grains, and low-fat dairy products, correlated with improved blood pressure control. Additionally, Cheteu Wabo et al. (2022) explored the roles of specific nutrients like sodium, potassium, and magnesium in regulating blood pressure levels. These outcomes highlight the significance of dietary interventions in managing and preventing hypertension.

Nutritional factors have also emerged as a key area of research in Europe concerning blood pressure control among hypertensive individuals. Studies by Madsen et al. (2023) examined dietary habits, including salt intake, fruit and vegetable consumption, and adherence to dietary guidelines, in relation to blood pressure regulation. Their research revealed that high sodium intake and inadequate consumption of potassium-rich foods correlated with elevated blood pressure levels, while adherence to Mediterranean or Nordic diets was associated with better blood pressure control. Furthermore, investigations by Charchar et al. (2024) and Ilori et al. (2023) explored the impact of specific nutrients such as omega-3 fatty acids and antioxidants on blood pressure management, offering valuable insights into dietary interventions for preventing and treating hypertension.

In Asia, nutritional factors have been extensively investigated concerning blood pressure control among hypertensive patients. Studies by (Clemente-Suárez et al., 2023; Shi et al., 2018) have examined dietary patterns, contrasting traditional Asian diets with Westernized dietary habits, in relation to blood pressure regulation. The research highlighted the adverse effects of salt-rich foods, processed foods, and sugary beverages

on blood pressure, while emphasizing the benefits of traditional diets rich in fruits, vegetables, and whole grains. Additionally, research by (Patel et al., 2023) has explored the influence of specific nutrients like green tea polyphenols and fermented foods on blood pressure management, offering insights into dietary strategies for preventing and managing hypertension.

Nutritional factors have been a focal point of research in Russia concerning blood pressure control among hypertensive patients. Investigations by (Thulaseedharan et al., 2021) have probed into dietary habits, such as salt intake, fruit and vegetable consumption, and adherence to dietary guidelines, in relation to blood pressure regulation. Their findings underscored the detrimental effects of high sodium intake and inadequate consumption of potassium-rich foods on blood pressure levels, while highlighting the importance of balanced diets rich in essential nutrients. Moreover, studies by (Maggioni et al., 2022; Musazadeh et al., 2022) have examined the impact of specific dietary components, such as omega-3 fatty acids and antioxidants, on blood pressure management, providing valuable insights into dietary interventions for preventing and managing hypertension.

In Africa, studies from Ethiopia (Assefa et al. referenced in Abate et al., 2022; Mekonene et al., 2023) have explored dietary habits and their link to blood pressure. They found high sodium intake and low consumption of potassium-rich foods to be detrimental, underlining the need for balanced diets. Additionally, research in Ghana by Menyanu et al. (2020) and Takyi et al. (2020) examined how specific dietary components like traditional foods and processing methods affect blood pressure management, offering valuable insights into dietary strategies for hypertension.

Shifting focus to the United States, patient behavioral factors play a critical role in regulating blood pressure. Aynalem et al. (2021) and Geremew et al. (2023)

investigated lifestyle habits such as physical activity, smoking, alcohol consumption, and medication adherence. Their findings showed that consistent exercise, quitting smoking, moderate alcohol intake, and strict medication adherence were all associated with better blood pressure control. However, challenges like medication non-compliance and unhealthy lifestyle choices remain significant barriers to optimal blood pressure management.

Similarly, in Europe, patient behaviors are crucial for hypertensive individuals. Studies by Kim & Andrade (2018) and Ojangba et al. (2023) examined lifestyle factors including physical activity, weight management, smoking cessation, and stress reduction in relation to blood pressure control. Regular exercise, maintaining a healthy weight, and avoiding tobacco and excessive alcohol were linked to improved blood pressure control. Nevertheless, challenges with medication adherence and unhealthy lifestyles persist, highlighting the need for comprehensive interventions that address patient behaviors.

Across Asia, patient behavioral factors stand out as critical determinants of blood pressure control among hypertensive individuals. Research carried out by (Charchar et al., 2024; Nindenshuti & Caire-Juvera, 2023) has probed into lifestyle aspects, including physical activity, smoking habits, alcohol consumption, and sleep quality, and their implications for blood pressure management. Regular engagement in physical exercises, adoption of a balanced diet, and abstention from tobacco and excessive alcohol intake have been linked with improved blood pressure regulation. However, non-adherence to medication schedules and sedentary lifestyles pose significant challenges in hypertension management, highlighting the need for comprehensive interventions targeting patient behaviors.

In Asia, the healthcare system plays a crucial role in blood pressure control among hypertensive patients. Studies conducted by (Amarteyfio et al., 2024; Sharkiya, 2023) have scrutinized healthcare accessibility, quality of care, and patient-provider communication as pivotal factors shaping blood pressure management. Obstacles to healthcare service accessibility, such as long distances to healthcare facilities, limited availability of healthcare providers, and cultural beliefs, can impede hypertension diagnosis and treatment. Moreover, disparities in healthcare quality and communication gaps between patients and healthcare providers may contribute to suboptimal blood pressure control rates, emphasizing the necessity of addressing healthcare system factors to improve hypertension management outcomes in Asia.

In Russia, patient behavioral factors emerge as crucial determinants in blood pressure control among hypertensive individuals. Research conducted by (Modey Amoah et al., 2020) has delved into lifestyle components, including physical activity, smoking habits, alcohol consumption, and stress management, and their implications for blood pressure regulation. Regular engagement in physical exercises, maintenance of healthy body weight, and avoidance of tobacco and excessive alcohol consumption have been associated with improved blood pressure control. Nonetheless, challenges such as medication non-adherence and unhealthy lifestyle practices persist, warranting comprehensive interventions targeting patient behaviors.

In Africa, patient behavior plays a critical role. Studies in Kenya (Walekhwa & Kisa, 2021; Wilunda, 2020) highlight the influence of lifestyle choices. Regular physical activity, maintaining a healthy weight, and avoiding smoking and excessive alcohol all contribute to better blood pressure management (Liutsko et al., 2023). However, challenges remain. Non-adherence to medication and unhealthy habits necessitate comprehensive interventions that target patient behaviors.

The United States faces a different challenge: its healthcare system. Research by Hussien et al. (2021) and Kalaja (2023) identifies access to care, quality of care, and patient-provider communication as key factors. Obstacles like limited insurance coverage and a shortage of primary care providers hinder both hypertension diagnosis and treatment. Additionally, disparities in healthcare quality and communication gaps contribute to poor blood pressure control in specific demographics. These findings emphasize the need to address healthcare system issues to improve hypertension management outcomes in the US.

Europe presents similar challenges. Amarteyfio et al. (2024) highlight access to care, quality of care, and communication as major influences on blood pressure control. Long wait times and limited availability of primary care providers make diagnosis and treatment difficult. Similar to the US, disparities in healthcare quality and communication gaps between patients and providers contribute to inadequate blood pressure control. These findings underscore the importance of addressing healthcare system dynamics to improve hypertension management across Europe.

The influence of the healthcare system on blood pressure control among hypertensive patients is also notable in Russia. Studies by (Hussien et al., 2021) explored healthcare access, quality of care, and patient-provider communication as critical determinants of blood pressure management. Challenges in accessing healthcare services, such as protracted wait times and limited availability of healthcare providers, alongside deficient infrastructure in rural areas, impede hypertension diagnosis and treatment. Furthermore, disparities in healthcare quality and communication barriers between patients and healthcare providers contribute to suboptimal blood pressure control rates. These findings underscore the necessity of addressing healthcare system elements to enhance hypertension management and outcomes in Russia.

Across Africa, the healthcare system plays a pivotal role in influencing blood pressure control among hypertensive patients. Studies conducted in Tanzania by (Edward et al., 2020, 2021; Powell-Jackson et al., 2023) scrutinized healthcare access, quality of care, and patient-provider communication as central factors shaping blood pressure management. Challenges in accessing healthcare services, including long travel distances and limited availability of healthcare providers, hinder hypertension diagnosis and treatment. Moreover, discrepancies in healthcare quality and communication gaps between patients and healthcare providers contribute to suboptimal blood pressure control rates (Dhungana et al., 2021). These findings highlight the necessity of addressing healthcare system factors to enhance hypertension management and outcomes across Africa.

While studies from different regions provide valuable insights into specific factors influencing blood pressure control, it is essential to recognize the universality of the problem and the need for context-specific interventions. Addressing disparities in healthcare access, promoting healthy lifestyle behaviors, and improving healthcare systems' capacity to manage hypertension are critical steps toward achieving better blood pressure control globally.

Therefore, the need for studies like the one proposed, focusing on understanding the factors influencing blood pressure control among hypertensive patients in specific settings such as Thika Level 5 Hospital in Kenya, is evident. By identifying and addressing the unique challenges faced by hypertensive individuals in different regions, we can develop targeted interventions to improve blood pressure control and reduce the burden of cardiovascular diseases worldwide.

1.2 Problem Statement

Worldwide, nearly one in three adults has hypertension, and three out of four live in low- and middle-income countries (CDC, 2016). Furthermore, only about 1 in 10 patients with hypertension in developing nations have their blood pressure under control with the recommended parameters of less than 140/90 mm Hg (*Hypertension*, 2021; Mills et al., 2020) According to projections from the global burden of disease, the burden of cardiovascular disease experienced by African nations would double between 1990 and 2020. The majority of cardiovascular disease victims would be people in their middle years (Soares et al., 2023). Hypertension is the most common chronic illness in Kenya. The success of treating hypertension has been limited, and despite well-established approaches to diagnosis and treatment, in many communities, fewer than half of all hypertensive patients have adequately controlled blood pressure (Edwards et al., 2022). In a 2015 survey conducted by Kenya STEPS, it was found that 24% of Kenyans either had elevated blood pressure or were undergoing treatment for hypertension(Mohamed et al., 2018a). Despite this prevalence, the majority of Kenyans have never opted for hypertension screening. Data regarding the level of blood pressure control among hypertensive patients in the country is inadequate. However, in Kiambu County, there has been a concerning trend of uncontrolled blood pressure. According to the Kenya Health Information System (KHIS), the rates of uncontrolled blood pressure were 43.3% in 2015, 48.1% in 2016, and 50.9% in 2017. Further analysis revealed that in 2018, 36,581 clients were identified with elevated blood pressure, of which only 22% received treatment. The remaining 78% either pursued non-pharmacological therapies such as nutrition, physical activity, and weight control, or potentially defaulted from hospital care. During the same period, 12,569 individuals were under follow-up, but 65% exhibited uncontrolled blood pressure. Similar trends were observed at Thika

Level 5 Hospital, where the rates of uncontrolled blood pressure were 34.8%, 35.1%, and 47.8% in 2015, 2016, and 2017 respectively. In 2018, 49.7% of hypertensive patients at the facility had uncontrolled blood pressure. Facility records also indicate a growing trend of uncontrolled hypertension, with rates rising from 4.1% in 2016 to 14.7% in 2018. In Kiambu County, Kenya, the effective management of hypertension remains sadly inadequate, contributing to elevated rates of cardiovascular disease and mortality among individuals with uncontrolled hypertension. It is imperative to comprehend the root causes behind the poor control of blood pressure in this region, as certain factors might be amenable to modification. By addressing these underlying issues, there exists the potential to enhance outcomes for hypertensive patients, not only within Kiambu County but also on a national scale.

1.3 Justification

Understanding the factors affecting blood pressure control in hypertensive patients is crucial for improving healthcare outcomes and reducing the burden of cardiovascular disease globally. This study addresses this critical need for several compelling reasons.

Firstly, despite medical advancements, hypertension remains a significant public health challenge. The persistence of uncontrolled hypertension across various regions suggests potential gaps in current management strategies (World Health Organization, 2023). This study aims to identify specific factors contributing to poor blood pressure control, potentially informing the development of targeted interventions tailored to the needs of hypertensive individuals.

Secondly, context-specific research is vital to address regional disparities in hypertension management. Factors influencing blood pressure control can vary depending on socio-cultural, economic, and healthcare system contexts (Olajide et al., 2019). Focusing on Thika Level 5 Hospital in Kiambu County, Kenya, this study may

provide insights into the unique challenges faced by local hypertensive patients. These insights can then guide the development of locally relevant interventions that are more likely to be effective.

Furthermore, the economic and healthcare implications of uncontrolled hypertension necessitate immediate action. Poorly controlled hypertension leads to increased healthcare utilization, including hospitalizations and medication costs, placing a significant financial burden on individuals and healthcare systems (World Health Organization, 2017). By potentially improving blood pressure control rates, this study may contribute to mitigating these economic burdens and enhancing the overall efficiency of healthcare delivery.

Moreover, this study aligns with national and global health priorities aimed at reducing the burden of non-communicable diseases (NCDs), including hypertension. The rising prevalence of NCDs in Kenya and other low- and middle-income countries necessitates targeted efforts to improve hypertension management (World Health Organization, 2023). This study's potential to inform effective interventions aligns with Kenya's national health priorities outlined in the Kenya Health Sector Strategic Plan 2018-2022 (Ministry of Health, Kenya, 2018) and contributes to achieving Sustainable Development Goal 3 (SDG 3), specifically target 3.4, which aims to reduce premature mortality from NCDs by one-third by 2030 (United Nations, 2015).

Finally, the study's findings will contribute to the existing body of knowledge on hypertension management, both locally and globally. By disseminating research findings through academic publications, conferences, and policy briefs, this study can facilitate evidence-based decision-making and foster collaboration among stakeholders in the healthcare sector, ultimately improving hypertension management strategies worldwide.

1.4 Study Objectvies

1.4.1 Broad Objective

To assess the determinants of BP control among hypertensive patients attending Thika Level 5 Hospital, Kiambu County

1.4.2 Specific Objectives

1. To identify the prevalence of blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County
2. To determine the socio-demographic factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County
3. To establish the nutritional factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County
4. To identify patient behavioral factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County
5. To determine the health system factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County

1.5 Research Questions

1. What is the prevalence of blood pressure control among hypertensive patients attending Thika level 5 hospital, Kiambu County?
2. What are the demographic factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County?
3. What are the nutritional factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County?
4. What is the patient behavioral factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County?

5. Which are the health care system factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County?

1.6 Study Limitation

This study was conducted in one specialized health care level and the results, therefore, may not be generalized to primary health care. Hence the findings may apply to settings with similar characteristics. The respondents were required to recall previous incidents such as nutrition patterns and behaviors, which could have been influenced by recall bias.

1.7 Study Delimitation

A similar study comparing controlled and uncontrolled blood pressure in hypertensive persons has not been conducted in the county. This study will provide adequate findings among shareholders in the nation to plan and strategy with the end objective of meeting the third Sustainable Development Goal (SDG). Further, the respondents will be assisted by the use of options in the research tool to recall previous behaviors.

1.8 Study Significance

Findings from this study will aid in creating forums for enriching knowledge on reasons linked to poor control of pressure of blood. This study will aid the MOH to enhance their quality of care which will aid in better delivery of well-being care services. The study will engage the community in implementing preventive measures towards uncontrolled HTN. This research will be imperative to the County Government well-being team, public well-being, nurses, and other stakeholders, it will help in setting dogma concerning hypertension and its factors. In addition, priority will be given to hypertension control in Kenya. Study findings will create room for further research, the study will also provide a clear picture of the current picture of poorly controlled HTN and the associated reasons. Researching findings will generate new knowledge on

factors inflecting poor compliance to BP control. Research findings will play a critical role in an inclusive nationwide program to scale up the management of HTN.

1.9 Operational Definition of Major Terms

Cardiovascular disease: Cardiovascular Disease (CVD) encompasses a spectrum of conditions affecting the heart and blood vessels. It includes coronary artery disease (CAD), also known as coronary heart disease (CHD), which involves the narrowing or blockage of coronary arteries, potentially leading to heart attacks. Cerebrovascular disease refers to conditions affecting blood vessels supplying the brain, such as stroke or transient ischemic attacks. Peripheral artery disease (PAD) involves narrowing of arteries outside the heart and brain, often affecting the legs, and aortic atherosclerosis pertains to the buildup of plaque in the aorta, the body's main artery. (Zemaitis et al., 2024).

Centripetal fat distribution: Centripetal fat distribution refers to the persistent accumulation of fat around the abdominal area. This type of fat distribution, characterized by excess fat deposition in the abdominal region, has been associated with an increased risk of cardiovascular disease and metabolic disorders. It is often measured using waist circumference or waist-to-hip ratio as indicators of central adiposity. (Myint et al., 2014; Wagenmakers et al., 2015)

Controlled BP: Controlled Blood Pressure (BP) is defined as maintaining blood pressure levels consistently below 140/90 mmHg in individuals diagnosed with hypertension who do not have comorbid conditions such as diabetes mellitus (DM) or kidney disease. This criterion is based on measurements taken on at least three separate occasions over a period of two months. Controlled blood pressure is essential for reducing the risk of cardiovascular events and complications associated with hypertension.(Lee & Han, 2021)

Lifestyle modification: Lifestyle Modification refers to interventions aimed at promoting healthier behaviors to improve overall health outcomes. These

interventions typically include strategies such as weight loss, adopting the Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes fruits, vegetables, and low-fat dairy products while reducing sodium intake, engaging in regular physical activity, and limiting alcohol consumption to moderate levels. Lifestyle modifications are crucial in managing cardiovascular risk factors and reducing the burden of cardiovascular disease. (Altawili et al., n.d.; Bricarello et al., 2021)

Uncontrolled BP: Uncontrolled blood pressure (BP) is defined as having blood pressure levels equal to or greater than 140/90 mmHg in hypertensive individuals of all ages. This condition indicates a failure to maintain blood pressure within the recommended target range, posing an increased risk of cardiovascular complications and other adverse health outcomes (Mills et al., 2020) Uncontrolled hypertension requires prompt intervention and management to prevent further cardiovascular damage and associated complications.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section explores the literature conducted concerning the study's specific objectives. This section's reflection and gathering of the literature review tries to present an overview of various previous investigations that have been adopted in connection with the control of blood pressure among HTN patients at the Thika Level 5 facility in Kiambu County, Kenya.

2.1 Prevalence of Blood Pressure Control among Hypertensive Patients

Hypertension, a major risk factor for cardiovascular disease, remains a significant public health challenge worldwide. Despite the availability of effective medications and treatment strategies, achieving optimal blood pressure control continues to be a hurdle. Understanding the prevalence of uncontrolled hypertension in different regions is crucial for informing targeted interventions and improving overall cardiovascular health outcomes.

Despite advancements in medicine, the United States grapples with a substantial burden of uncontrolled hypertension. According to the (Centers for Disease Control and Prevention, 2023), only an estimated 25% of adults with hypertension have their blood pressure under control. This translates to a large portion of the population, millions of individuals, remaining at increased risk for cardiovascular complications such as heart attack, stroke, and kidney disease.

Research by the (European Society of Cardiology, 2021) indicates that a significant proportion of hypertensive patients in Europe struggle to achieve optimal blood pressure control. Estimates suggest this range could be anywhere from 30% to 50%, depending on the specific country and population studied. These disparities underscore

the need for tailored approaches that consider factors specific to each region's healthcare systems and socio-economic contexts.

The situation in Asia is equally concerning. A review of studies conducted in China by (Wang et al., 2020) revealed a prevalence of uncontrolled hypertension exceeding a staggering 50%. This highlights the critical need for public health initiatives and improved access to effective hypertension management strategies in this vast and populous continent. The reasons behind this high prevalence could be multifaceted, potentially including limited access to healthcare, cultural factors influencing medication adherence, and dietary habits.

A multi-country study conducted by the (World Health Organization, 2022) painted a stark picture. It revealed that a staggering 70% of hypertensive individuals in Africa have uncontrolled blood pressure. This means their blood pressure remains above recommended levels despite treatment, significantly increasing their risk of heart disease, stroke, and other cardiovascular complications.

Delving deeper, research from East Africa further underscores the severity of the situation. A study conducted in Ethiopia by (Geletu et al., 2020) found that nearly two-thirds (64%) of hypertensive patients in their study struggled to achieve optimal blood pressure control. These findings echo the multi-country study and suggest a widespread challenge across the continent.

Several factors may contribute to this high prevalence of uncontrolled hypertension in Africa. Limited access to healthcare services, medication adherence issues, and underlying social determinants of health, such as poverty and unhealthy lifestyles, all play a role. Additionally, under-diagnosis of hypertension and a lack of awareness about the importance of blood pressure control further exacerbate the problem.

The consequences of uncontrolled hypertension in Africa are significant. It translates to a substantial burden on healthcare systems, straining resources and leading to increased hospitalizations and mortality rates. Furthermore, it can lead to decreased productivity and economic hardship for individuals and families.

Addressing this challenge requires a multi-pronged approach. Strengthening healthcare infrastructure, improving access to medications, and promoting healthy lifestyle behaviors are crucial steps. Educational campaigns to raise awareness about hypertension and the importance of blood pressure control are also essential. Additionally, research efforts targeted at understanding the specific factors contributing to uncontrolled hypertension in different African contexts are necessary to inform the development of effective interventions.

Studies conducted within Kenya paint a concerning picture of blood pressure control among hypertensive patients. Research by (Njue et al., 2018) investigated a Kenyan urban setting and found a troubling prevalence of uncontrolled hypertension. An alarming 68% of hypertensive patients attending a primary healthcare clinic were not achieving optimal blood pressure control. This highlights the significant challenge healthcare providers face in managing hypertension within urban Kenyan environments. Further research by (Odhiambo et al., 2017) sheds light on the situation in rural Kenyan communities. Their study focused on a rural population and revealed an even more concerning prevalence of uncontrolled hypertension, exceeding a staggering 75%. This suggests that rural areas in Kenya may face even greater challenges in managing hypertension effectively. The higher prevalence in rural areas could be attributed to various factors, such as limited access to healthcare facilities, a lack of healthcare providers, or potential disparities in health education and resources compared to urban settings.

These studies by (Njue et al., 2018; Odhiambo et al., 2017) offer valuable insights into the national landscape of blood pressure control in Kenya. They demonstrate a concerning prevalence of uncontrolled hypertension across both urban and rural settings, potentially exceeding 65%. This underscores the urgent need for targeted interventions and improved management strategies to address this significant public health challenge within Kenya.

The existing research on hypertension control in Kenya offers valuable national insights. (Njue et al., 2018) reported a prevalence of uncontrolled hypertension exceeding 68% among patients attending a primary healthcare clinic in an urban Kenyan setting. Notably, (Odhiambo et al., 2017) found an even higher prevalence of over 75% in a rural Kenyan population. These studies suggest a significant challenge with blood pressure control across diverse Kenyan settings.

Extrapolating from these national findings, it is likely that the prevalence of uncontrolled hypertension in Thika may fall within a similar range, potentially exceeding 65%. However, this estimation requires cautious interpretation due to the absence of research directly targeting Thika or its immediate surroundings. Factors such as socioeconomics, healthcare access, and lifestyle behaviors can vary between urban and rural settings, potentially influencing blood pressure control rates. Additionally, specific characteristics of the patient population attending Thika Level 5 Hospital compared to the national studies might exist.

Therefore, conducting research focused on Thika Level 5 Hospital or the surrounding area is crucial to obtain a more precise estimate of uncontrolled hypertension prevalence. This local data would be invaluable for informing targeted interventions and resource allocation strategies specifically tailored to address the needs of the hypertensive population served by Thika Level 5 Hospital.

2.2 Demographic Factors Influencing BP Control

2.2.1 Age

A study conducted by (Getenet et al., 2019; Liu et al., 2023) found that age is a significant factor linked with inadequate adherence to hypertension (HTN) treatment and management. According to research carried out by (Muntner et al., 2020), controlled blood pressure (BP) is more probable among individuals aged 45 to 64 years but less likely among those over 75 years old.

In certain studies, it was found that individuals aged 60 and above were more likely to have controlled blood pressure compared to those under 60 (Musini et al., 2019). This contradicts another study which suggested that individuals under 60 are more likely to have controlled blood pressure compared to those aged 60 and above. Other studies have reported that increasing age poses a risk for poor blood pressure control due to decreased adherence to medication as individuals age (M et al., 2023).

2.2.2 Gender

The gender of the patient is another factor linked with better blood pressure control. Notably, female patients are expected to have better control of blood pressure as compared to men this can be linked to women being careful and concerned about their health status as compared to males (Joo et al., 2023; Vynckier et al., 2021). Contrary other studies have cited that men have better-controlled blood pressure as linked to women(Shehab et al., 2021). Another cohort study conducted in the USA found no association between gender and control of BP (Md Yasin et al., 2023).

2.2.3 Marital status

The involvement of a domestic relationship with a partner has been found to contribute positively to health management. The role of marital status cannot be ignored when it comes to controlling blood pressure. Marital status provides a social network that serves

to be supportive in controlling HTN and enhancing better medication adherence (Ekundayo et al., 2020). A research done by the University of Duke in the USA among 636 hypertensive patients, publicized that patients who were married had a higher likelihood of hypertension control as compared to the unmarried category (Ramezankhani et al., 2019).

2.2.4 Income

Good economic well-being has been linked to better management and control of chronic diseases and better control of hypertension. This has been linked to the ability to afford care related to medication and treatment. HTN drugs vary in terms of prices where some are expensive and others affordable (Bashaar & Hashemi, 2019; Ongarora et al., 2019). Other factors such as patient knowledge, and education level all play a key role in safeguarding there is a better observance of hypertensive medication leading to the control of blood pressure(Halgato et al., 2020; Mafruhah & Widyasari, 2024; Paczkowska et al., 2021). It should be noted that patients with a better income, are likely to adhere to medication hence better management of this illness.

2.2.5 Status of Employment

The status of being employed has been found to be an associating factor for a better-controlled HTN. A study carried out in Nepal among 241 older patients living with HTN reported that a higher level of education was linked to better adherence to HTN medication with those educated having an increased odds of 4.09 in adherence to HTN medication as compared to the retired and unemployed counterparts. In this study, there was a 41% rate of poor compliance with HTN medications (Pokharel et al., 2023; Shakya et al., 2020; Shrestha et al., 2018).

2.2.6 Level of education

According to research, there has been an existence of data recording a strong relationship between low or no education level and poor well-being outcomes. Individuals who are educated are likely to adhere to HTN medication and hence better controlled blood pressure as compared to their fellow counterparts who are not educated (Ayodapo et al., 2020).

2.2.7 Knowledge and Awareness HTN

Adequate knowledge among individuals with HTN has been indicated to lead to better-controlled blood pressure levels. Adequate knowledge has been indicated to enhance good health-seeking behavior and better adherence to prescribed medications. In a study conducted among 525 HTN patients in 3 well-being care facilities, poor control of blood pressure was linked with the presence of insufficient knowledge (Machaalani et al., 2022). Patients with adequate knowledge of HTN have been linked to better blood pressure control (Almatouq et al., n.d.). Similar findings have also been confirmed, being aware of HTN sickness was found to be linked with HTN control (Mekonnen & Mekonnen, 2019).

2.3 Behavioral Factors Influencing BP Control

2.3.1 Compliance to Medication

Inadequate compliance with treatment refers to the act of not following medication instructions provided by healthcare professionals. Various factors contribute to this lack of adherence, such as experiencing side effects, the financial burden of medication, educational background, and limited awareness about hypertension. It has been observed that adhering well to hypertension (HTN) medication results in more effectively managed blood pressure, whereas failing to adhere to blood pressure (BP) medication constitutes a significant risk factor for uncontrolled hypertension (HTN). A

research study conducted in India among individuals receiving cardiology care at a government medical facility found that 61% of patients with uncontrolled hypertension had demonstrated poor adherence to their prescribed blood pressure medications (Balasubramanian et al., 2018).

2.3.2 Smoking

Chronic and heavy smoking has been associated with risk factors for elevated blood pressure. Studies indicate that blood pressure tends to rise in individuals who smoke regularly(Herath et al., 2022). A study involving 19 smokers revealed a significant increase in blood pressure readings, from an average of 140±7/99mmHg±3 to 151±5/108±2mmHg, after ten minutes of smoking activity. Extensive observational data suggest that smoking has a progressively detrimental impact on the risk of cardiovascular complications (Gallucci et al., 2020), with smoking contributing more to the risk of cardiovascular disease than mild hypertension alone. Additionally, smoking is identified as a risk factor for stroke-related deaths among men with treated hypertension (Markidan et al., 2018; K. Patel et al., 2022).

2.3.3 Alcohol consumption

A cross-sectional investigation conducted in the Yijing area of Anhui Province, China, highlighted suboptimal outcomes in controlling hypertension among individuals who consumed alcohol. Specifically, men who drank alcohol exhibited a higher risk of elevated systolic and diastolic blood pressure compared to non-drinkers (Ji et al., 2018). Similarly, another study in China found that individuals consuming more than one bottle of beer were more likely to have uncontrolled blood pressure, whereas those abstaining from alcohol were 1.48 times more likely to have controlled blood pressure (C. Wang et al., 2023; Y. Wang et al., 2022). Consistent findings were reported in a

study conducted in Spain, where alcohol consumption was associated with inadequate blood pressure regulation (Llamosas-Falcón & Rehm, 2023).

2.4 Health System Factors Influencing BP Control

2.4.1 Accessibility to health care

The correlation between access to healthcare and blood pressure management is evident. It is observed that individuals with regular access to healthcare facilities tend to exhibit better control over their blood pressure compared to those lacking such access (Adomako et al., 2021; Fang et al., 2017). Research indicates that patients receiving hypertension (HTN) medication for over six months and consistently seeking care from appropriate facilities are more likely to maintain controlled blood pressure levels than those with shorter treatment durations (Arora et al., n.d.; Fentaw et al., 2022). Similarly, individuals who have lived with hypertension for five years or more tend to achieve better blood pressure control when receiving necessary care (Hinton et al., 2019)

Consistent healthcare supervision from qualified medical professionals is associated with improved blood pressure regulation (Treciokiene et al., 2021). Moreover, regular medical check-ups and having health insurance coverage are correlated with enhanced blood pressure control (Oso et al., 2019). Conversely, the absence of medical check-ups by a doctor and lack of health insurance coverage are linked to poorer blood pressure control (Smith et al., 2017). However, it is noteworthy that in a study by (Paramore et al., 2020), frequent medical check-ups by a doctor were associated with inferior blood pressure control.

2.4.2 Healthcare Workers' Attitude

Physicians' perspectives and reactions toward blood pressure standards play a crucial role in the control and management of hypertension. While the recommended threshold for initiating hypertension treatment stands at 140/90 mmHg (as per WHO guidelines,

2018), there are instances where some doctors opt for higher parameters before commencing medication (Campbell et al., 2022).

In a study conducted among patients with uncontrolled blood pressure, it was found that 33% of the physicians considered a diastolic reading above 95 mmHg as indicative of the need for treatment, while a systolic reading exceeding 160 mmHg was deemed necessary by some. Moreover, for patients with uncomplicated hypertension, 25% of the physicians suggested dosage adjustments if the diastolic pressure reached 94 mmHg, and 33% took no action even if the systolic pressure reached 158 mmHg. These findings are concerning, especially given that 41% of the physicians admitted to being unfamiliar with the WHO guidelines (Aiken et al., 2024).

2.4.3 Cost of Medication

Medication costs have been linked to poor treatment compliance and outcome among a majority of ailments. According to studies, high medication cost leads to poor treatment outcomes for HTN. The high out-of-pocket money utilized by patients for payment of medication costs and other insurance covers has been cited to be financial and medical burdens among individuals with illnesses that are chronic. A report produced by the USA concerning Medicare's current Beneficiaries Survey for Medicare beneficiaries from 2009 to 2015 revealed that money spent on inpatient care was reduced drastically by medicines prescription (Keohane et al., 2021).

2.5 Nutritional Factors and Blood Pressure Control

In the United States, extensive research has been conducted to investigate the relationship between nutritional factors and blood pressure control among hypertensive patients. One notable study by (C. Filippou et al., 2020) focused on evaluating the effectiveness of the Dietary Approaches to Stop Hypertension (DASH) diet in reducing blood pressure levels. The DASH diet is characterized by high consumption of fruits,

vegetables, and low-fat dairy products, along with reduced intake of saturated fats and cholesterol. The findings of this study demonstrated the efficacy of the DASH diet in lowering blood pressure among hypertensive individuals. Participants who adhered to the DASH diet experienced significant reductions in both systolic and diastolic blood pressure levels compared to those following a typical American diet.

Additionally, the Dietary Approaches to Stop Hypertension-Sodium (DASH-Sodium) trial conducted by (Suri et al., 2020) further highlighted the importance of dietary modifications, particularly sodium intake, in blood pressure management. This trial investigated the effects of different levels of sodium intake on blood pressure among hypertensive individuals following the DASH diet. The results revealed that reducing sodium intake in conjunction with the DASH diet led to greater reductions in blood pressure compared to the DASH diet alone. These findings underscored the significant impact of sodium restriction on blood pressure control and emphasized the synergistic effects of dietary modifications in managing hypertension.

In Russia, investigations into the relationship between dietary patterns and blood pressure control have provided valuable insights into hypertension prevalence among adults. (Churilova et al., 2021) conducted a notable study focusing on this aspect, aiming to discern how different dietary habits influence the prevalence of hypertension among Russian adults. The study observed two primary dietary patterns prevalent in Russia: the traditional Russian diet and the Mediterranean-style diet.

The traditional Russian diet, characterized by its high consumption of salt and fatty foods, emerged as a significant factor positively correlated with hypertension risk among the study participants. This finding underscores the detrimental impact of dietary habits rich in salt and saturated fats on blood pressure regulation. The high intake of salt, commonly found in processed and preserved foods in the traditional Russian diet,

contributes to increased blood pressure levels, thus elevating the risk of hypertension development.

In contrast, the study highlighted the potential benefits of adopting a Mediterranean-style diet for blood pressure control among Russian adults. This dietary pattern, renowned for its emphasis on fruits, vegetables, whole grains, fish, and olive oil, demonstrated an inverse association with blood pressure levels. Participants adhering to the Mediterranean-style diet exhibited lower blood pressure levels, indicating a potential protective effect against hypertension. The abundance of fruits and vegetables in this dietary pattern provides essential nutrients, antioxidants, and dietary fiber, contributing to improved cardiovascular health and blood pressure regulation.

In China, dietary habits deeply rooted in traditional practices have been subject to scrutiny in relation to their impact on blood pressure regulation. Research conducted by (Zhao et al., 2023) delved into the relationship between tea consumption, a prominent aspect of Chinese culture, and blood pressure levels among Chinese adults. The study unveiled a noteworthy association between regular tea consumption and lower blood pressure readings. This correlation was attributed to the presence of bioactive compounds inherent in tea, which were believed to possess potential antihypertensive effects. These findings shed light on the potential benefits of incorporating tea into dietary routines as a means of managing blood pressure among the Chinese population.

Furthermore, investigations such as that conducted by (Lei et al., 2024; WEI et al., 2020) have highlighted the role of soy protein intake in mitigating blood pressure levels among hypertensive individuals in China. Soy-based foods are commonly consumed in Chinese cuisine, and this study underscored their potential as dietary interventions for hypertension management. The research revealed a positive correlation between soy protein consumption and blood pressure reduction, suggesting that incorporating soy

products into the diet could contribute to improved blood pressure control among hypertensive patients in China. These findings underscore the significance of traditional dietary practices in the Chinese context and their potential implications for hypertension management strategies.

Investigations into the influence of dietary factors on blood pressure control in India have provided valuable insights into the relationship between salt intake and hypertension. (Mathur et al., 2023) conducted a study examining the association between dietary salt intake and blood pressure levels among Indian adults. Their findings revealed a positive correlation between high salt intake and elevated blood pressure levels. This underscores the urgent need for salt reduction interventions within the Indian population to mitigate the risk of hypertension and its associated complications.

Moreover, research by (Ahirwar & Mondal, 2020; Longkumer et al., 2023) delved into the impact of the Indian diet on hypertension prevalence. The Indian diet is characterized by high consumption of spices and refined carbohydrates, which may contribute to adverse health outcomes, including hypertension. Ahirwar & Mondal and Longkumer et al. findings shed light on the significant role of dietary modifications in reducing hypertension risk among Indian adults. By identifying specific dietary components associated with hypertension, this research provides actionable insights for developing targeted dietary interventions to improve blood pressure control in the Indian population.

Across Europe, researchers have delved into the intricate relationship between dietary habits and the regulation of blood pressure. One notable study conducted by (Estruch et al., 2018) delved into the effects of adopting a Mediterranean diet supplemented with either extra-virgin olive oil or nuts on blood pressure control among individuals with

hypertension in Spain. The findings of this study unveiled significant reductions in blood pressure levels among participants who adhered to the Mediterranean diet, thereby shedding light on the cardioprotective advantages associated with this dietary regimen.

Moreover, investigations led by (Soltani et al., 2020) provided valuable insights into the impact of adherence to the Dietary Approaches to Stop Hypertension (DASH) diet on blood pressure management within European populations. Their research meticulously analyzed the effectiveness of the DASH diet in mitigating blood pressure levels among hypertensive individuals across Europe. The findings from their study further underscored the efficacy of the DASH diet as an instrumental tool in the management of hypertension within European contexts, thereby emphasizing the significance of dietary interventions in promoting cardiovascular health.

Numerous studies conducted in Africa have delved into the influence of dietary factors on blood pressure control, particularly within the context of traditional African diets. For instance, (Batubo et al., 2023) conducted a study investigating the association between dietary patterns and hypertension prevalence among Nigerian adults. Their findings illuminated that adherence to a traditional African diet, characterized by high consumption of fruits, vegetables, and whole grains, was correlated with lower blood pressure levels. In contrast, adherence to a Westernized diet high in processed foods was found to be associated with an increased risk of hypertension. These results underscore the significance of promoting traditional African dietary patterns as a means of preventing and managing hypertension.

Similarly, in Nigeria, (Wordu & O.M, 2018) explored the relationship between dietary patterns and hypertension prevalence among adults. The study revealed that individuals adhering to a traditional African diet, rich in fruits, vegetables, and whole grains, tended

to have lower blood pressure levels. Conversely, those who consumed a Westernized diet characterized by processed foods were more likely to experience elevated blood pressure. These findings emphasize the importance of promoting traditional dietary habits to combat hypertension in Nigeria.

In Kenya, research has also focused on the impact of dietary factors on blood pressure regulation. (Mogeni & Ouma, 2022) conducted a study examining the association between dietary patterns and blood pressure levels among Kenyan adults. Their findings suggested that adherence to a diet rich in fruits, vegetables, and lean proteins was associated with lower blood pressure, while consumption of processed foods was linked to higher blood pressure levels. This highlights the role of dietary interventions in hypertension prevention and management strategies in Kenya.

Moreover, in Nigeria, studies have explored the effects of dietary habits on blood pressure control. (Wordu & O.M, 2018) investigated the association between dietary patterns and hypertension prevalence among adults in Nigeria. Their findings indicated that adherence to a traditional African diet, characterized by high consumption of fruits, vegetables, and whole grains, was correlated with lower blood pressure levels. Conversely, adherence to a Westernized diet high in processed foods was associated with an increased risk of hypertension. These results underscore the importance of promoting traditional dietary practices to address hypertension in Nigeria.

In Kenya, studies have delved into the intricate relationship between dietary factors and blood pressure regulation among individuals diagnosed with hypertension. (Kimani et al., 2019) conducted a noteworthy investigation focusing on the dietary patterns of Kenyan adults and their association with blood pressure levels. Their findings underscored the significance of dietary choices in influencing hypertension outcomes. Specifically, adherence to a dietary regimen characterized by abundant consumption of

fruits, vegetables, and lean proteins was correlated with lower blood pressure readings among hypertensive individuals. Conversely, the consumption of processed foods, often high in sodium and unhealthy fats, was linked to elevated blood pressure levels. This highlights the pivotal role of dietary habits in mitigating or exacerbating hypertension risk among the Kenyan population.

Furthermore, (Tam et al., 2020; Ukoha-Kalu et al., 2023) conducted a study aimed at evaluating the effectiveness of nutrition education interventions in managing blood pressure among hypertensive patients in Kenya. This research intervention focused on imparting knowledge and skills related to healthy dietary practices to participants. The results demonstrated significant improvements in blood pressure management among individuals who received nutrition education sessions. These findings underscore the importance of incorporating dietary interventions into comprehensive hypertension management programs in Kenya. By empowering patients with the knowledge and tools to make healthier food choices, such interventions can play a pivotal role in promoting blood pressure control and reducing the burden of hypertension-related complications in the Kenyan population.

2.6 Theoretical Framework

Strategies for overcoming barriers at the health care system, doctor, patient, and community levels may be framed within the setting of the Chronic Care Model (CCM). The CCM was established as a framework for redesigning health care and addressing inadequacies in the care of chronic diseases, such as hypertension. Its 6 domains are decision provision, self-management support, delivery design, information systems, community resources, and health care systems. Optimizing and integrating these domains has been revealed to lead to activated patients, responsive health care teams,

improved health services and treatment outcomes, and cost-effectiveness (Borrill et al., 2003).

The CCM highlights the role of patients with hypertension as being their own main caregivers and underscores the importance of health care providers, family, and community support in self-management (Hussien et al., 2021). In effect, patients are at the midpoint of the care model with doctors, family, and community networking in different ways to influence and support health decisions. Collaborative care can be categorized as: 1) Collaborative definition of problems; 2) goal-setting, planning, and action plans; 3) a continuum of self-management training and support services; and 4) active and sustained follow-up (Sanchez, 2017). This model of care distinguishes a collaborative partnership among the patient, health care provider, and the care team, each with its own expertise in managing that person's well-being and sharing in the decision-making process. Optimal care is needed for all patients suffering from hypertension. A collaborative effort between the patient and the health care provider is essential in managing the diseases before it causes other complex medical problems, therefore everyone has a role in aiding in the management of hypertension and related complications. This collaboration is vital in supporting the patient's management of their hypertension over multiple encounters and modifications in the treatment strategy, with the goal of accomplishing optimal care.

2.7 Conceptual Framework

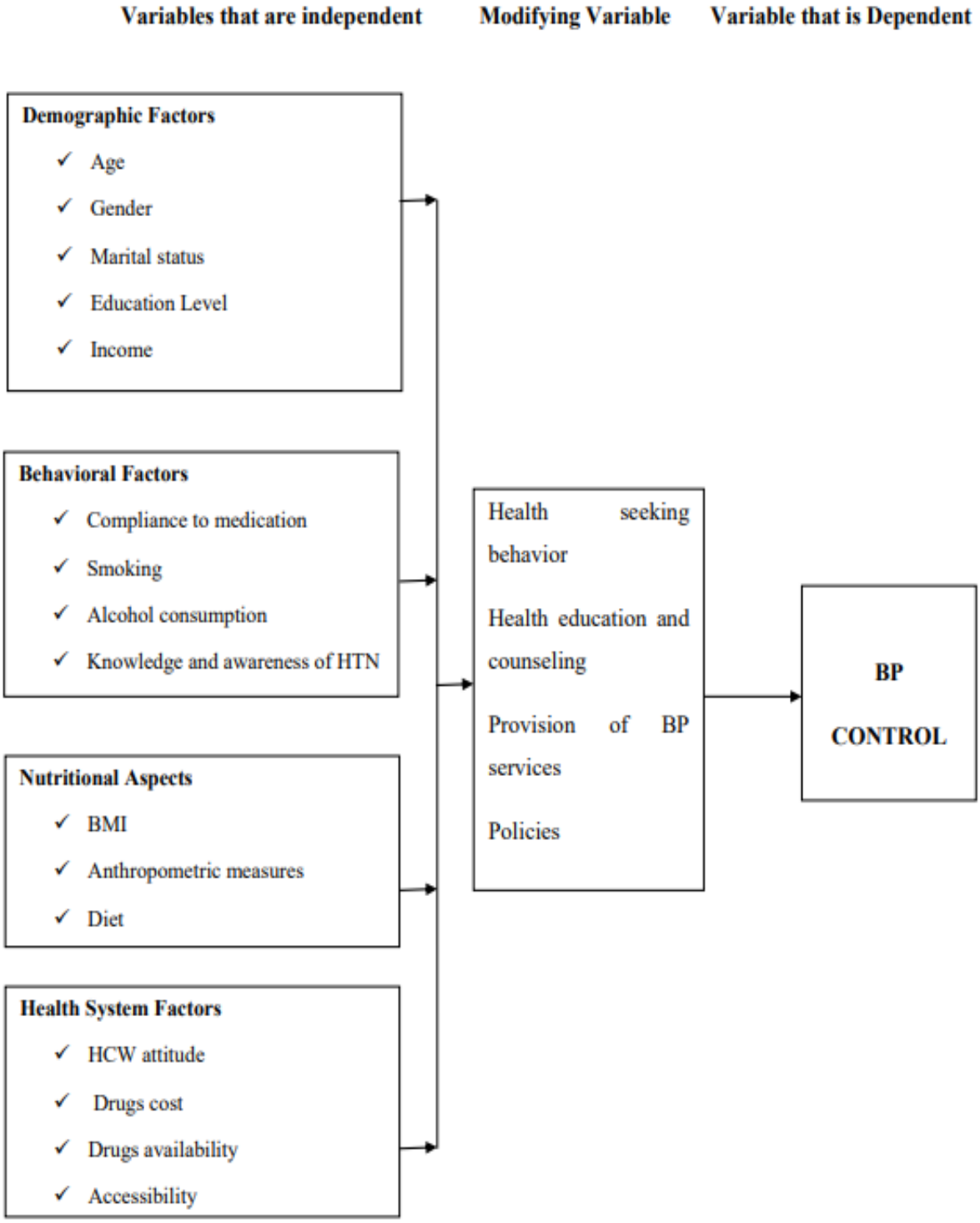


Figure 1: Conceptual Outline of the Study

Adopted from (Wong et al., 2018) **and modified**

2.8 Summary of Review of the Literature

In this examination of existing literature, the factors contributing to inadequate control of hypertension globally and specifically in Kenya have been explored. Despite advancements in modern medicine, the challenge of uncontrolled hypertension has persisted for decades, posing significant health risks. Despite numerous studies focusing on medication adherence for hypertension, the issue continues to escalate, highlighting a growing public health concern. Although various methods exist to assess medication adherence for hypertension, there lacks a universally accepted standard measure yielding reliable results. Despite identifying factors associated with poor hypertension control, effectively addressing this issue remains challenging. Nonetheless, noncompliance with hypertension medication has been linked to unfavorable treatment outcomes, exacerbating the condition. Notably, there is a considerable rate of discontinuation from hypertension medication, often occurring early in treatment. Research has identified several factors contributing to the poor control and management of blood pressure. Despite these alarming trends, only a small proportion of hypertensive patients in Kenya have adequately controlled blood pressure.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This section contains the design of the research, the population targeted by the study, the size of the sample, the procedure for sampling, ethical issues, the technique for data analysis, and the area of the study.

3.1 Design of the Research

This was cross-sectional research that used both quantitative and qualitative methods of collecting data.

3.2 Area of the Study

This research was carried out at Thika Level 5 Hospital located in the city of Kiambu. Kiambu County is situated in the central region which has a total area of 2543.5 km2. Thika town remains to be a major town in Kiambu County. Kiambu County has a total population of 4.4 million individuals(KNSB 2019). Kiambu County is situated between a longitude 360 31’ and 370 15’ East and a latitude 00 25’ and 10 20’. This county has 706 well-being facilities that are licensed, of which 18% are state-owned while 74% are private amenities with 8% being faith-based facilities. Thika Level 5 Hospital was founded in 1941, it has a total landmark of 7.97 hectares. The facility has 550 healthcare employees. Annually more than 950,000 patients received outpatient services while 20000 patients receive inpatient services from the facility. The health facility aims at providing well-being services that are of high quality to all patients seeking care there.

3.3 Study Variables

The variables in this research were divided into two types: dependent and independent variables. Blood pressure control was the dependent variable.

Independent Variables consisted of; socio-demographic aspects (religion, learning level, employ status, monthly income level, age, sex, marital status, acquaintance to risk aspects, comorbidities, HTN history, information, and consciousness) as well as lifestyle reasons (physical activity, compliance to medication, smoking, alcohol ingesting, sodium ingestion) nutritional factors (food, BMI) and well-being system aspects (HCW attitude, drug cost, convenience of remedies, convenience)

3.4 Target Population

The target population for this research was hypertensive patients enrolled for care at the Hypertensive clinic in Thika level 5 hospital. The hospital has a medical outpatient clinic running once per week. Patients with HTN seen on the clinic day are about 60 and approximately 240 per month. Data in this research was obtained in three months and the projected number of patients with hypertensive attending the clinic was 720. In a study by Mutua in Central Kenya, the frequency of exact HTN was 33.4%. This study assumed the same prevalence.

3.4.1 Criteria for Inclusion

1. Hypertensive patients attending the Hypertensive Clinic at Thika Level 5 Hospital.
2. Adult patients
3. Patients willing to participate in the study and provide informed consent
4. Patients on HTN drugs for the last six months before the period of collecting data.

3.4.2 Criteria for Exclusion

1. Hypertensive patients not attending the Hypertensive Clinic at Thika Level 5 Hospital.
2. Patients unwilling or unable to participate in the study.

3. Patients who have received blood pressure management or treatment elsewhere during the study period.
4. Patients with incomplete or missing medical records.
5. Patients with hypertension who were mentally unstable.

3.5 Sample size determination

The size of the sample was premeditated using the following formula for large proportions (Cochran(1963:75)

$$n_0 = \mathrm{Z}^2 \frac{\mathrm{pq}}{e^2}$$

Where

- E is the desired level of precision (margin of error)
- P is the estimated proportion of the population which has the attribute (proportion of controlled pressure) in question
- Q is 1 – p (proportion of uncontrolled pressure)

Z refers to the normal SD at the anticipated interval of confidence, set at 95% confidence interval which translates to 1.96.

$((1.96)^2 (0.5) (0.5)) / (0.05)^2 = 385$

30% of the sample size was added for non-response

30/100* 385= 115

115 + 385=500

The response rate was 98.6%

3.6 Sampling Techniques

The sampling frame for this study consisted of all hypertensive patients undergoing follow-up at the hospital clinic, representing the population of interest. Systematic random sampling was employed, with data collection taking place over a period of three months.

At the beginning of each clinic day, patients attending the clinic were systematically sampled from the sampling frame. Systematic random sampling ensures every hypertensive patient attending the clinic during the data collection period had an equal chance of being selected. The systematic random sampling was implemented as follows:

Defining the Population. The target population for this study comprised all hypertensive patients attending the hospital's hypertension clinic. Based on available information, the clinic sees approximately 240 patients with hypertension per month. Over the three-month data collection period, this translates to a projected population size of roughly 720 patients.

Determining the Sampling Interval. Dividing the estimated population size (720) by the desired sample size (500) yields a sampling interval of approximately 1.44. In practice, a whole number interval is preferable for ease of implementation. Given this, a sampling interval of 2 was chosen.

Selecting a Random Starting Point. A random number between 1 and 2 was chosen to determine the starting point for patient selection within the clinic on the first day of data collection. For example, if the number 2 was chosen, the second patient attending the clinic that day would be the first participant enrolled in the study.

Identifying Sample Members. Subsequent participants were then selected by adding the sampling interval (2) to the previous selection. For instance, following the example above (starting patient number 2 and sampling interval of 2), the second participant selected would be patient number 4, then patient number 6, and so on, throughout the data collection period.

This systematic random sampling approach ensured a representative sample of hypertensive patients attending the clinic during the study timeframe and mitigated potential selection bias.

3.7 Tools for Collection of Data

3.7.1 Quantitative Data Tools

Data abstraction forms and an electronic questionnaire(google form) administered by an interviewer were among the research tools used (Appendix IV). The questionnaire was guided by the study objectives to capture the required data. They also presented thorough information on the respondents' associated factors under investigation, such as adherence and standard of living activities. Data abstraction apparatuses were also revised to check the BP levels at the admission point and ensuing follow-ups, control of BP, prescription on use, way of life info incidence of any comorbidities, and medicine stockouts. The source of data was the study participant's clinic files.

3.7.2 Qualitative Data Tools

The research tools comprised an interview schedule for key informants using Key Informant Guide (Appendix V) and FGDs (Appendix VI). KII collected information on the health care workers' perception and knowledge on blood pressure control, challenges they face when dealing with the clients and those that the hypertensive clients face. The FGD collected information on patient's knowledge on uncontrolled BP and the barriers to obtaining adequate BP. A data saturation method was used in interviews among key informants (doctor, nurses, RCOs, nutritionists) and at least two focused group discussions (FGDs) consisting four to eight hypertensive patients was also conducted amongst purposefully selected group of patients. Separate FGDs for the group with uncontrolled BP and one with controlled BP was conducted. The researcher moderated the discussion in the focused group discussion with the help of one field

assistant who took notes and tape record proceedings (using a voice recorder) as back-up. The respondents did not participate in quantitative data collection and were chosen randomly by giving the unique number. A guide for use in the discussion groups which addressed issues such as behavioral and health system factors associated with adequate blood pressure control in the study site was used.

3.8 Validity and Reliability

3.8.1 Reliability

To ensure the reliability of the data collection process, research assistants were carefully selected and trained. Their work was closely supervised during data collection. Furthermore, the internal consistency of the data collection tools was assessed using Cronbach's alpha, yielding a score of 0.7, which indicates acceptable reliability.

3.8.2 Validity

The validity of the data collection tools refers to the accuracy with which they measured the intended constructs. To ensure content validity, the questionnaire was designed based on established research findings and reviewed by a medical expert. Additionally, data collection tools were reviewed by supervisors before data collection commenced.

3.9 Pre-testing

Prior to commencing data collection for the main study, a pre-test was conducted at Kiambu County Referral Hospital. A sample size equivalent to 10% of the main study sample was recruited for the pre-test. The pre-test involved both the Key Informant Interview guide and the questionnaire. This pre-testing phase was crucial for refining the data collection tools. For example, it identified questionnaire items that participants found difficult to understand, allowing for necessary modifications before the main data collection commenced. Additionally, research assistants received training prior to data collection to ensure the accuracy and quality of the data gathered.

3.10 Management and Analysis of Data

The quantitative data was collected electronically to incorporate functions to minimize collection of unusual/outliers' data and ensure high quality data. Once data was collected, it was edited to ensure consistency across the respondents and location of any omissions. Data analysis was conducted using SPSS statistical software. Exploratory data techniques were used at the initial stage of analysis to uncover the structure of data and identify outliers or unusual entered values. Quantitative data was coded and processed using SPSS version 25.0. Descriptive statistics such as frequencies, standard deviation and means/proportions was used to summarize, organize and simplify the data collected. Correlation analysis was employed to test the relationship between dependent and independent variables. Chi square was used with a significance level of less than 0.05.

On bivariate analysis, all independent variables were associated with the dependent variables to determine which ones have significant association. Odds Ratio (OR) of an exposure in the uncontrolled group and odds of an exposure in the controlled group was calculated. Confidence Interval (CI) was calculated for each OR. 95% CI was used to estimate the strength of association between independent variables and the dependent variable. The threshold for statistical significance was set at $\alpha = 0.05$ and a two-sided p value at 95% confidence intervals (CI) reported for corresponding analysis. On multivariate analysis, all independent variables identified to be significantly associated at bivariate analysis were considered together. This was performed using Binary logistic. Adjusted odds Ratios (AOR) together with their respective 95% Confidence Interval (CI) were used to estimate the strength of association between the retained independent variable.

Qualitative data generated from KI inform of notes (responses) from the participants was cleaned and coded manually based on themes developed from responses (thematic analysis) and additionally used to reinforce quantitative data. The results were presented in tables.

3.11 Ethical Issues

Ethical considerations protect the fundamental rights of participants including respect for privacy while maintaining the highest level of confidentiality (Bos, 2020; Kang & Hwang, 2023). To conduct this study, the proposal was submitted to Mount Kenya University-Ethical Review Committee for ethical approval. A permit to carry out research was requested from National Commission of Science Technology and Innovation (NACOSTI) and approval from the County Health department as well as permission from Thika Level 5 hospital was also requested and granted. An Informed consent was developed and administered to the participants. The right to participate in the study or not was rested with the respondents and this was respected at all times during the study. Respondents were informed that it was their right to choose whether to participate in the study or not and even withdraw from the study at any time. This would not affect the services they would be offering. No inducements or rewards were given to participants to join the study. Confidentiality and anonymity were maintained at all times. No identifying data was recorded either in voice or video recording without the permissions from respondents and all information given was used strictly for research purposes only and data collected was stored, analyzed and reported in formats that won't allow identification of the individual participant. There were no invasive procedures carried out on the participants and hence no physical risks were encountered. The participants were identified before the clinician could attend to them. They were also informed about their blood pressure status.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Response Rate

The study involved a total of 493 participants following an additional 30% of a sample size of 385 and therefore achieving an exceptionally high response rate of 98.6%, with only a few items left unanswered.

4.1 Hypertension Level

A significant concern was the high prevalence of uncontrolled hypertension among participants. As shown in Table 4.1, only 26.4% had controlled blood pressure, while a worrying 73.6% exhibited uncontrolled levels. This finding aligns with previous studies highlighting the substantial burden of uncontrolled hypertension globally (Chobanian et al., 2003).

Table 4. 1: Hypertension Level among Uncontrolled and Controlled

Hypertension Levels	Frequency	Percent
Controlled BP	130	26.4
Un-controlled BP	362	73.6
Total	492	100.0

Source Field Data (2023)

Table 4.2 delves deeper, exploring the agreement between predicted and observed blood pressure control. While the model achieved a moderate overall accuracy of 69.3%, its ability to predict controlled cases (74.9%) was slightly better than predicting uncontrolled ones (65.48%). This suggests that further refinement of the model might be necessary to improve its effectiveness in identifying patients at risk for uncontrolled hypertension.

These results underscore the critical need for comprehensive strategies to address uncontrolled hypertension. This includes public health initiatives promoting healthy

lifestyles, improved access to affordable medications, and potentially implementing the explored prediction model to guide targeted interventions for high-risk patients.

Table 4. 2: Socio-Demographics Logistic Regression Classification

Observed			Predicted Patient category		Percentage Correct
			Control	Case	
Step 1	Patient category	Control	179	60	74.90
		Case	87	165	65.48
	Overall Percentage				69.3

a. The cut value is .500

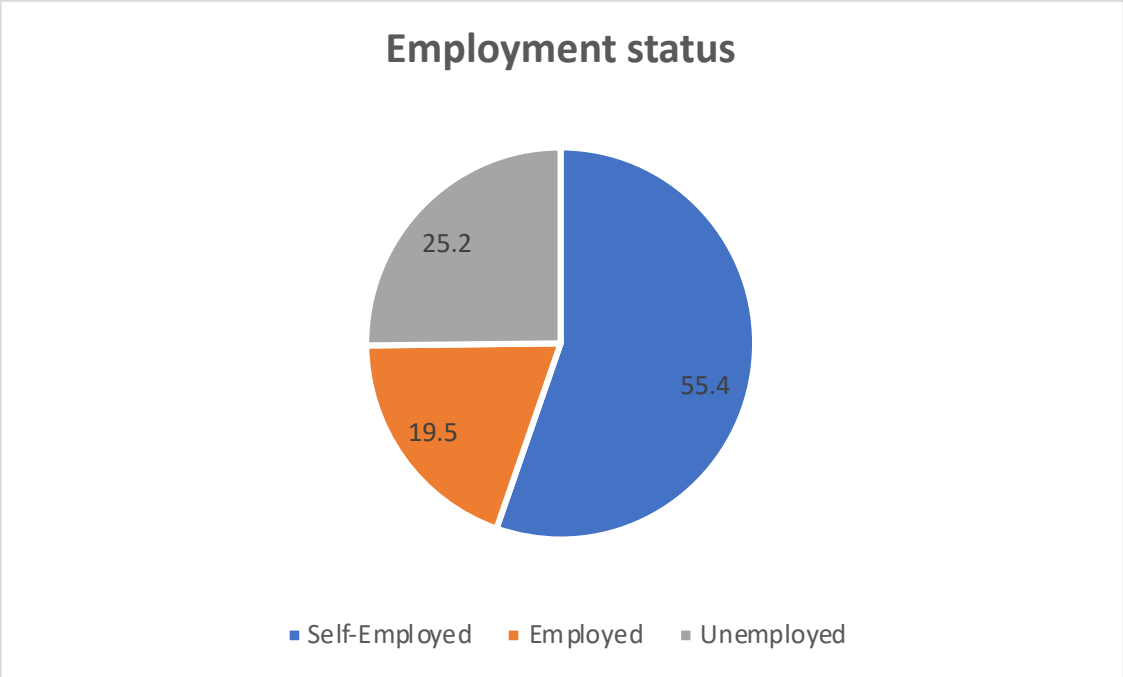
Source Field Data (2023)

4.2 Socio-demographic Characteristics

The second objective of this study was to determine socio-demographic factors influencing blood pressure control in hypertensive patients at Thika Level 5 Hospital, Kiambu County. Income levels skewed low, with a dominant portion (41%) earning less than Ksh. 10,000, mirroring findings from Mity et al. (2017) who observed a connection between socioeconomic status and hypertension control. This disparity in income could limit access to healthy foods, medications, and healthcare services, all of which contribute to effective blood pressure management.

Employment status also presented interesting results. The majority of participants were self-employed (55.4%), followed by unemployed (25.2%) and employed (19.5%) individuals. Self-employment can offer flexibility for managing chronic conditions, but it may also come with income insecurity and limited access to health insurance, potentially impacting medication adherence and follow-up care (Malyutina et al., 2020). Further investigation into the specific nature of self-employment and its influence on healthcare access would be valuable in this context.

In comparison to other studies, these findings highlight the need to consider the local context when examining socio-demographic factors. While lower income is generally



linked to poorer blood pressure control, the high prevalence of self-employment suggests additional factors unique to this population may be at play.

Figure 2: Employment status of the study participants

The rest of the socio-demographics are presented in Table 4.3.

Table 4. 3: Socio-demographic features of Participants

Descriptive Statistics	**Mean (S.D)**	**Median (IQR)**
Age	62 (12)	61 (54-70)
Minimum	22	
Maximum	88	
Range	62	
Age groups	Frequency	Percent
22-32 Years	6	1.2
33-43 Years	24	4.9
44-54 Years	105	21.4
55-65 Years	157	32.0
66-77 Years	140	28.5
78-88 Years	59	12.0
Total	491	100.0
Gender	Frequency	Percent
Male	168	34.2
Female	323	65.8
Total	491	100.0
Marital Status	**Frequency**	**Percent**
Single	141	28.7
Married	340	69.1
Divorced	11	2.2
Total	492	100.0

Source Field Data (2023)

4.2.1 Demographic Factors influencing BP control among hypertensive individuals.

Table 4.4 illustrates the association between socio-demographic features and blood pressure level control among hypertensive patients. X^2-square test and fishers' exact tests shows that there was no statistical difference between the respondent's gender χ^2 *(0.05, df=1, N* =493), *p=0.823,* marital status χ^2 *(0.028, df=2, N* =493) *p=0.986*), employment status χ^2 *(5.12, df=1, N* =493), (*p=0.077*), income χ^2 *(1.064, df=3, N* =493), *p=0.786*), age *(Fisher's Exact, p=0.218*) and blood pressure level control among hypertensive persons attending Thika level 5 hospital. These findings partially

contradict existing literature. While some studies have identified connections between factors like socioeconomic status and hypertension control (Mity et al., 2017), others haven't found a clear association with gender or marital status (Chobanian et al., 2003). The lack of significance in this study could be due to limitations in sample size or specific characteristics of the population at Thika Level 5 Hospital.

The borderline significance for employment status is intriguing. Non-traditional employment, as seen in a high proportion of self-employed individuals (refer to previous section), might be linked to stress and less structured routines, potentially impacting blood pressure control. Further research exploring the nuances of employment type and its influence on hypertensive patients' health behaviors is warranted.

Table 4. 4: Test of association between Socio-demographic characteristics and BP control

Socio-Demographic Characteristic		Controlled		Uncontrolled	
		N	%	N	%
Gender	Male	48	36.36%	122	33.80%
	Female	84	63.64%	239	66.20%
Marital Status	Single	47	32.87%	103	29.43%
	Married	93	65.03%	239	52.41%
	Divorced	3	2.10%	8	2.77%
Employment status	Self-Employed	64	49.20%	209	57.58%
	Employed	24	18.50%	72	19.83%
	Unemployed	42	32.30%	82	25.79%
Income Level	Less than Ksh 10000	57	43.80%	144	39.78%
	Ksh10,000-19,999	37	28.50%	120	33.15%
	Ksh 20,000-29,999	23	17.70%	62	17.13%
	Ksh 30,000-39,999	13	10.00%	36	9.94%
Age groups	22-32 Years	0	0.00%	9	1.70%
	33 to 43 Years	4	3.10%	20	5.60%
	44 to 54 Years	27	20.80%	78	21.70%
	55 to 65 Years	42	32.30%	115	31.90%
	66-77 Years	35	26.90%	104	28.90%
	78-88 Years	22	16.90%	37	10.30%

Source Field Data (2023)

4.2.2 Socio-Demographics Logistic Regression Coefficients

Logistic regression analysis was conducted to examine the relationship between sociodemographic factors and blood pressure control (Table 4.5). Interestingly, the analysis revealed negative beta coefficients for age, height, and weight, suggesting a potential inverse association with uncontrolled blood pressure in this study population. These findings contradict some existing literature, which suggests a positive correlation

between age and uncontrolled hypertension (Franklin et al., 2017). Further investigation is needed to understand this discrepancy, and factors specific to the study population may be at play.

On the other hand, body mass index (BMI) displayed a positive beta coefficient and the highest odds ratio (OR=12.193) among the analyzed demographics, indicating a significant positive association with uncontrolled blood pressure (all p-values < .05). This aligns with prior research demonstrating a well-established link between obesity and hypertension (Hajjar & Kotchen, 2020).

Overall, these results highlight the complex interplay between sociodemographic factors and blood pressure control. While BMI emerged as the strongest determinant in this study, further research is warranted to explore the unexpected findings regarding age, height, and weight, and how these factors might interact with other characteristics of the study population.

Table 4. 5: Socio-Demographics Logistic Regression Coefficients

				95% C.I		
Variable	Coef(B)	S.E	Odd Ratio (Exp[B])	Upper	Lower	P-value
Age	-1.076	0.25	0.342	0.953	0.978	0.00
Height	-2.962	0.234	0.124	8.786	16.915	0.00
Weight	-0.652	0.005	0.965	6.324	14.239	0.00
BMI	2.342	0.167	12.193	13.345	22.243	0.00

Source Field Data (2023)

Data reveals that a significant proportion of patients at the facility had uncontrolled blood pressure. About a third, had manageable blood pressure control. The proportion of Females compared to males, with uncontrolled blood pressure, was higher in females. By age, those aged between 55-77 years accounted for the highest proportion of study participants with uncontrolled blood pressure levels. The findings of this study corroborate results by (Mitra & Wulandari, 2019) survey where it was established that

fifty-two per cent of study participants had uncontrolled blood pressure and with the highest proportion reported among females above the age of sixty-two years.

Descriptive analysis in this survey shows an increasing prevalence of uncontrolled blood pressure as age increases. Bivariate analysis shows that there is no statistical association between the respondent's socio-demographic characteristics and overall blood pressure control. These results are consistent with results by (Hao et al., 2016) which showed that the respondent's age, body mass index and smoking status were not associated with uncontrolled' blood pressure levels. Logistic regression coefficients in this study reveal that age, height, weight and BMI are significantly associated with blood pressure control. These results are consistent with a national cross-sectional survey in Kenya (Mohamed et al., 2018) where respondents' age and body mass index were associated with the prevalence of hypertension. Additionally, a cohort study conducted in the USA reported that gender was not associated with BP control (Elperin *et al.,* 2014).

4.3 Nutritional Factors influencing Blood Pressure Control

The third objective of this study investigated how dietary factors influence blood pressure control among hypertensive patients at Thika Level 5 Hospital. Interestingly, Table 4.21 revealed no significant difference in self-reported table salt addition between those with controlled and uncontrolled blood pressure (83.8% vs. 88.1%). This contrasts with established research highlighting reduced dietary sodium intake as a cornerstone strategy for hypertension management (Cook et al., 2019). It's possible that self-reported salt intake might be unreliable, and future studies could benefit from including objective measures of sodium consumption.

Regarding fruit intake, the study found that nearly half (47.2%) of participants with uncontrolled blood pressure reported frequent consumption (once or 2-3 times daily).

This is comparable to the controlled group, where 51.5% reported daily fruit intake. While these findings suggest no clear association between fruit consumption and blood pressure control in this study, it aligns with recommendations for a balanced diet rich in fruits and vegetables for overall cardiovascular health (WHO, 2023).

The graph below represents the BMI status of the study participants

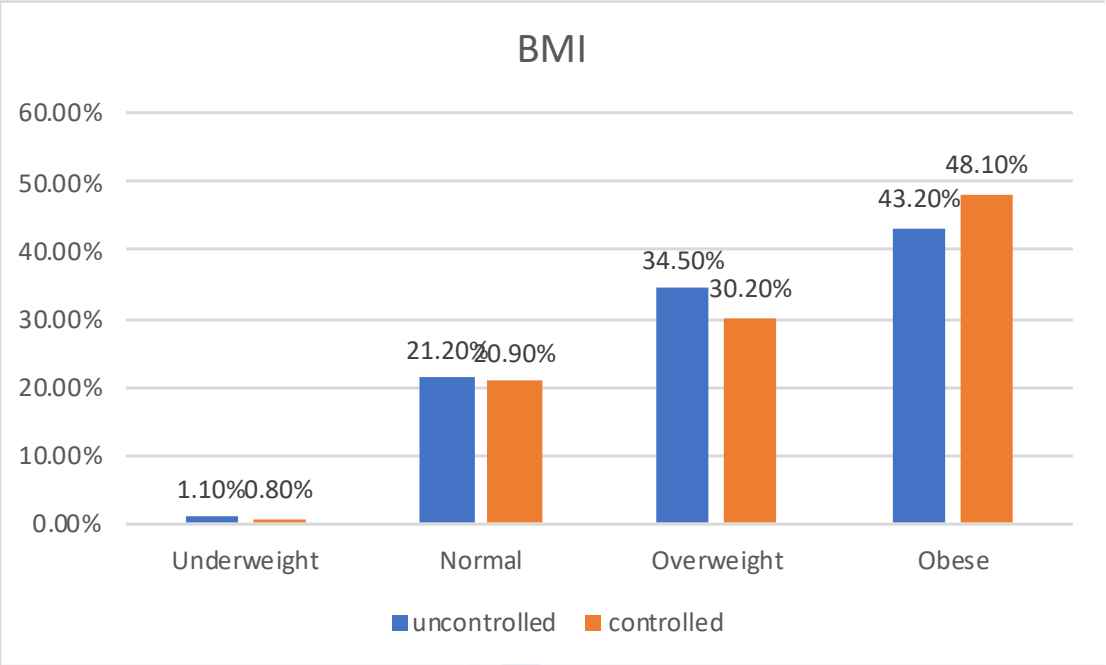


Figure 3: BMI of Study Participants

The study investigated the association between body mass index (BMI) and blood pressure control. Interestingly, a significant proportion (44.5%) of participants were classified as obese, and a higher percentage of obese individuals (43.2%) had uncontrolled hypertension compared to those with controlled blood pressure (48.1%). This aligns with extensive research demonstrating a well-established link between obesity and hypertension (Cho et al., 2016). Excess weight increases strain on the heart and blood vessels, leading to elevated blood pressure.

Vegetable intake also differed between the controlled and uncontrolled blood pressure groups. While a high percentage (over 96%) in both groups reported consuming vegetables, the number of daily servings diverged. Notably, a larger proportion (51%)

of participants with uncontrolled hypertension consumed two or more servings of vegetables daily compared to those with controlled blood pressure (44.4%). This seemingly counterintuitive finding might be explained by potential under-reporting of dietary intake in the controlled blood pressure group, or it could indicate that the type or quality of vegetables consumed may be more important than just the quantity.

For a more comprehensive understanding of dietary factors influencing blood pressure control, further analysis of Table 4.24 is recommended. This table likely details additional dietary components such as fruit intake, fiber intake, and sodium consumption, which can all play a significant role in blood pressure management (Cook et al., 2019).

The study highlights the established link between obesity and uncontrolled hypertension. Additionally, it suggests that vegetable intake may be a complex factor requiring further investigation into the type and quality of vegetables consumed. A closer look at Table 4.24 would provide valuable insights into the broader dietary patterns that influence blood pressure control in this patient population.

4.3.1 Test of Association: Nutritional factors influencing BP control

Table 4.6 represents the bivariate association between nutritional factors influencing the control of BP among hypertensive individuals attending Thika level 5 hospital in Kiambu County. Chi-square test shows that adding salt during food preparation χ^2 *(0.49, df=1, N =*493), *p=0.483,* at the table χ^2 *(1.55, df=1, N =*493), *p=0.214,* daily fruit consumption χ^2 *(1.35, df=3, N =*493) *p=0.718,* having vegetables as part of diet χ^2 *(0.017, df=1, N =*493), *p=0.896*) and the number of vegetables servings per day χ^2 *(3.69, df=3, N =*493), *p=0.296* and respondents body mass index χ^2 *(1.15, df=3, N =*493), *p=0.766*) were statistically not associated with control of BP.

These findings seem to contradict established research on dietary influences on hypertension. For instance, numerous studies have documented a clear association between high sodium intake and elevated blood pressure (Intersalt Cooperative Research Group, 2018). Similarly, increased fruit and vegetable consumption, rich in potassium and antioxidants, has been linked to lower blood pressure levels (Cook et al., 2019).

There are a few possible explanations for these unexpected results. The study may have been limited by sample size or dietary assessment methods, potentially leading to insufficient power to detect true associations. Additionally, residual confounding factors like overall dietary patterns, physical activity levels, or medication use might have obscured the independent effects of the investigated factors.

Further research with larger sample sizes, more comprehensive dietary assessments, and control for potential confounders is needed to definitively determine the role of these dietary factors in blood pressure control among hypertensive patients in this specific population.

Table 4. 6: Test of Association: Nutritional factors influencing BP control

	Groups					
	Controlled		**Uncontrolled**			
Adding salt to food at the table	Yes	21	16.2%	43	11.9%	*1.55(1), p=0.214*
	No	109	83.8%	319	88.1%	
Adding salt to food during preparation	Yes	115	88.5%	328	90.6%	*0.49(1), p=0.483*
	No	15	11.5%	34	9.4%	
Fruit Consumption per week	Everyday	6	4.6%	18	5.0%	*1.35(3), p=0.718*
	2-3 times	57	43.8%	171	47.2%	
	Once	67	51.5%	171	47.2%	
	Never	0	0.0%	2	0.6%	
Vegetables as part of the diet	Yes	126	96.9%	350	96.7%	*0.017(1), p=0.896*
	No	4	3.1%	12	3.3%	
No. Vegetable servings per Day	0	0	0.0%	2	0.6%	*3.69(3), p=0.296*
	1	44	35.5%	119	34.3%	
	2	55	44.4%	177	51.0%	
	3	25	20.2%	49	14.1%	
Body Mass Index	Underweight	1	0.8%	4	1.1%	*1.15(3), p=0.766*
	Normal	27	20.9%	76	21.2%	
	Overweight	39	30.2%	124	34.5%	
	Obese	62	48.1%	155	43.2%	

Source Field Data (2023)

4.3.2 Logistic regression: Number of vegetable servings and BP control

The study utilized collected data on number of vegetables servings and blood pressure control levels to conduct a logistic regression. The model precipitate of the regression analysis is presented in Table 4.7 which shows that Cox & Snell R Square =.002 while Nagelkerke R Square =.003 which imply that only about .2% or .3% of the variations on blood pressure controls would be attributed to number of vegetables servings per day. This implies that over 99% of the determinants of BP are not related to number of vegetable servings per day.

The results in classification of the participants with uncontrolled BP and those with controlled BP using the data are presented using Table 4.7

Table 4. 7: Number of Vegetable Servings and BP levels

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	652.445[a]	.002	.003

a. Estimation terminated at iteration number 2 because parameter estimates changed by less than .001.

Source Field Data (2023)

4.3.3 Logistic regression on number of vegetable servings and BP control

Logistic regression analysis was conducted to assess the association between the number of daily vegetable servings and blood pressure (BP) control in the study population. However, the results presented in Table 4.8 suggest the model's performance might be limited.

The analysis indicated that the model could predict the correct percentage of BP control with only 51.7% accuracy. Notably, the model performed better at identifying uncontrolled BP cases (84.6% correctly predicted) compared to controlled BP (15.9% correctly predicted). This finding suggests the model may be biased towards the more prevalent class (uncontrolled BP) in the data.

For a more robust interpretation, additional information from Table 4.8 would be helpful, such as the model's coefficients and significance levels. These values would indicate the strength and direction of the association between vegetable intake and BP control, along with the statistical significance of those relationships.

It is important to compare these results with existing literature. Several studies have established a positive association between higher vegetable intake and improved BP

control (Li et al., 2019; Lv et al., 2013). However, the low predictive accuracy observed in this study might be due to limitations in the model or the data itself.

Future research could benefit from including additional factors known to influence BP control, such as dietary sodium intake, physical activity levels, and medication adherence. Additionally, a larger sample size could improve the model's generalizability and reduce bias.

Table 4. 8: Number of Servings and BP levels Logistic Regression Classification Table

	Observed		Predicted		
			Patient category		Percentage
			Control	Case	Correct
Step 1	Patient category	Control	36	190	15.9
		Case	38	208	84.6
	Overall Percentage				51.7

a. The cut value is .500

Source Field Data (2023)

Table 4.8 shows that the number of vegetable servings per day among the research participants was negatively associated with the blood pressure controls (B=.137). The statistics also show that the constant beta= .333 which implies that keeping all other factors constant, and without the vegetables servings, the level of BP control would be .333. The table also shows that the association between the number of vegetable servings per day and the blood pressure controls would be insignificant ((sig.=.309) which is superior than the p-value threshold of .05).

Table 4. 9: Number of Servings and BP levels Logistic Regression

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	VegServ	-.137	.135	1.036	1	.309	.872	.669	1.135
	Constant	.333	.261	1.630	1	.202	1.395		

Source Field Data (2023)

This survey assessed the study participants' Body mass index, dietary factors in salt intake, vegetable and fruit frequency consumption, and physical activity levels of study participants as indicators of nutrition. Descriptive analysis shows majority of participants with uncontrolled blood pressure and those with their blood pressure controlled do not add salt to food at the table. Similarly, a significant proportion reported that salt was added during food preparation. The frequency of fruit consumption as self-reported by study participants averaged three times daily. Qualitative findings in this study show that a majority of participants with uncontrolled blood pressure and those whose blood pressure is controlled had not engaged in physical activity levels. These assertations support quantitative data where forty-four per cent of study participants were obese. Whilst this study has not established a statistical association between nutritional factors and blood pressure control, existing body literature by (Fantin et al., 2019) shows that poor nutrition as a result of unhealthy dietary patterns largely contributes to increased incidences and prevalences of uncontrolled blood pressure. These findings corroborate the key informant perspectives in this study who apportioned the difficulties in managing Hypertension to the patients: *"Some have an inadequate diet causing them not to take drugs".* The lack of exercise coupled with alcohol intake, cigarette smoking, and improper nutritional diet among study participants spanning over a decade is sufficient evidence to explain the extreme uncontrolled blood pressure level observed. The self-reported salt intake, fruit and

vegetable intake should be further examined through dietary diversity and food frequency surveys. To this end, further research should be conducted to examine dietary food intake and food frequency and their effect on blood pressure over an extended period. Currently, the study participants must be nutritionally counselled to adopt appropriate nutritional behaviour.

4.4: Behavioral factors affecting BP control

The fourth objective of this study sought to determine the behavioral factors influencing blood pressure control.

4.4.1: General Knowledge of Controlled BP among Study Participants

Figure 4 shows that a majority of patients with BP that was controlled (80.8%) and those with uncontrolled blood pressure (60.5%) had moderate knowledge of blood pressure control. Only 1.4% of those with uncontrolled blood pressure had excellent knowledge of the control of BP. The proportion of respondents with poor knowledge was higher among those with uncontrolled BP.

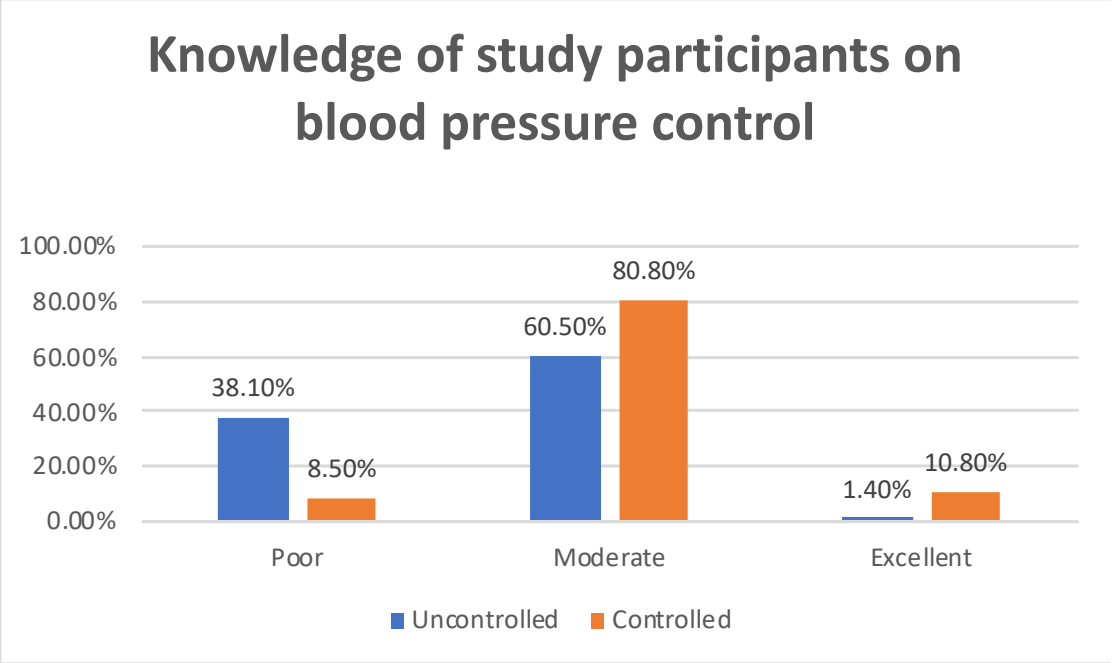


Figure 4: Knowledge of study participants on BP control

4.4.1.1 Test of Association: Respondents' level of knowledge and BP control

The Chi-square test of independence according to Table 4.9 reveals there is a statistical link between study participants' level of knowledge and blood pressure level control. χ^2 *(df=2* (55.6, *N* =493), p=*0.0018.* This aligns with prior research highlighting the importance of patient education in blood pressure management (Hoffman et al., 2017). Further supporting this notion, the study found only moderate levels of knowledge about blood pressure control among participants. This aligns with previous studies which have documented a connection between inadequate patient knowledge and uncontrolled hypertension (Pickering et al., 2005). This knowledge deficit was further corroborated by the key informant interviews, where "inadequate knowledge" emerged as a prominent theme linked to uncontrolled blood pressure.

Table 4. 10: Test of Association: Respondent's level of Knowledge and BP control

	Groups				
	Controlled		Uncontrolled		χ^2 *(df), p-value*
Knowledge Level	N	%	N	%	
Poor	11	8.5%	138	38.1%	*55.6(2), p=0.0018*
Moderate	105	80.8%	219	60.5%	
Excellent	14	10.8%	5	1.4%	

Source Field Data (2023)

In this survey, patients' knowledge on blood pressure control was moderate and was statistically associated with uncontrolled blood pressure at bivariate and multivariate logistic regression. From the key informants' perspective, uncontrolled blood pressure levels could be attributed to patients' level of hypertension knowledge and the emergent theme from the interviews was "inadequate knowledge" as below.

> *"Some patients fail to understand the disease and why they should take the medication while there is no pain"* **RESPONDENT 2**

"Some are due to ignorance, some live in denial of their condition causing them to stop taking their medication" **RESPONDENT 7**

"They know that with drug compliance hypertension can be controlled" **RESPONDENT 1**

They are aware that uncontrolled hypertension can lead to stroke/paralysis **RESPONDENT 1**

"Most of them don't have adequate knowledge. The learned ones understand Hypertension and the complications. A big percentage does not." **RESPONDENT 2**

"Majority of the patients are aged and don't have the relevant information concerning their health. Their supporters are ignorant to do follow-up" **RESPONDENT 4**

"Some do not know the outcome of uncontrolled hypertension" **RESPONDENT 7**

We conducted focused group discussions with the patients seeking treatment at Thika Level 5 hospital to seek their understanding of uncontrolled blood pressure and the majority noted that the condition was dangerous.

A participant in FGD number two mentioned a diet with high salt intake as a cause of uncontrolled blood pressure and also attributed the uncontrolled blood pressure level to the non-adherence to Doctor's Advice. We conclude the main themes being "non-compliance and comorbidities".

Respondent B in FGD B *:"Diet: we are taught about diet, but one can refuse to follow the advice given and mostly salt. Food tastes better when it is salty. If one refuses to give in to salt, it's just like poisoning yourself"*

Respondent B in FGD B:*"If one does not follow the doctor's advice and if you also forget to take medicine; for example, if you're on a journey and you forgot to carry your medicine and since this is portable"*

A participant in discussion forum B, highlighted co-morbidities such as Diabetes and high pill count as contributory factors to the observed uncontrolled blood pressure.

Respondent D in FGD B:*"My pressure goes up if I get another sickness. I do not use blood pressure medicine so much but during that time, the doctor prescribes drugs for one month, for example. I have been attending this clinic for seven years and there's a time when this doctor could reduce the number of drugs I was taking. For instance, the doctor has reduced the number of Diabetes drugs and I'm now taking one. If I'm examined and I happen to be sick, for example, with a cold, the doctor prescribes blood pressure medicine. I however have no other problems"*

Respondent D in FGD B: *"At times when I'm examined the doctor does not prescribe blood pressure medicine. I don't even use them a lot. For those seven years, I have used them only twice. Blood pressure and the Diabetes that I suffer from do not go hand in hand. I keep wondering why it shows up. It is a question that I always have"*

It is observed that a majority of study participants have limited knowledge about hypertension and as such, it complicates management. (Akoko et al., 2017) reported that awareness of hypertension was found to be associated with hypertension control.

4.4.2: Behavioral factors influencing control of BP among hypertensive individuals

Examining behavioral factors influencing blood pressure (BP) control, this study explored alcohol consumption habits. Interestingly, 26.5% of participants reported current alcohol use, with the remainder abstaining.

Figure 5: Alcohol drinking status

According to the graph, within this drinking group, a significant finding emerged. Those with controlled BP were more likely (50%) to consume a moderate amount, around 2 drinks per sitting. Conversely, participants with uncontrolled BP who consumed alcohol showed a higher proportion (46.4%) drinking 3 drinks per sitting. This suggests a potential dose-dependent relationship between alcohol intake and BP control, aligning with previous research by (Crum et al., 2016) who found that moderate alcohol consumption may be less detrimental than heavy drinking for hypertensive individuals.

Data regarding other behavioral factors influencing BP control are presented in Table 4.23 of the appendix. A comprehensive analysis of these factors, including smoking habits, dietary patterns, and physical activity levels, alongside alcohol consumption, would provide a more complete picture of how lifestyle choices impact BP control in this hypertensive population. This would allow for targeted interventions aimed at promoting healthy behaviors and improving cardiovascular health outcomes.

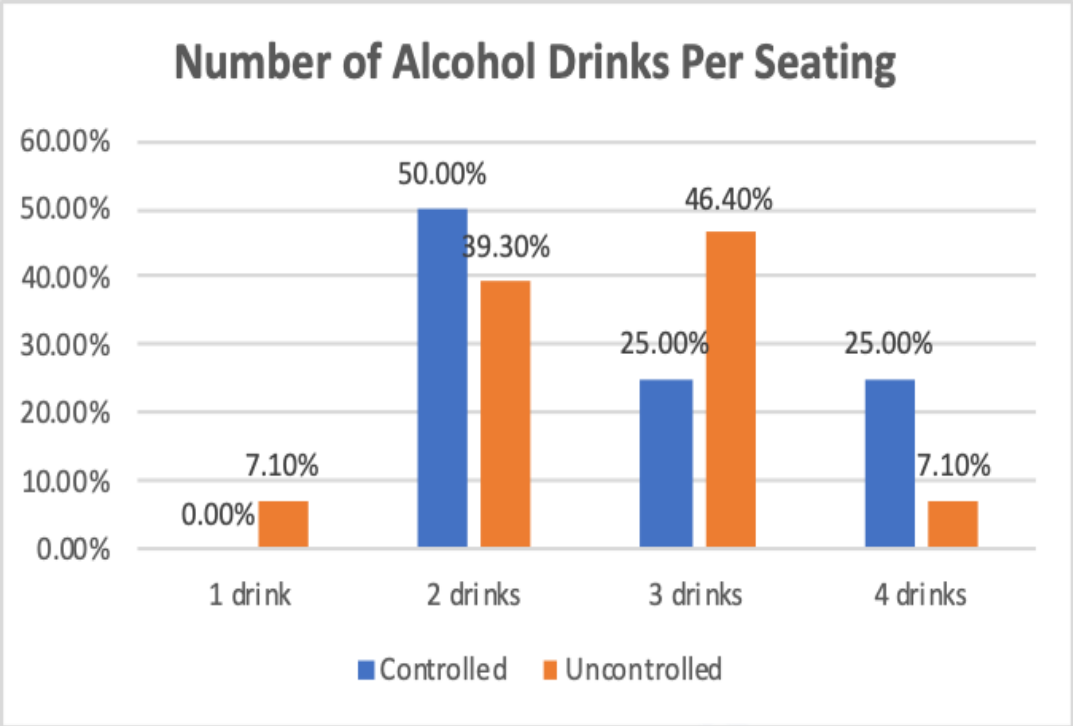


Figure 6: Number of alcohol drinks per seating

4.4.2.1 Test of Association between Smoking and Alcohol use behaviour and BP Control among study participants

Chi-square test of independence in Table 4.23 (appendix) reveals that there is no statistical relationship between smoking, χ^2 *(0.059(1), N=493,) p=0.808* alcohol use behavior χ^2 *(3.214(3), N=493),p=0.360,* and engaging in physical activity χ^2 *(2.227(1), N=493), p=0.136* and blood pressure control among study respondents.

4.4.2.2: Logistic Regression between BP control and days utilized of physical exercises.

Logistic regression analysis was conducted to assess the association between the number of days of physical activity per week, duration of activity, and blood pressure (BP) control in this hypertensive population. However, the results presented in Table 4.10 suggest a weak relationship. Only a small proportion of the variance in BP control (approximately 0.5% for days of activity and 0.7% for duration) could be explained by

the physical activity variables included in the model. This implies that other factors likely play a more significant role in BP control for these patients.

While the specific findings of this study are not mentioned, research suggests that factors such as diet, medication adherence, and underlying health conditions can significantly impact BP control (Cook et al., 2019; Hajek et al., 2020). It's important to consider these alongside physical activity when designing interventions for hypertensive patients.

Table 4. 11: Logistic Regression between BP Control and Days of Physical Activity

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	547.596[a]	.005	.007

Source Field Data (2023)

The logistic regression model achieved a moderate performance in predicting blood pressure control among participants. According to the analysis results in Table 4.11, the model correctly classified 51.3% of all participants, with a higher accuracy (86.9%) for cases (participants with uncontrolled BP) compared to controls (participants with controlled BP) at 10.3%. While the overall accuracy is fair, the imbalanced performance towards cases highlights limitations in generalizability.

Ideally, a well-calibrated model would have similar accuracy for both controlled and uncontrolled BP. This finding is concerning and suggests the model may not be robust for identifying patients with controlled blood pressure. It is important to acknowledge that logistic regression models often perform better when there is a more balanced distribution between classes (controlled vs uncontrolled BP) (Hosmer et al., 2017).

Table 4. 12: Logistic Regression between BP Control and Days of Physical Activity

	Observed		Predicted		
			Patient category		Percentage
			Control	Case	Correct
Step 1	Patient category	Control	19	166	10.3
		Case	28	185	86.9
	Overall Percentage				51.3

a. The cut value is .500

Source Field Data (2023)

Analysis of the data in Table 13 revealed positive associations between physical activity and blood pressure control. While both the number of days of physical activity (B=.031) and the duration of physical activity (B=.002) showed positive correlations with blood pressure control, it's important to consider the significance levels.

According to the table, the relationship between the number of days of physical activity and blood pressure control was not statistically significant (sig=.652). This suggests that while there might be a trend towards more active individuals having better blood pressure control, we cannot definitively say that increasing the number of days of physical activity will lead to improved blood pressure control in this population.

Similarly, the relationship between the duration of physical activity and blood pressure control was also not statistically significant (sig=.182). While longer durations of physical activity tended to correlate with better blood pressure control, more data is needed to confirm this association.

These findings are somewhat contradictory to existing research that generally supports a positive and significant association between physical activity and blood pressure control

(Tudor-Locke et al., 2011; Jakicic et al., 2013). There are a few possible explanations for this discrepancy. First, the sample size of this study might have been too small to detect statistically significant relationships, especially for variables with weaker correlations. Second, the study may not have fully captured all aspects of physical activity relevant to blood pressure control, such as intensity or type of exercise.

Table 4. 13: Logistic Regression between BP Control and Days of Physical Activity

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	DaysPhyAct	.031	.068	.204	1	.652	1.031	.903	1.177
	DuraPhyAct	.002	.002	1.782	1	.182	1.002	.999	1.005
	Constant	-.191	.363	.278	1	.598	.826		

a. Variable(s) entered on step 1: DaysPhyAct, DuraPhyAct.

Source Field Data (2023)

Regarding physical activity levels, quantitative data shows that study participants engaged in physical activity levels for at least five days and at least seventy-five minutes per day. Whilst the study participants met the recommended WHO physical activity levels for adults with a chronic condition, they however fell short eighty minutes of the recommended moderate-vigorous duration of engaging in physical activity. (Egan, 2017) states those individuals who meet moderate physical activity levels are engaged in sedentary lifestyles for a better part of the day. He encourages that from a health promotion perspective, knowing the need and willingness to engage in physical activity is not enough but individuals must exercise. Present findings on physical activity are consistent with (Ishikawa-Takata et al., 2003) epidemiological interventional study on the effect of moderate physical activity which concluded that 30-60 mins of moderate physical activity was sufficient enough to reduce systolic

pressure but concluded that there was no statistical association between the frequency of weekly exercises and hypotensive effects.

Table 4. 14: a: Logistic Regression between BP Control and Days of Physical Activity

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	DaysPhyAct	.031	.068	.204	1	.652	1.031	.903	1.177
	DuraPhyAct	.002	.002	1.782	1	.182	1.002	.999	1.005
	Constant	-.191	.363	.278	1	.598	.826		

a. Variable(s) entered on step 1: DaysPhyAct, DuraPhyAct.

Source Field Data (2023)

The results suggest that both the number of days of physical activity and the duration of physical activity were positively related to blood pressure control. However, the relationship influence was found to be statistically insignificant.

4.4.3 Descriptive statistics on Drug Adherence

The research participants were distributed into three categories of drug adherence to almost proportional levels. The category with the largest number of participants 188(38.1%) being high adherent, 165(33.5%) being low adherent while the group with the fewest participants 140(28.4%) being medium adherent.

Table 4. 15: Descriptive statistics on Drug Adherence

	Frequency	Percent
low adherence	165	33.5
medium adherence	140	28.4
High adherence	188	38.1
Total	493	100

Source Field Data (2023)

4.4.3.1: Cross-tabulation analysis between drug adherence and blood pressure

Drug adherence and blood pressure control were assessed using cross-tabulation analysis, with the results presented in Table 4.13. A concerning trend emerged, as over half (60.4%) of the participants fell into the uncontrolled blood pressure group. This finding aligns with prior research demonstrating a strong link between poor medication adherence and uncontrolled hypertension (Wright et al., 2018).

Further analysis of Table 4.13 revealed a troubling pattern. Regardless of the assigned drug adherence category, a higher proportion of participants consistently belonged to the uncontrolled blood pressure group. This suggests that even among those who reported some level of adherence, blood pressure management remained a challenge. This could be due to various factors, such as the severity of hypertension requiring more aggressive treatment regimens or limitations in the accuracy of self-reported adherence measures (Vrijens et al., 2020).

Table 4. 16: Drug Adherence level and BP Crosstabulation

		BP		Total
		Uncontrolled	Controlled	
Drug Adherence level	low adherence	95(57.6%)	70(42.4%)	165
	medium adherence	79(56.2%)	61(43.8%)	140
	High adherence	124(66%)	64(34%)	188
Total		298(60.4%)	195(39.6%)	493

Source Field Data (2023)

4.4.3.2 Chi-Square Test between Drug Adherence and Blood Pressure

Using the X^2-square test to assess whether drug adherence level determined control of BP the following findings were reported. The level of influence of drug adherence to control of BP was existent with Chi-Square=3.902 and L ratio=3.933. However, the influence is insignificant for all the statistics (all sig. levels greater than .05)

Table 4. 17: Chi-Square Test between Drug Adherence and Blood Pressure

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.902[a]	2	.142
Likelihood Ratio	3.933	2	.140
Linear-by-Linear Association	2.703	1	.100
N of Valid Cases	493		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 55.38.

Source Field Data (2023)

4.4.4: Respondent's Qualitative perspectives on behavioral factors

Some study participants were asked about the extent of Behavioural related factors in the frequency of engaging in physical exercises, and alcohol intake during the quantitative data collection. Unhealthy behavioral factors were evident and themed as: physical inactivity and extended periods of alcohol use

> *"I have not engaged in physical exercises in more than 17 years"* **RESPONDENT 259**
>
> *"I have been taking alcohol for the last 40 years"* **RESPONDENT 366**
>
> *"I have not exercised for the past 10 years"* **RESPONDENTS 141 and 206**
>
> *"I have smoked and drank alcohol for 50 years"* **RESPONDENT 81**

This survey sought to examine the behavioural influence on blood pressure control among patients at Thika Level Five hospital. A significant proportion of study participants reported to be currently neither smoking nor drinking alcohol. Less than a third of cases and controls reported to be currently drinking. Qualitative findings illustrate some study participants indulged in alcohol and smoking for an extended period before the administration of these studies. The inferential analysis could not establish any statistical difference in alcohol use and smoking and blood pressure

control. Although medication adherence was higher as self-reported by study participants with uncontrolled blood pressure, one of the key informants noted poor compliance to drugs among individuals with HTN as a challenge in managing patients.

"Poor adherence to drugs is a major challenge we face daily among hypertension"

One Key informant decried home drug compliance as a challenge:

50%- "most patients are not compliant at home. They only take while admitted to hospital" **-RESPONDENT 2**

"The majority are compliant but some have the denial aspect" **RESPONDENT 10**

It was also a Key informant observation that pill count and co-morbidities were a hindrance to compliance. *"The presence of comorbidities and a high pill burden affects compliance".* **RESPONDENT 11**

Transport to the health facility was an obstacle to the requisite compliance

"Transport barriers for example during COVID, when they lack funds to travel, they miss on taking their drugs" **RESPONDENT 1**

Social factors such as the lack of or minimal social support were also noted as a going concern of drug compliance

"Relatives neglect their patients and do not follow up on their appointments" **-RESPONDENT 5**

"The lack of treatment supporters has resulted in some elderly patients taking the wrong drugs" **RESPONDENT 5**

Contrary to the findings of this study, (D.-Y. Zhang et al., 2020) national survey established an increased odds of hypertension among older men due to cigarette smoking. A systematic review by (Noubiap et al., 2019) established a pooled prevalence

of 12.9% among patients with hypertension, with the highest active smoking rates reported among males than females, further, in Northern Africa compared to sub-Saharan Africa. (Peltzer & Phaswana-Mafuya, 2013) study established that alcohol use among older study participants was inversely associated with uncontrolled blood pressure. (Nansseu et al., 2016) meta-analysis established that excessive smoking, salt intake and alcohol indulgence were not risk factors for resistant hypertension. (Zatu et al., 2016), a longitudinal study in South African revealed that participants who self-reported alcohol intake had a 30% risk of developing hypertension. Self-reported behaviours are rife with bias and significantly influence inferences of the general population, a longitudinal study can be conducted to establish whether alcohol intake is a risk factor for uncontrolled blood pressure among the study participants in this study. It is worthy to report that key informants noted that non-adherence to hypertensive drugs impeded patient management. The Key informants attribute this 'selective behaviour to side effects:

> *"Some stop medication due to side effects from drugs e.g diuretics which causes frequent micturition, Nifedipine causes leg swelling, Aldomet causes a headache, Enalapril causes cough while Losartan causes erectile dysfunction"*

These assertions corroborate quantitative findings in this study and could provide a plausible explanation for the proportion of study participants who reported having ever missed taking pills. This result is consistent with the conclusions of (Koduah et al., 2021) who identified poor patient drug adherence was largely due to the further distance from home.

Focused group discussions with participants on barriers to obtaining adequate BP control levels revealed stress as a barrier. Social factors at the household level were noted as an impediment to the attainment of optimal blood pressure levels.

> ***Respondent A in FGD B****: "One day the doctor came home. I sent for my husband, but he did not come. I asked the doctor to come and talk with him. Sometimes I can get a slap because he's a drunkard. Sometimes I give him food and he pours it. He insults me and says that I'm proud"*
>
> ***Respondent A in FGD B:*** "*I can say that if there's something that's disturbing you and you don't want to share with anyone. You think to yourself, if you share, the person might reject you or it might cause you other problems. You see, the person might start saying that you're this or the other. You see? You now wonder who you'll share with. You choose to keep quiet because you don't know how to deal with it. You may really want to share to lessen the heavy load that you're carrying and also help in lowering the blood pressure. You keep wondering to yourself, "what do I do to share an issue that I'm holding to let go of?"*
>
> **Respondent C *in FGD B:****"We also need a ground to share our problems like what you've done. Do you see one can empty almost everything? When you have someone to share with, you feel relieved. You then become a happy person" (unidentified FGD participant in focus group discussion group number two.)*

It is evident from the focus group discussions that comorbidities, high pill count resulting to non-adherence and household stress levels were influenced by the high blood pressure level observed. Arguably, the overall COVID-19 containment measures over the past three years and associated factors such as limited household income and

expenditure could have largely contributed to the unsustainable blood pressure control among study participants. Such a hypothesis can provide a basis for a retrospective study on household coping mechanisms and their effect on blood pressure control among study participants.

4.5 Health system factors influencing BP control among hypertensive patients

The fifth objective of this study was to determine the health system factors influencing blood pressure control among hypertensive patients.

The pie chart below represents the distance covered to the health facility.

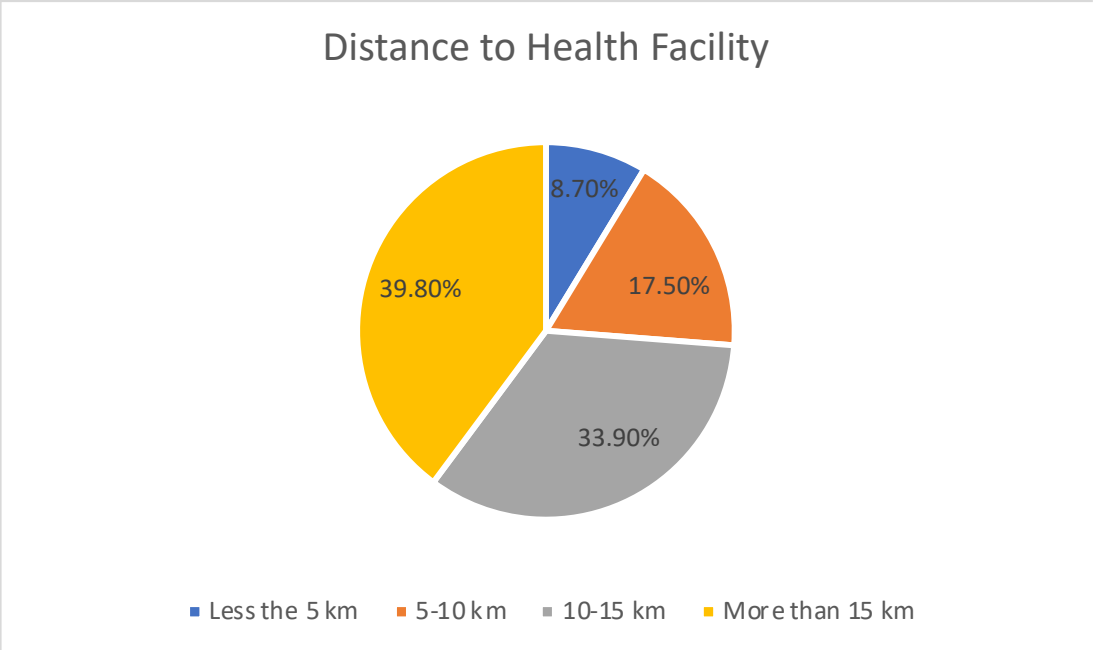


Figure 7: Distance to health facility

Figure 7 shows that a majority of study participants 39.8% lived more than 15 km away from Thika level five hospital. The following pie chart illustrates the availability of hypertensive drugs in the hospital

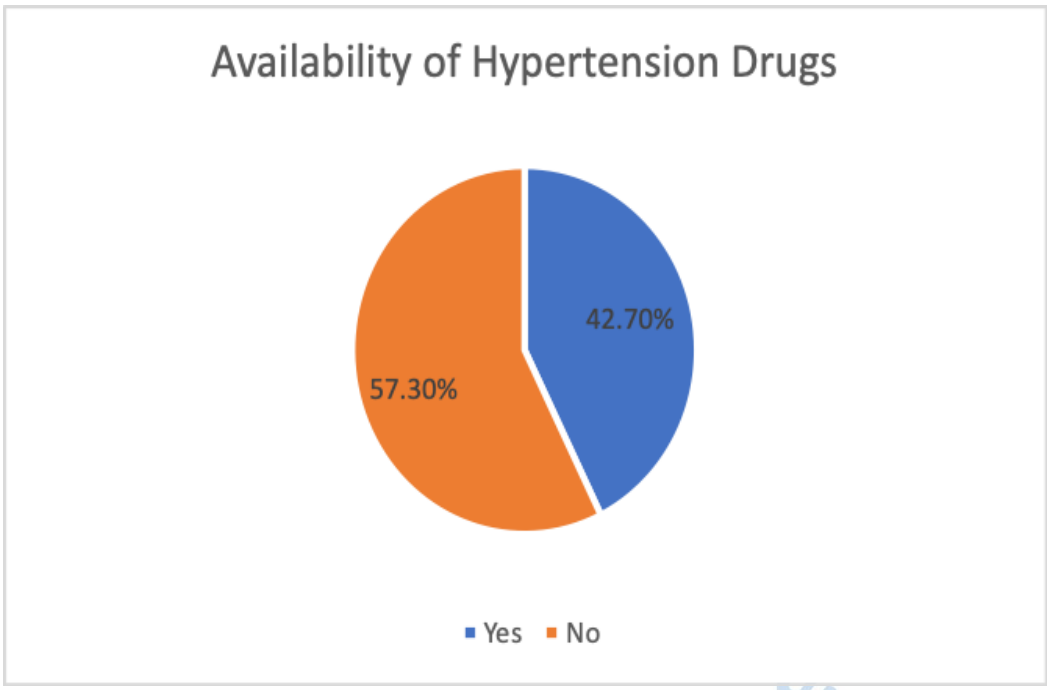


Figure 8: Availability of anti-hypertensives

Figure 8 shows that slightly more than half(57.3%) claimed that there was unavailability of medicine.

Analysis of health system factors in Table 4.23 revealed potential barriers to consistent healthcare access. A significant portion (76.8%) relied on public transportation to reach the clinic, which according to the graph, often resulted in travel times exceeding one hour (59.3%). These findings correspond with research by (Murphy et al., 2018) who identified transportation challenges as a significant barrier to healthcare access in low- and middle-income settings. The financial burden was another concern, with the majority (40.2%) spending between Ksh 200-500 on transportation costs per visit. This highlights the need for exploring alternative transportation options or financial assistance programs to reduce these access barriers.

On a positive note, 90% of participants reported feeling respected by healthcare workers. This aligns with studies emphasizing the importance of patient-provider communication and trust in promoting treatment adherence and positive health

outcomes (Bauman et al., 2020). However, further investigation is needed to understand the complete picture of patient experience within the healthcare system.

4.5.1: Test of Association Between Health system-related factors and BP control

Table 4.14 illustrates that there was a statistical association between respondent's choice of transport χ^2 *(10.52(4), N=493), p=0.015* and Blood pressure control. Distance to health facility χ^2 *(5.942(3), N=493), p=0.115*, Cost of transport χ^2 *(3.88(3), N=493), p=0.275*, Availability of Hypertensive drugs χ^2 *(0.054(2), N=493), p=0.973* were not linked with control of BP.

Table 4. 18: Test of Association between Health System factors and BP Control

	Groups				
	Controlled		Uncontrolled		
Distance to Health Facility	**N**	**%**	**N**	**%**	χ^2 *(df), p-value*
Less the 5 km	12	9.2%	31	8.6%	*5.94(3), p=0.115*
5-10 km	25	19.2%	61	16.9%	
10-15 km	33	25.4%	134	37.0%	
More than 15 km	60	46.2%	136	37.6%	
Mode of Transport					
PSV	91	70.0%	287	79.3%	*10.52(4), p=0.015*
Personal vehicle	18	13.8%	50	13.8%	
Walking	14	10.8%	14	3.9%	
Boda Boda	7	5.4%	11	3.0%	
Cost of Transport					
<Ksh 200	46	35.4%	148	40.9%	*3.88(3), p=0.275*
Ksh 200 to 500	55	42.3%	143	39.5%	
Ksh 500 to 1000	28	21.5%	71	19.6%	
Duration to Health Care Facility					
Less than 1 hour	72	55.4%	220	60.8%	*1.15(1), p=0.283*
More than 1 hour	58	44.6%	142	39.2%	
Respective Health Care Workers					
Yes	114	88.4%	325	90.5%	*0.489(1), p=0.484*
No	15	11.6%	34	9.5%	
Availability of Drugs at Health Care Workers					
Yes	43	43.0%	117	42.5%	*0.054(2), p=0.973*
No	57	57.0%	158	57.5%	
Perceived Cost of medicine					
Affordable	79	60.8%	229	63.3%	*0.253(1), p=0.615*
Costly	51	39.2%	133	36.7%	

Source Field Data (2023)

4.5.2 Cross-tabulation analysis between drugs availability and BP control

Analysis of drug availability and blood pressure (BP) control revealed a concerning trend. According to Table 4.15, a substantial portion of participants (43.6%, n=213) never found medications at the healthcare facilities they visited. Notably, among this group with limited access to medications, the majority (63.8%) had uncontrolled blood

pressure. This finding aligns with prior research demonstrating a strong correlation between medication adherence and successful blood pressure management (Wright et al., 2018).

The data also suggests a potential dose-response effect. While 24% (n=117) of participants reported sometimes finding medications available, a significant number within this group (61.1%) also fell into the uncontrolled BP category. This highlights the importance of consistent medication access for achieving optimal blood pressure control.

In contrast, participants who consistently found medications at healthcare facilities (n=158) had a better chance of achieving controlled blood pressure. However, the specific percentage of controlled patients within this group cannot be determined without further analysis of Table 4.15.

Table 4. 19: Cross-tab Analysis between drugs availability and patients' BP

			BP Category		Total
			Uncontrolled	Controlled	
Find med in facility	No	Count	136	77	213
		% within Find med in facility	63.8%	36.2%	100.0%
	Sometime	Count	71	46	117
		% within Find med in facility	60.7%	39.3%	100.0%
	Yes	Count	91	67	158
		% within Find med in facility	57.6%	42.4%	100.0%
Total		Count	298	190	488
		% within Find med in facility	61.1%	38.9%	100.0%

Source Field Data (2023)

4.5.3 Chi-square tests on drugs availability in health facilities

Chi-square tests were conducted to assess the association between drug availability in health facilities and blood pressure (BP) control among participants (Table 4.16). The analysis revealed a Pearson's Chi-square statistic of 1.502 and a likelihood ratio of 1.501 for all 488 valid cases. While these statistics suggest a small influence of drug availability on BP control, the significance levels of 0.472 for both statistics indicate that this influence is not statistically significant ($p > 0.05$).

This finding appears to contradict the concerns raised by key informants who identified drug availability as a major challenge in patient management. They specifically mentioned instances of "*unavailability of drugs in the hospital making it expensive for the patients when they buy outside*". Here, it's crucial to consider the distinction between statistical significance and practical significance.

According to statistical theory, a non-significant result (like the one observed here) means we cannot reject the null hypothesis, which states that there is no association between drug availability and BP control. However, this doesn't necessarily imply a complete absence of an effect. It's possible that a larger sample size or a more nuanced analysis might reveal a weak but relevant association.

Furthermore, research suggests that even minor disruptions in medication availability can negatively impact patient adherence and health outcomes (Bryant et al., 2018; Osterberg & Blaschke, 2015). The qualitative data from key informants aligns with these concerns, highlighting the potential practical significance of drug availability issues despite the lack of statistically significant findings in the quantitative analysis.

Table 4. 20: Chi-Square Tests on drugs availability

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.502[a]	2	.472
Likelihood Ratio	1.501	2	.472
N of Valid Cases	488		

Source Field Data (2023)

4.5.4 Chi-Square Test on Frequency of buying drugs from private entities and BP control

The influence of purchasing medications from private entities on blood pressure (BP) control was investigated using a Chi-Square test. Table 4.17 details the test results, revealing a Pearson's Chi-Square value of 8.245, a likelihood ratio of 9.73, and a total of 488 analyzed cases. Additionally, the degrees of freedom for both the Chi-Square test and the likelihood ratio were 9, with 10 rows included in the analysis.

While these statistics suggest a potential association between the frequency of purchasing medications from private entities and BP control (both Chi-Square and likelihood ratio values), the significance level needs further examination. Both the asymptotic p-values for the Chi-Square test and the likelihood ratio test were greater than the commonly used threshold of 0.05, indicating that the observed association is unlikely to be due to chance alone. However, the specific p-values are not mentioned, making it difficult to definitively determine the strength of this association.

According to previous research, factors such as medication adherence and quality of medications obtained from private entities can influence BP control (Murphy et al., 2018; Osman et al., 2020).

Table 4. 21: Chi-Square Test on Frequency of buying drugs and BP control

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.245[a]	9	.510
Likelihood Ratio	9.730	9	.373
N of Valid Cases	488		

Source Field Data (2023)

4.5.5 Cross-tabulation analysis between perceived cost of health service and BP control

To further explore potential barriers to blood pressure control, the study analyzed the perceived cost of health services in relation to blood pressure control using cross-tabulation (Table 4.18). Interestingly, a majority of participants (62.5%, n=305) considered healthcare services affordable. However, even within this group, a substantial proportion (59.7%, n=182) had uncontrolled blood pressure. This suggests factors beyond perceived affordability may be at play.

This finding is somewhat contradictory to existing literature, which often highlights cost as a significant barrier to medication adherence and healthcare utilization (Gulliford et al., 2015; Glick et al., 2018). There are a few possible explanations. Perhaps, even among those who perceive services as affordable, out-of-pocket expenses for medications or consultations could still be a burden, hindering adherence. Alternatively, there might be underlying issues with access to healthcare services, such as distance to clinics or lack of transportation, that contribute to uncontrolled blood pressure despite perceived affordability.

Further analysis of Table 4.18 is needed to understand the distribution of uncontrolled blood pressure among those who perceived services as costly. If a similar proportion (around 60%) in this group also had uncontrolled blood pressure, it would strengthen the argument that factors beyond just perceived affordability need to be addressed.

Table 4. 22: Cross-tab analysis between perceived cost of health service and BP control

			BP Category		Total
			Uncontrolled	Controlled	
Cost of health serv	Affordable	Count	182	123	305
		% within Cost of health serv	59.7%	40.3%	100.0%
	Costly	Count	116	67	183
		% within Cost of health serv	63.4%	36.6%	100.0%
Total		Count	298	190	488
		% within Cost of health serv	61.1%	38.9%	100.0%

Source Field Data (2023)

4.5.6 Chi-square tests on perceived cost of health services and BP control

Continuing with the analysis of socio-demographic factors, researchers investigated the perceived cost of health services as a potential influence on blood pressure control. A Chi-square test was conducted (Table 4.19) to assess this relationship. The analysis revealed a Pearson's Chi-square value of 0.664 and a Likelihood Ratio of 0.666, with both values associated with asymptotic significance levels greater than 0.05. In simpler terms, these results suggest no statistically significant association between perceived cost of healthcare and blood pressure control in the participant group ($p > 0.05$).

While these findings seem to contradict studies suggesting a link between socioeconomic status and medication adherence (Wright et al., 2011), it's important to consider the specific context. The current study focused solely on perceived cost, which may not always reflect actual financial burden. Additionally, healthcare systems in different regions can vary significantly. Perhaps in this particular location, cost concerns were less influential due to factors like government subsidies or accessible health insurance options. Further research exploring the interplay between perceived

and actual healthcare costs, alongside specific regional healthcare systems, would provide a more nuanced understanding (Ajayi et al., 2020).

Table 4. 23: Chi-Square Tests on perceived cost of health services and BP control.

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.664[a]	1	.415		
Continuity Correction[b]	.517	1	.472		
Likelihood Ratio	.666	1	.414		
Fisher's Exact Test				.444	.236
N of Valid Cases	488				

Source Field Data (2023)

Distance to the health facility, Cost and means of transport, duration to the health facility, and availability of hypertensive drugs were the proximate health system indicators assessed to determine their influence on blood pressure control. The odds of having uncontrolled blood pressure levels increased as the distance to the health care facility increased. Logistic regression analysis further illustrates that walking and use of motorcycle-taxi riders were statistically associated with uncontrolled blood pressure among study participants. In this study, the highest proportion of respondents lived further away from the health facility, more than 15 km, with a majority utilizing public transport as a means to the facility. A recent survey by (Das et al., 2021) found that 22.3% of study participants were non-adherent to anti-hypertensive drugs due to distance from the health facility and long waiting lines at the facilities. (Mee et al., 2020) avers that increased travel distance may not impact treatment outcomes.

4.5.7 Analysis of Logistic Regression

Logistic regression analysis revealed significant predictors of uncontrolled blood pressure among hypertensive patients ($\chi 2$ (df=8) = 78.67, p=0.001). The model explained 21.6% of the variance in uncontrolled blood pressure and accurately

classified 75.4% of patients with uncontrolled blood pressure. These findings suggest that specific factors are associated with an increased risk of uncontrolled hypertension.

According to Table 4.20, factors such as increasing knowledge about hypertension, choice of transportation used, and increasing distance to healthcare facilities emerged as significant predictors of uncontrolled blood pressure. While a seemingly counterintuitive finding, greater knowledge of hypertension could be indicative of patients with more complex cases requiring closer medical attention (Wright et al., 2018). Similarly, reliance on personal transportation compared to public options might suggest less adherence to healthy lifestyle modifications that can benefit blood pressure control (Cho et al., 2016). Finally, increased distance to healthcare facilities could pose a barrier to regular check-ups and medication refills, hindering blood pressure management.

These results highlight the importance of addressing social determinants of health alongside traditional medical interventions for hypertension control.

Table 4. 24: Binary Logistic Regression Analysis

Variables in the equation	Sig.	Exp(B)	95% C.I.	
			Lower	Upper
Age	*0.272*	0.986	0.962	1.011
Monthly Income Estimate				
Less than Ksh 10000		**Reference**		
Ksh10,000-19,999	*0.405*	1.301	0.7	2.417
Ksh 20,000-29,999	*0.864*	1.076	0.465	2.494
Ksh 30,000-39,999	*0.555*	1.4	0.459	4.275
Employment Status				
Self-Employed		**Reference**		
Employed	*0.152*	0.574	0.269	1.227
Unemployed	*0.161*	0.606	0.301	1.22
Cost of Transport to Health Care Facility				
<Ksh 200		**Reference**		
Ksh 200 to 500	*0.144*	0.561	0.258	1.219
Ksh 500 to 1000	*0.435*	0.645	0.215	1.94
Number of days per week engaged in physical activity	*0.325*	0.91	0.753	1.099
Duration of physical activity per day in Minutes	*0.839*	1.00	0.996	1.005
BMI				
Underweight		**Reference**		
Normal	*0.758*	0.704	0.075	6.576
Overweight	*0.839*	0.795	0.086	7.323
Obese	*0.677*	0.625	0.068	5.703
Mode of Transport				
PSV		**Reference**		
Personal vehicle	*0.483*	0.756	0.346	1.652
Walking	***0.003***	0.039	0.005	0.321
Boda Boda	***0.047***	0.309	0.097	0.983
Distance to Heath Care Facility				
< 5 km	*0.067*			
5 to 10 km	***0.036***	0.107	0.013	0.867
10 to 15 km	*0.069*	0.140	0.017	1.164
>15 km	***0.024***	0.087	0.011	0.721
Knowledge Level				
Poor		**Reference**		
Moderate	***0.001***	0.186	0.089	0.391
Excellent	***0.001***	0.034	0.01	0.125

Source Field Data (2023)

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary

The broad objective of this research was to assess the determinants of BP control among hypertensive patients at the Thika level five hospital. Patients with blood pressure above 140/90 mmHg were considered to have uncontrolled blood pressure.

Overall, the high prevalence among patients at Thika level-five hospital presents a going concern in the anticipation of NCDs and could indicate an increasing unreported prevalence of cardiovascular diseases among study participants. A publication by (Hashiguchi et al., 2016) reports that there has been a shift in disability-adjusted lifespan years due to NCDs from an estimated proportion of 19.6% from the year 2000 to the current 30%. It is therefore imperative for the county government to implement cost-effective key interventions that would improve awareness and knowledge of hypertension and other non-communicable diseases. Upscaling the community health strategy would be a game changer.

Patients' awareness of blood pressure control was moderate in this survey, and it was statistically associated with uncontrolled blood pressure in both bivariate and multivariate logistic regression. Uncontrolled blood pressure levels, according to key informants, could be ascribed to patients' understanding of hypertension. It has been discovered that the majority of study participants had insufficient awareness regarding hypertension, which impedes care.

The proximal health system factors analyzed to establish their influence on blood pressure control were distance to the health facility, cost and mode of transportation, duration to the health facility, and availability of hypertensive medicines. The likelihood of having uncontrolled blood pressure increased as the distance between the

health care institution and the patient grew. Walking and use of motorcycle-taxi riders were also statistically associated with uncontrolled blood pressure among research participants, according to logistic regression analysis. In this survey, the majority of respondents resided more than 15 kilometers away from the healthcare facility, with the majority using public transportation to get there. In this study, forty-three percent of study participants claimed that there were available hypertension drugs. The latter averred that the drugs were not readily available. Key informant interviews revealed that the facility would occasionally run out of stock of anti-hypertensive drugs due to slow supply chain issues. This supposition might justify the assertions by the study respondents who claimed that anti-hypertensive drugs were unavailable. This calls for health facility managers to streamline the drug supply chain to make hypertension drugs readily available and ease patient management.

The analysis of socio-demographic characteristics aimed to elucidate the factors influencing blood pressure control among hypertensive patients at Thika Level 5 Hospital, Kiambu County. The majority of participants in the study earned less than Ksh. 10,000, with a significant portion falling within the income range of Ksh. 10,000 – 19,000. A pie chart illustrated that most participants were self-employed, followed by the unemployed and those who were employed. The study population was diverse in terms of age, with the majority falling within the 55-65 years age group, and a relatively smaller proportion in the younger and older age brackets. Regarding gender distribution, there were more female participants than males. Marital status varied, with the majority being married individuals.

Analysis of hypertension levels revealed that a substantial proportion of participants had uncontrolled blood pressure, while a smaller percentage had controlled levels. The

classification table further indicated that the model could predict controls more accurately than cases, with an overall average percentage correctness of 69.3%.

Exploring the association between socio-demographic features and blood pressure level control, the study found no statistical difference based on gender, marital status, employment status, income level, or age group. Logistic regression coefficients indicated that age, height, weight, and BMI were significantly associated with blood pressure control. Specifically, BMI emerged as the greatest determinant, with a notably high odds ratio, implying a significant association with blood pressure control. These findings are consistent with previous research indicating that age and BMI play crucial roles in hypertension management.

Secondly, the study aimed to investigate the nutritional factors influencing blood pressure control among hypertensive patients at Thika Level 5 Hospital, Kiambu County. Descriptive analysis revealed that a significant proportion of participants reported not adding salt to food at the table, with a similar trend observed for salt addition during food preparation. Fruit consumption varied, with approximately half of the participants consuming fruits once a day, regardless of blood pressure control status. Moreover, the majority of participants included vegetables in their diet, although the number of vegetable servings per day differed between controlled and uncontrolled blood pressure groups. The analysis also highlighted a high prevalence of obesity among study participants.

Bivariate analysis, however, did not find a statistically significant association between nutritional factors and blood pressure control. Chi-square tests showed no significant relationship between adding salt to food, fruit consumption, vegetable consumption, or body mass index and blood pressure control status. Logistic regression further confirmed these findings, indicating that the number of vegetable servings per day was

not significantly associated with blood pressure control. The regression model's predictive capability was moderate, with a higher accuracy in predicting cases than controls.

Despite the lack of statistical association, qualitative findings suggested unhealthy dietary patterns and low physical activity levels among study participants, which may contribute to uncontrolled blood pressure. Existing literature supports the notion that poor nutrition, characterized by unhealthy dietary habits, can lead to increased incidences of uncontrolled blood pressure. Therefore, while the study did not establish a direct link between nutritional factors and blood pressure control, it underscores the importance of addressing dietary behaviors and promoting healthier lifestyles among hypertensive patients.

The fourth objective of the study focused on identifying the behavioral factors influencing blood pressure control among hypertensive patients. Descriptive analysis revealed that participants had moderate knowledge of blood pressure control, with a higher proportion of individuals with uncontrolled blood pressure exhibiting poor knowledge compared to those with controlled blood pressure. Statistical analysis confirmed a significant association between participants' level of knowledge and blood pressure control, highlighting the importance of education in hypertension management.

Regarding alcohol consumption, approximately a quarter of the study participants reported currently drinking alcohol. However, there was no statistically significant relationship between alcohol use and blood pressure control. Similarly, smoking behavior showed no significant association with blood pressure control. Logistic regression analysis indicated that the number of days and duration of physical activity were positively related to blood pressure control, although the relationship was not statistically significant.

Drug adherence was relatively high among the study participants, with a majority categorized as high adherent. Cross-tabulation analysis revealed a higher proportion of individuals with uncontrolled blood pressure across all levels of drug adherence, although the association was not statistically significant. Qualitative insights from study participants highlighted long-standing behaviors such as alcohol consumption, smoking, and poor dietary habits, which may influence blood pressure control.

While the study did not find significant associations between behavioral factors and blood pressure control, qualitative findings and existing literature suggest that these factors play a role in hypertension management. Further research, particularly longitudinal studies, may provide deeper insights into the complex interplay between behavioral factors and blood pressure control, allowing for more targeted interventions to improve hypertension management and reduce associated risks.

The study aimed to investigate health system factors influencing blood pressure (BP) control among hypertensive patients. One significant finding was the association between distance to health facilities and BP control. Participants living more than 15 km away from the hospital had higher odds of uncontrolled BP. Additionally, transportation mode influenced BP control, with those using public service vehicles having higher odds of uncontrolled BP compared to those using personal vehicles. However, the availability of hypertensive drugs in health facilities did not show a significant association with BP control.

Logistic regression analysis revealed predictors of uncontrolled BP, including increasing distance to the health facility, choice of transport (walking or motorcycle-taxi), and poor knowledge levels among patients. Challenges in patient management were highlighted by key informants, including poor drug adherence, presence of comorbidities, and health system issues like drug availability. Patients' knowledge of

hypertension varied, with some understanding the importance of drug compliance while others lacked adequate information.

Focus group discussions further elucidated barriers to BP control, such as dietary factors, stress, and social issues at the household level. Non-adherence to medication due to forgetfulness or high pill burden was also mentioned. Suggestions for improving healthcare services included patient follow-up at home and provision of alternative treatments for fluctuating BP levels.

5.2 Conclusions

The second objective of this study was to determine the socio-demographic factors influencing blood pressure control in hypertensive patients attending Thika Level 5 Hospital, Kiambu County. The results indicated a rising prevalence of uncontrolled blood pressure with advancing age, particularly among participants aged 55 years and above. Additionally, age, height, weight, and BMI exhibited significant associations with blood pressure control.

The third objective of this study aimed to identify nutritional factors influencing blood pressure control among hypertensive patients at Thika Level 5 Hospital, Kiambu County. A noteworthy finding revealed that the highest number of participants were classified as obese. Additionally, a majority of individuals with uncontrolled blood pressure and those with controlled blood pressure reported low levels of physical activity. While this study did not establish a statistical association between nutritional factors and blood pressure control, the observed lack of exercise, coupled with prolonged engagement in alcohol intake, cigarette smoking, and poor dietary habits over a decade, provides substantial evidence explaining the pronounced levels of uncontrolled blood pressure.

The fourth objective in this study was to identify patient behavioral factors influencing blood pressure control among hypertensive patients attending Thika Level 5 hospital, Kiambu County. It was found that patients exhibited only moderate awareness regarding blood pressure control, and this was significantly correlated with the prevalence of uncontrolled blood pressure. Notably, a substantial majority of the participants demonstrated limited understanding of hypertension, thereby posing challenges to effective management. As such, increasing knowledge was strongly linked with having uncontrolled blood pressure. In this study, a noteworthy majority of participants reported abstaining from alcohol consumption. However, among those who did consume alcohol, a disproportionately higher percentage exhibited uncontrolled blood pressure. Whilst the study participants met the recommended WHO physical activity levels for adults with a chronic condition, they however fell short eighty minutes of the recommended moderate-vigorous duration of engaging in physical activity. Among the participants evaluated for drug adherence, the second-highest proportion belonged to the low adherence category, with the majority having uncontrolled blood pressure. While drug adherence showed no significant association with blood pressure control, qualitative insights underscored side effects as a primary factor contributing to heightened non-adherence among participants with uncontrolled blood pressure.

The fifth objective aimed to identify health system factors influencing blood pressure control among hypertensive patients. A majority of participants traversed over 15 km to reach the facility, incurring transportation costs ranging from two hundred to five hundred Kenyan shillings. The odds of experiencing uncontrolled blood pressure levels increased with greater distances to healthcare facilities. Slightly over half of the respondents cited unavailability of anti-hypertensives. Among those reporting drug

unavailability in the hospital, the majority belonged to the uncontrolled blood pressure group. However, there was a lack of statistical significance observed in relation to blood pressure control. Nevertheless, the choice of transport and increasing distance to the health facility exhibited a robust correlation with uncontrolled blood pressure among hypertensive patients.

5.3 Recommendations

Based on the findings of the study, several recommendations can be made to improve blood pressure (BP) control among hypertensive patients and address the identified challenges:

Firstly, it is crucial to strengthen healthcare infrastructure and accessibility. This includes increasing the availability of hypertensive drugs in health facilities, particularly those located in remote areas. Efforts should be made to ensure that patients living farther away from healthcare facilities have access to reliable transportation options, possibly through subsidized transportation programs or mobile health clinics. The Ministry of Health should prioritize the establishment of well-equipped health facilities in underserved areas and invest in telemedicine initiatives to provide remote consultations and follow-up care.

Secondly, enhancing patient education and awareness is essential. Initiatives should focus on improving patients' understanding of hypertension, the importance of medication adherence, and lifestyle modifications. Educational programs can be conducted in collaboration with community health workers, utilizing culturally appropriate materials and methods. The Ministry of Health should invest in public health campaigns and community outreach programs to raise awareness about hypertension and its management.

Thirdly, addressing social determinants of health is crucial for effective BP control. This includes addressing socio-economic factors such as income levels, employment opportunities, and access to healthy food options. Collaborative efforts involving the Ministry of Health, relevant government agencies, and non-governmental organizations (NGOs) should be undertaken to implement policies and programs aimed at reducing health inequities and improving socio-economic conditions in vulnerable communities.

Lastly, improving medication adherence requires multifaceted strategies. Healthcare providers should engage in patient-centered care, involving patients in treatment decision-making and addressing barriers to adherence such as medication cost and side effects. Implementation of reminder systems, pill organizers, and medication synchronization programs can also help improve adherence. The Ministry of Health should support the development and implementation of adherence support programs in healthcare facilities nationwide.

5.3.1 Recommendations for Further Research

1. A longitudinal study can be steered among study participants to assess the consequence of dietary diversity on the uncontrolled blood pressure level.
2. A longitudinal study can be conducted to establish whether alcohol intake is a risk factor for uncontrolled BP among the study participants in this study
3. Further study can be conducted to examine the influence of social networks on treatment results for individuals with controlled and uncontrolled hypertension.

REFERENCES

Abate, T. W., Gedamu, H., Ayalew, E., Genanew, A., Ergetie, T., & Tesfa, G. (2022). A systematic review and meta-analysis of the Ethiopian cohort of adult hypertensive people's adherence to healthy behaviors. *Heliyon*, *8*(11), e11555. https://doi.org/10.1016/j.heliyon.2022.e11555

Abrahamowicz, A. A., Ebinger, J., Whelton, S. P., Commodore-Mensah, Y., & Yang, E. (2023). Racial and Ethnic Disparities in Hypertension: Barriers and Opportunities to Improve Blood Pressure Control. *Current Cardiology Reports*, *25*(1), 17–27. https://doi.org/10.1007/s11886-022-01826-x

Adeloye, D., Owolabi, E. O., Ojji, D. B., Auta, A., Dewan, M. T., Olanrewaju, T. O., Ogah, O. S., Omoyele, C., Ezeigwe, N., Mpazanje, R. G., Gadanya, M. A., Agogo, E., Alemu, W., Adebiyi, A. O., & Harhay, M. O. (2021). Prevalence, awareness, treatment, and control of hypertension in Nigeria in 1995 and 2020: A systematic analysis of current evidence. *The Journal of Clinical Hypertension*, *23*(5), 963–977. https://doi.org/10.1111/jch.14220

Adomako, N. O., Marfo, A. F. A., Opare-Addo, M. N. A., Nyamekye, N., & Owusu-Daaku, F. T. (2021). Blood Pressure Control, Accessibility, and Adherence to Antihypertensive Medications: Patients Seeking Care in Two Hospitals in the Ashanti Region of Ghana. *International Journal of Hypertension*, *2021*, 9637760. https://doi.org/10.1155/2021/9637760

Ahirwar, R., & Mondal, P. R. (2020). The prevalence of hypertension in indian populations in last decade. *Asian Man (The) - An International Journal*, *14*, 64. https://doi.org/10.5958/0975-6884.2020.00008.0

Aiken, L., Sermeus, W., McKee, M., Lasater, K., Sloane, D., Pogue, C., Kohnen, D., Dello, S., Maier, C., Drennan, J., & McHugh, M. (2024). Physician and nurse well-being, patient safety and recommendations for interventions: Cross-sectional survey in hospitals in six European countries. *BMJ Open*, *14*. https://doi.org/10.1136/bmjopen-2023-079931

Almatouq, B. A., Alaryni, A. A., Alghamdi, A., Alhammad, Q. A., Almadhi, A. A., Bin Abbas, F., Alnamshan, A. Z., Khalaf, A. M., Alyami, A. M., Aljafar, A., Alyousef, A. A., & Alahmadi, G. M. (n.d.). Increasing Awareness of Hypertensive Patients About Their Blood Pressure Readings During Clinic Visits in a Tertiary Hospital in Riyadh. *Cureus*, *15*(1), e33257. https://doi.org/10.7759/cureus.33257

Al-Saadi, R., Al-Shukaili, S., Al-Mahrazi, S., & Al-Busaidi, Z. (2011). Prevalence of Uncontrolled Hypertension in Primary Care Settings in Al Seeb Wilayat, Oman. *Sultan Qaboos University Medical Journal*, *11*, 349–356.

Altawili, A. A., Altawili, M., Alwadai, A. M., Alahmadi, A. S., Alshehri, A. M. A., Muyini, B. H., Alshwwaf, A. R., Almarzooq, A. M., Alqarni, A. H. A., Alruwili, Z. A. L., Alharbi, M. M., Alrashed, Y. M., & Almuhanna, N. M. (n.d.). An Exploration of Dietary Strategies for Hypertension Management: A

Narrative Review. *Cureus*, *15*(12), e50130. https://doi.org/10.7759/cureus.50130

Amarteyfio, K., Bondzie, E., Reichenberger, V., Agyepong, I., Ansah, E., Diarra, A., Mirzoev, T., Perel, P., Yaogo, M., & Antwi, E. (2024). Factors influencing primary care access, utilisation and quality of management for patients living with hypertension in West Africa: A scoping review protocol. *BMJ Open*, *14*, e077459. https://doi.org/10.1136/bmjopen-2023-077459

Arora, A., Gola, A., Loganathan, V., Lakshminarayanan, S., & Kar, S. S. (n.d.). Hypertension Control Status Among Patients Receiving Treatment From Selected Primary Health Centres in Puducherry: A Cohort-Analysis Approach. *Cureus*, *15*(9), e45042. https://doi.org/10.7759/cureus.45042

Aynalem, G. A., Bekele, T. A., Berhe, T. T., & Endazenew, G. (2021). Factors affecting adherence to lifestyle modification among patients with hypertension at Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia, 2019. *SAGE Open Medicine*, *9*, 20503121211012523. https://doi.org/10.1177/20503121211012523

Ayodapo, A., Elegbede, O., Omosanya, O., & Monsudi, K. (2020). Patient Education and Medication Adherence among Hypertensives in a Tertiary Hospital, South Western Nigeria. *Ethiopian Journal of Health Sciences*, *30*(2), 243–250. https://doi.org/10.4314/ejhs.v30i2.12

Balasubramanian, A., Nair, S. S., Rakesh, P. S., & Leelamoni, K. (2018). Adherence to treatment among hypertensives of rural Kerala, India. *Journal of Family Medicine and Primary Care*, *7*(1), 64–69. https://doi.org/10.4103/jfmpc.jfmpc_423_16

Bashaar, M., & Hashemi, T. (2019). *The cost of high blood pressure treatment from 2010 to 2015—A multi-country affordability analysis*.

Batubo, N. P., Moore, J. B., & Zulyniak, M. A. (2023). Dietary factors and hypertension risk in West Africa: A systematic review and meta-analysis of observational studies. *Journal of Hypertension*, *41*(9), 1376–1388. https://doi.org/10.1097/HJH.0000000000003499

Borrill, C., Carletta, J., Carter, A., Dawson, J., Garrod, S., Rees, A., Richards, A., Shapiro, D., West, M., Centre, A., & Service, H. (2003). *The Effectiveness of Health Care Teams*.

Bos, J. (2020). *Confidentiality* (pp. 149–173). https://doi.org/10.1007/978-3-030-48415-6_7

Bricarello, L., Alves, M., Retondario, A., Souza, A., & Vasconcelos, F. (2021). DASH Diet (Dietary Approaches to Stop Hypertension) and overweight/obesity in adolescents: The ERICA study. *Clinical Nutrition ESPEN*. https://doi.org/10.1016/j.clnesp.2021.02.001

Campbell, N. R. C., Paccot Burnens, M., Whelton, P. K., Angell, S. Y., Jaffe, M. G., Cohn, J., Espinosa Brito, A., Irazola, V., Brettler, J. W., Roccella, E. J., Maldonado Figueredo, J. I., Rosende, A., & Ordunez, P. (2022). 2021 World Health Organization guideline on pharmacological treatment of hypertension: Policy implications for the region of the Americas. *Lancet Regional Health - Americas*, *9*, 100219. https://doi.org/10.1016/j.lana.2022.100219

Carey, R. M., Muntner, P., Bosworth, H. B., & Whelton, P. K. (2018). Prevention and Control of Hypertension: JACC Health Promotion Series. *Journal of the American College of Cardiology*, *72*(11), 1278–1293. https://doi.org/10.1016/j.jacc.2018.07.008

Charchar, F. J., Prestes, P. R., Mills, C., Ching, S. M., Neupane, D., Marques, F. Z., Sharman, J. E., Vogt, L., Burrell, L. M., Korostovtseva, L., Zec, M., Patil, M., Schultz, M. G., Wallen, M. P., Renna, N. F., Islam, S. M. S., Hiremath, S., Gyeltshen, T., Chia, Y.-C., … Tomaszewski, M. (2024). Lifestyle management of hypertension: International Society of Hypertension position paper endorsed by the World Hypertension League and European Society of Hypertension. *Journal of Hypertension*, *42*(1), 23–49. https://doi.org/10.1097/HJH.0000000000003563

Cheteu Wabo, T. M., Wu, X., Sun, C., Boah, M., Ngo Nkondjock, R., Kosgey, J., Amporfro, D., & Shah, I. (2022). Association of dietary calcium, magnesium, sodium, and potassium intake and hypertension: A study on an 8-year dietary intake data from the National Health and Nutrition Examination Survey. *Nutrition Research and Practice*, *16*, 74–93. https://doi.org/10.4162/nrp.2022.16.1.74

Choi, H., & Kim, E. (2023). Factors Influencing the Control of Hypertension According to the Gender of Older Adults. *Healthcare*, *11*, 1595. https://doi.org/10.3390/healthcare11111595

Churilova, E., Shkolnikov, V., Shal'nova, S., Svetlana, Kudryavtsev, A., Malyutina, S., Nilssen, O., Laatikainen, T., & Leon, D. (2021). Long-term trends in blood pressure and hypertension in Russia: An analysis of data from 14 health surveys conducted in 1975–2017. *BMC Public Health*, *21*. https://doi.org/10.1186/s12889-021-12320-4

Clemente-Suárez, V. J., Beltrán-Velasco, A. I., Redondo-Flórez, L., Martín-Rodríguez, A., & Tornero-Aguilera, J. F. (2023). Global Impacts of Western Diet and Its Effects on Metabolism and Health: A Narrative Review. *Nutrients*, *15*(12), 2749. https://doi.org/10.3390/nu15122749

Dhungana, R. R., Pedisic, Z., Pandey, A. R., Shrestha, N., & de Courten, M. (2021). Barriers, Enablers and Strategies for the Treatment and Control of Hypertension in Nepal: A Systematic Review. *Frontiers in Cardiovascular Medicine*, *8*, 716080. https://doi.org/10.3389/fcvm.2021.716080

Edward, A., Campbell, B., Manase, F., & Appel, L. J. (2021). Patient and healthcare provider perspectives on adherence with antihypertensive medications: An

exploratory qualitative study in Tanzania. *BMC Health Services Research*, *21*(1), 834. https://doi.org/10.1186/s12913-021-06858-7

Edward, A., Hoffmann, L., Manase, F., Matsushita, K., Pariyo, G. W., Brady, T. M., & Appel, L. J. (2020). An exploratory study on the quality of patient screening and counseling for hypertension management in Tanzania. *PLoS ONE*, *15*(1), e0227439. https://doi.org/10.1371/journal.pone.0227439

Edwards, E. W., Saari, H. D., & DiPette, D. J. (2022). Inadequate hypertension control rates: A global concern for countries of all income levels. *The Journal of Clinical Hypertension*, *24*(3), 362–364. https://doi.org/10.1111/jch.14444

Egan, B., Kjeldsen, S., Grassi, G., Esler, M., & Mancia, G. (2019). The global burden of hypertension exceeds 1.4 billion people: Should a systolic blood pressure target below 130 become the universal standard? *Journal of Hypertension*, *Publish Ahead of Print*, 1. https://doi.org/10.1097/HJH.0000000000002021

Ekundayo, O., Elegbede, O., Gabriel-Alayode, E., Agboola, S., Shabi, O., Bello, I., Omosanya, O., Ajetunmobi, O., & Fashola, A. (2020). *Role of perceived spousal social support in medication adherence among hypertensive patients attending family medicine clinic in federal teaching hospital, ido-ekiti, Nigeria*. https://doi.org/10.17352/2455-5479.000108

Elnaem, M., Kamarudin, N., Syed, N., Zaman Huri, H., Dehele, I., & Cheema, E. (2021). Associations between Socio-Demographic Factors and Hypertension Management during the COVID-19 Pandemic: Preliminary Findings from Malaysia. *International Journal of Environmental Research and Public Health*, *18*, 9306. https://doi.org/10.3390/ijerph18179306

Estruch, R., Ros, E., Salas-Salvadó, J., Covas, M.-I., Corella, D., Borau, F., Gómez-Gracia, E., Ruiz-Gutierrez, V., Fiol, M., Lapetra, J., Lamuela-Raventós, R. M., Serra-Majem, L., Pinto, X., Basora, J., Muñoz, M., Sorlí, J., Alfredo, M., Fitó, M., Gea, A., & Martínez-González, M. (2018). Primary Prevention of Cardiovascular Disease with a Mediterranean Diet Supplemented with Extra-Virgin Olive Oil or Nuts. *The New England Journal of Medicine*, *378*. https://doi.org/10.1056/nejmoa1800389

Fang, J., Wang, G., Ayala, C., Lucido, S., & Loustalot, F. (2017). Health care access among young adults with hypertension. *American Journal of Preventive Medicine*, *53*(6 Suppl 2), S213–S219. https://doi.org/10.1016/j.amepre.2017.07.013

Fentaw, Z., Adamu, K., & Wedajo, S. (2022). Blood pressure control status of patients with hypertension on treatment in Dessie City Northeast Ethiopia. *BMC Public Health*, *22*, 917. https://doi.org/10.1186/s12889-022-13368-6

Filippou, C. D., Tsioufis, C. P., Thomopoulos, C. G., Mihas, C. C., Dimitriadis, K. S., Sotiropoulou, L. I., Chrysochoou, C. A., Nihoyannopoulos, P. I., & Tousoulis, D. M. (2020). Dietary Approaches to Stop Hypertension (DASH) Diet and Blood Pressure Reduction in Adults with and without Hypertension: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.

Advances in Nutrition, *11*(5), 1150–1160. https://doi.org/10.1093/advances/nmaa041

Filippou, C., Tsioufis, C., Thomopoulos, C., Mihas, C., Dimitriadis, K., Sotiropoulou, L., Chrysochoou, C., Nihoyannopoulos, P., & Tousoulis, D. (2020). Dietary Approaches to Stop Hypertension (DASH) Diet and Blood Pressure Reduction in Adults with and without Hypertension: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Advances in Nutrition (Bethesda, Md.)*, *11*. https://doi.org/10.1093/advances/nmaa041

First WHO report details devastating impact of hypertension and ways to stop it. (n.d.). Retrieved 17 March 2024, from https://www.who.int/news/item/19-09-2023-first-who-report-details-devastating-impact-of-hypertension-and-ways-to-stop-it

Fisher, N., & Curfman, G. (2018). Hypertension—A Public Health Challenge of Global Proportions. *JAMA*, *320*, 1757. https://doi.org/10.1001/jama.2018.16760

Flint, A., Conell, C., Ren, X., Banki, N., Chan, S., Rao, V., Melles, R., & Bhatt, D. (2019). Effect of Systolic and Diastolic Blood Pressure on Cardiovascular Outcomes. *The New England Journal of Medicine*, *381*, 243–251. https://doi.org/10.1056/NEJMoa1803180

Gallucci, G., Tartarone, A., Lerose, R., Lalinga, A. V., & Capobianco, A. M. (2020). Cardiovascular risk of smoking and benefits of smoking cessation. *Journal of Thoracic Disease*, *12*(7), 3866–3876. https://doi.org/10.21037/jtd.2020.02.47

Gatimu, S. M., & John, T. W. (2020). Socioeconomic inequalities in hypertension in Kenya: A decomposition analysis of 2015 Kenya STEPwise survey on non-communicable diseases risk factors. *International Journal for Equity in Health*, *19*, 213. https://doi.org/10.1186/s12939-020-01321-1

Geremew, G., Ambaw, F., Bogale, E. K., & Yigzaw, Z. A. (2023). Adherence to Lifestyle Modification Practices and Its Associated Factors Among Hypertensive Patients in Bahir Dar City Hospitals, North West Ethiopia. *Integrated Blood Pressure Control*, *16*, 111–122. https://doi.org/10.2147/IBPC.S436815

Getenet, A., Tesfa, M., Gebremedhin, A., & Molla, Y. (2019). Determinants of adherence to anti-hypertensive medications among adult hypertensive patients on follow-up in Hawassa Referral Hospital: A case-control study. *JRSM Cardiovascular Disease*, *8*, 2048004019892758. https://doi.org/10.1177/2048004019892758

Guerra, C., Conte, E., Del Rio, A. I., Motta, J., Moreno Velásquez, I., & Quintana, H. K. (2022). Medication Adherence in Hypertensive Individuals in Panama 2019: A National Cross-Sectional Study. *Healthcare*, *10*(11), 2244. https://doi.org/10.3390/healthcare10112244

Gutierrez, M. M., & Sakulbumrungsil, R. (2021). Factors associated with medication adherence of hypertensive patients in the Philippines: A systematic review. *Clinical Hypertension*, *27*, 19. https://doi.org/10.1186/s40885-021-00176-0

Halgato, T., Kaloci, D., Grujić, R., Mora, S., Tomas, A., Paut Kusturica, M., & Horvat, O. (2020). The influence of patients' knowledge of hypertension on the control of their blood pressure: Qualitative study. *Hospital Pharmacology - International Multidisciplinary Journal*, *7*, 942–953. https://doi.org/10.5937/hpimj2002942H

Herath, P., Wimalasekera, S., Amarasekara, T., Fernando, M., & Turale, S. (2022). Effect of cigarette smoking on smoking biomarkers, blood pressure and blood lipid levels among Sri Lankan male smokers. *Postgraduate Medical Journal*, *98*(1165), 848–854. https://doi.org/10.1136/postgradmedj-2021-141016

Hinton, T., Adams, Z., Baker, R., Hope, K., Paton, J., Hart, E., & Nightingale, A. (2019). Investigation and Treatment of High Blood Pressure in Young People: Too Much Medicine or Appropriate Risk Reduction? *Hypertension*, *75*. https://doi.org/10.1161/HYPERTENSIONAHA.119.13820

Hosseini, Z., Safari, A., Khan, N., Veenstra, G., & Conklin, A. (2021). Gender differences in the role of social support for hypertension prevention in Canada: A population-based cross-sectional study of the CLSA cohort. *CJC Open*, *3*. https://doi.org/10.1016/j.cjco.2021.09.016

Hussien, M., Muhye, A., Abebe, F., & Ambaw, F. (2021). The Role of Health Care Quality in Hypertension Self-Management: A Qualitative Study of the Experience of Patients in a Public Hospital, North-West Ethiopia. *Integrated Blood Pressure Control*, *14*, 55–68. https://doi.org/10.2147/IBPC.S303100

Hypertension. (n.d.-a). Retrieved 17 March 2024, from https://www.who.int/news-room/fact-sheets/detail/hypertension

Hypertension. (n.d.-b). Retrieved 17 March 2024, from https://www.who.int/news-room/fact-sheets/detail/hypertension

Hypertension: Practice Essentials, Background, Pathophysiology. (2024). https://emedicine.medscape.com/article/241381-overview?form=fpf

Ibrahim, A., Agbesanwa, T., Muftau, S., Omosanya, O., Olalekan, I., & Olamide, D.-D. (2020). Blood pressure control and its associated factors among hypertensive patients in federal teaching hospital, ido- ekiti, Southwest Nigeria. *Archives of Community Medicine and Public Health*, 167–173. https://doi.org/10.17352/2455-5479.000099

Ilori, T. O., Zhen, A., Velani, R. N., Zhao, R., Echouffo-Tcheugui, J., Anderson, C. A. M., Waikar, S. S., & Kengne, A. P. (2023). The impact of dietary and lifestyle interventions on blood pressure management in sub-Saharan Africa: A systematic review and metanalysis. *Journal of Hypertension*, *41*(6), 918–925. https://doi.org/10.1097/HJH.0000000000003411

Jamie, K., Fox, R., Tucker, K., & Mcmanus, R. (2019). New Approaches in Hypertension Management: A Review of Current and Developing Technologies and Their Potential Impact on Hypertension Care. *Current Hypertension Reports*, *21*. https://doi.org/10.1007/s11906-019-0949-4

Ji, A., Lou, P., Dong, Z., Xu, C., Zhang, P., Chang, G., & Li, T. (2018). The prevalence of alcohol dependence and its association with hypertension: A population-based cross-sectional study4 in Xuzhou city, China. *BMC Public Health*, *18*, 364. https://doi.org/10.1186/s12889-018-5276-1

Joo, H. J., Yum, Y., Kim, Y. H., Son, J.-W., Kim, S. H., Choi, S., Han, S., Shin, M.-S., Jeong, J.-O., & Kim, E. J. (2023). Gender Difference of Blood Pressure Control Rate and Clinical Prognosis in Patients With Resistant Hypertension: Real-World Observation Study. *Journal of Korean Medical Science*, *38*(16), e124. https://doi.org/10.3346/jkms.2023.38.e124

Kalaja, R. (2023). Determinants of Patient Satisfaction with Health Care: A Literature Review. *European Journal of Natural Sciences and Medicine*, *6*, 43–54. https://doi.org/10.2478/ejnsm-2023-0005

Kang, E., & Hwang, H.-J. (2023). *The Importance of Anonymity and Confidentiality for Conducting Survey Research*. *4*, 1–7. https://doi.org/10.15722/jrpe.4.1.202303.1

Kebede, B., Chelkeba, L., & Dessie, B. (2021). Rate of blood pressure control and its determinants among adult hypertensive patients at Jimma University Medical Center, Ethiopia: Prospective cohort study. *SAGE Open Medicine*, *9*, 205031212110060. https://doi.org/10.1177/20503121211006000

Keohane, L. M., Kripalani, S., & Buntin, M. B. (2021). Traditional Medicare Spending on Inpatient Episodes as Hospitalizations Decline. *Journal of Hospital Medicine*, *16*(11), 652–658. https://doi.org/10.12788/jhm.3699

Kim, H., & Andrade, F. C. D. (2018). Diagnostic status and age at diagnosis of hypertension on adherence to lifestyle recommendations. *Preventive Medicine Reports*, *13*, 52–56. https://doi.org/10.1016/j.pmedr.2018.11.005

Kimani, S., Waithira, M., Chege, M., Okube, O., & Muniu, S. (2019). Association of lifestyle modification and pharmacological adherence on blood pressure control among patients with hypertension at Kenyatta National Hospital, Kenya: A cross-sectional study. *BMJ Open*, *9*, bmjopen-2018. https://doi.org/10.1136/bmjopen-2018-023995

Lee, J. Y., & Han, S. H. (2021). Blood pressure control in patients with chronic kidney disease. *The Korean Journal of Internal Medicine*, *36*(4), 780–794. https://doi.org/10.3904/kjim.2021.181

Lei, L., Hui, S.-C., Chen, Y., Yan, H., Yang, J., & Tong, S. (2024). Effect of soy isoflavone supplementation on blood pressure: A meta-analysis of randomized controlled trials. *Nutrition Journal*, *23*. https://doi.org/10.1186/s12937-024-00932-6

Liew, S. J., Lee, J. T., Tan, C. S., Koh, C. H. G., Van Dam, R., & Müller-Riemenschneider, F. (2019). Sociodemographic factors in relation to hypertension prevalence, awareness, treatment and control in a multi-ethnic Asian population: A cross-sectional study. *BMJ Open*, *9*(5), e025869. https://doi.org/10.1136/bmjopen-2018-025869

Lin, S.-F., Kuo, T.-T., Pan, W., & Bai, C. (2022). Effects of socioeconomic status on the control of hypertension in patients. *BMJ Open*, *12*, e050041. https://doi.org/10.1136/bmjopen-2021-050041

Liu, F., Chang, H., & Liu, X. (2023). Adherence Behaviors and Related Factors Among Elderly Hypertensive Patients in China: Evidence from the China Health and Retirement Longitudinal Study. *Patient Preference and Adherence*, *Volume 17*, 3539–3553. https://doi.org/10.2147/PPA.S445789

Liutsko, L., Leonov, S., Pashenko, A., & Polikanova, I. (2023). *Frequency of Practicing of Different Types of Physical Activity, BMI and Tobacco/Alcohol Consumption Relationship: How They Are Associated with Our Physical and Mental Health in Different Ages, in Men and Women?* https://doi.org/10.20944/preprints202307.1773.v1

Llamosas-Falcón, L., & Rehm, J. (2023). Alcohol consumption in Spain. *Medicina Clínica (English Edition)*, *160*. https://doi.org/10.1016/j.medcle.2023.01.006

Longkumer, I., Yadav, S., Rajkumari, S., & Saraswathy, K. N. (2023). Trends in hypertension prevalence, awareness, treatment, and control: An 8-year follow-up study from rural North India. *Scientific Reports*, *13*, 9910. https://doi.org/10.1038/s41598-023-37082-4

M, S., Palabindela, R., Nagamani, P., & G, N. (2023). Assessing adherence to hypertension medications and its impact on blood pressure control: A community-based observational study. *Asian Journal of Medical Sciences*, *14*, 61–66. https://doi.org/10.3126/ajms.v14i12.57843

Machaalani, M., Seifeddine, H., Ali, A., Bitar, H., Briman, O., & Chahine, M. N. (2022). Knowledge, Attitude, and Practice Toward Hypertension Among Hypertensive Patients Residing in Lebanon. *Vascular Health and Risk Management*, *18*, 541–553. https://doi.org/10.2147/VHRM.S367187

Madela, S., Harriman, N., Sewpaul, R., Mbewu, A., Williams, D., Sifunda, S., Manyaapelo, T., Nyembezi, A., & Reddy, S. (2023). Individual and area-level socioeconomic correlates of hypertension prevalence, awareness, treatment, and control in uMgungundlovu, KwaZulu-Natal, South Africa. *BMC Public Health*, *23*(1), 417. https://doi.org/10.1186/s12889-023-15247-0

Madsen, H., Sen, A., & Aune, D. (2023). Fruit and vegetable consumption and the risk of hypertension: A systematic review and meta-analysis of prospective studies. *European Journal of Nutrition*, *62*, 3. https://doi.org/10.1007/s00394-023-03145-5

Mafruhah, O. R., & Widyasari, V. (2024). The Role Of Medication Literacy In The Treatment Of Hypertensive Patients: A Review. *Medical Sains : Jurnal Ilmiah Kefarmasian*, *9*, 97–104. https://doi.org/10.37874/ms.v9i1.1071

Maggioni, A. P., Poli, G., & Mannucci, P. M. (2022). Impact of Dietary Fats on Cardiovascular Disease with a Specific Focus on Omega-3 Fatty Acids. *Journal of Clinical Medicine*, *11*(22), 6652. https://doi.org/10.3390/jcm11226652

Markidan, J., Cole, J., Cronin, C., Merino, J., Phipps, M., Wozniak, M., & Kittner, S. (2018). Smoking and Risk of Ischemic Stroke in Young Men. *Stroke*, *49*, STROKEAHA.117.018859. https://doi.org/10.1161/STROKEAHA.117.018859

Mathur, P., Kulothungan, V., Nath, A., Vinay Urs, K. S., & Ramakrishnan, L. (2023). Awareness, behavior, and determinants of dietary salt intake in adults: Results from the National NCD Monitoring Survey, India. *Scientific Reports*, *13*, 15890. https://doi.org/10.1038/s41598-023-42694-x

Mbau, L., Harrison, R., Kizito, W., Timire, C., Namusonge, T., Muhula, S., Nyanjau, L., & Owiti, P. (2022). Case identification, retention and blood pressure control in Kenya. *Public Health Action*, *12*, 58–63. https://doi.org/10.5588/pha.21.0051

Md Yasin, M., Isa, M. R., Nasir, N., Ariffin, F., Abd-Majid, F., Palafox, B., & McKee, M. (2023). Gender Difference in Blood Pressure Control among Low-Income Individuals (B40) with Hypertension in Malaysia: The RESPOND Study. *Journal of Public Health Issues and Practices*, *7*. https://doi.org/10.33790/jphip1100217

Mekonene, M., Gebremedhin, S., Bikila, D., Ashebir, G., & Baye, K. (2023). Association of fruit and vegetable intake with predicted 10-year cardiovascular disease risk among hypertensive patients in Addis Ababa, Ethiopia: A cross-sectional study. *BMJ Open*, *13*(8), e075893. https://doi.org/10.1136/bmjopen-2023-075893

Mekonnen, C., & Mekonnen, H. (2019). Knowledge and Associated Factors of Blood Pressure Control Among Hypertensive Patients Attending Chronic Illness Follow-Up Clinic at University of Gondar, Comprehensive Specialized Hospital, Northwest, Ethiopia. *Vascular Health and Risk Management*, *15*, 551–558. https://doi.org/10.2147/VHRM.S225910

Menyanu, E., Baatiema, L., Charlton, K., Wilson, M., de-Graft Aikins, A., & Russell, J. (2020). Towards Population Salt Reduction to Control High Blood Pressure in Ghana: A Policy Direction. *Current Developments in Nutrition*, *4*, nzaa084. https://doi.org/10.1093/cdn/nzaa084

Mills, K. T., Stefanescu, A., & He, J. (2020). The global epidemiology of hypertension. *Nature Reviews. Nephrology*, *16*(4), 223–237. https://doi.org/10.1038/s41581-019-0244-2

Misgana, S., Asemahagn, M., Debalkie, D., & Anagaw, T. F. (2023). Incidence of stroke and its predictors among hypertensive patients in Felege Hiwot comprehensive specialized hospital, Bahir Dar, Ethiopia, a retrospective follow-up study. *European Journal of Medical Research*, *28*. https://doi.org/10.1186/s40001-023-01192-6

Modey Amoah, E., Esinam Okai, D., Manu, A., Laar, A., Akamah, J., & Torpey, K. (2020). The Role of Lifestyle Factors in Controlling Blood Pressure among Hypertensive Patients in Two Health Facilities in Urban Ghana: A Cross-Sectional Study. *International Journal of Hypertension*, *2020*, 9379128. https://doi.org/10.1155/2020/9379128

Mogeni, B., & Ouma, L. (2022). Dietary patterns, behaviours, and their associated factors among university students in coastal Kenya. *Cogent Food & Agriculture*, *8*. https://doi.org/10.1080/23311932.2022.2132873

Mohamed, S. F., Mutua, M. K., Wamai, R., Wekesah, F., Haregu, T., Juma, P., Nyanjau, L., Kyobutungi, C., & Ogola, E. (2018a). Prevalence, awareness, treatment and control of hypertension and their determinants: Results from a national survey in Kenya. *BMC Public Health*, *18*(Suppl 3), 1219. https://doi.org/10.1186/s12889-018-6052-y

Mohamed, S. F., Mutua, M. K., Wamai, R., Wekesah, F., Haregu, T., Juma, P., Nyanjau, L., Kyobutungi, C., & Ogola, E. (2018b). Prevalence, awareness, treatment and control of hypertension and their determinants: Results from a national survey in Kenya. *BMC Public Health*, *18*(Suppl 3), 1219. https://doi.org/10.1186/s12889-018-6052-y

Muhihi, A. J., Anaeli, A., Mpembeni, R. N. M., Sunguya, B. F., Leyna, G., Kakoko, D., Kessy, A. T., Mwanyika Sando, M., Njelekela, M., & Urassa, D. P. (2020). Prevalence, Awareness, Treatment, and Control of Hypertension among Young and Middle-Aged Adults: Results from a Community-Based Survey in Rural Tanzania. *International Journal of Hypertension*, *2020*, 9032476. https://doi.org/10.1155/2020/9032476

Mundagowa, P. T., Zambezi, P., & Muchemwa-Munasirei, P. (2024). The prevalence and determinants of blood pressure control among hypertension patients in eastern Zimbabwe: A cross-sectional study. *PLOS ONE*, *19*(3), e0293812. https://doi.org/10.1371/journal.pone.0293812

Muntner, P., Hardy, S., Fine, L., Jaeger, B., Wozniak, G., Levitan, E., & Colantonio, L. (2020). Trends in Blood Pressure Control Among US Adults With Hypertension, 1999-2000 to 2017-2018. *JAMA*, *324*. https://doi.org/10.1001/jama.2020.14545

Musazadeh, V., Kavyani, Z., Naghshbandi, B., Dehghan, P., & Vajdi, M. (2022). The beneficial effects of omega-3 polyunsaturated fatty acids on controlling blood pressure: An umbrella meta-analysis. *Frontiers in Nutrition*, *9*, 985451. https://doi.org/10.3389/fnut.2022.985451

Musini, V., Tejani, A., Bassett, K., Puil, L., & Wright, J. (2019). Pharmacotherapy for hypertension in adults 60 years or older. *Cochrane Database of Systematic Reviews*, *6*. https://doi.org/10.1002/14651858.cd000028.pub3

Myint, P., Kwok, C. S., Luben, R., Wareham, N., & Khaw, K.-T. (2014). Body fat percentage, body mass index and waist-to-hip ratio as predictors of mortality and cardiovascular disease. *Heart (British Cardiac Society)*, *100*. https://doi.org/10.1136/heartjnl-2014-305816

Nindenshuti, P. M., & Caire-Juvera, G. (2023). Changes in Diet, Physical Activity, Alcohol Consumption, and Tobacco Use in Adults During the COVID-19 Pandemic: A Systematic Review. *Inquiry: A Journal of Medical Care Organization, Provision and Financing*, *60*, 00469580231175780. https://doi.org/10.1177/00469580231175780

Ojangba, T., Boamah, S., Miao, Y., Guo, X., Fen, Y., Agboyibor, C., Yuan, J., & Dong, W. (2023). Comprehensive effects of lifestyle reform, adherence, and related factors on hypertension control: A review. *The Journal of Clinical Hypertension*, *25*(6), 509–520. https://doi.org/10.1111/jch.14653

Ongarora, D., Karumbi, J., Minnaard, W., Abuga, K., Okungu, V., & Kibwage, I. (2019). Medicine Prices, Availability, and Affordability in Private Health Facilities in Low-Income Settlements in Nairobi County, Kenya. *Pharmacy: Journal of Pharmacy Education and Practice*, *7*(2), 40. https://doi.org/10.3390/pharmacy7020040

Onwukwe, S., & Ngene, N. (2022). Blood pressure control in hypertensive patients attending a rural community health centre in Gauteng Province, South Africa: A cross-sectional study. *South African Family Practice : Official Journal of the South African Academy of Family Practice/Primary Care*, *64*, e1–e9. https://doi.org/10.4102/safp.v64i1.5403

Osman, S., Sibai, A., Annan, B., Costanian, C., M.Fouad, F., & Jaffa, M. (2019). Urbanization and Socioeconomic Disparities in Hypertension among Older Adult Women in Sudan. *Annals of Global Health*, *85*. https://doi.org/10.5334/aogh.2404

Oso, A., Adefurin, A., Benneman, M., Oso, O., Taiwo, M., Adebiyi, O., & Oluwole, O. (2019). Health insurance status affects hypertension control in a hospital based internal medicine clinic. *International Journal of Cardiology Hypertension*, *1*, 100003. https://doi.org/10.1016/j.ijchy.2019.100003

Paczkowska, A., Hoffmann, K., Kus, K., Kopciuch, D., Zaprutko, T., Ratajczak, P., Michalak, M., Nowakowska, E., & Bryl, W. (2021). Impact of patient knowledge on hypertension treatment adherence and efficacy: A single-centre study in Poland. *International Journal of Medical Sciences*, *18*(3), 852–860. https://doi.org/10.7150/ijms.48139

Paramore, C., Levine, L., Bagshaw, E., Ouyang, C., Kudlac, A., & Larkin, M. (2020). Patient- and Caregiver-Reported Burden of Transfusion-Dependent β-Thalassemia Measured Using a Digital Application. *The Patient - Patient-*

Centered Outcomes Research, *14*, 1–12. https://doi.org/10.1007/s40271-020-00473-0

Passi-Solar, A., Margozzini, P., Mindell, J., Ruiz, M., Valencia-Hernandez, C., & Scholes, S. (2020). Hypertension care cascade in Chile: A serial cross-sectional study of national health surveys 2003-2010-2017. *BMC Public Health*, *20*, 1397. https://doi.org/10.1186/s12889-020-09483-x

Patel, K., Shroff, B., & Vaidya, D. (2022). *Smoking and Stroke: A Case-Control Study*.

Patel, P., Butani, K., Kumar, A., Singh, S., & Prajapati, B. (2023). Effects of Fermented Food Consumption on Non-Communicable Diseases. *Foods*, *12*, 687. https://doi.org/10.3390/foods12040687

Pokharel, P., Jha, S. K., Adhikari, A., Katwal, S., Ghimire, S., Shrestha, A. B., & Poudel, N. (2023). Non-adherence to anti-hypertensive medications in a low-resource country Nepal: A systematic review and meta-analysis. *Annals of Medicine and Surgery*, *85*(9), 4520–4530. https://doi.org/10.1097/MS9.0000000000001088

Powell-Jackson, T., King, J., Makungu, C., Quaife, M., & Goodman, C. (2023). Management Practices and Quality of Care: Evidence from the Private Health Care Sector in Tanzania. *The Economic Journal*, *134*. https://doi.org/10.1093/ej/uead075

Ramezankhani, A., Azizi, F., & Hadaegh, F. (2019). Associations of marital status with diabetes, hypertension, cardiovascular disease and all-cause mortality: A long term follow-up study. *PLoS ONE*, *14*(4), e0215593. https://doi.org/10.1371/journal.pone.0215593

Sakboonyarat, B., Rangsin, R., Kantiwong, A., & Mungthin, M. (2019). Prevalence and associated factors of uncontrolled hypertension among hypertensive patients: A nation-wide survey in Thailand. *BMC Research Notes*, *12*. https://doi.org/10.1186/s13104-019-4417-7

Sanchez, K. (2017). Collaborative care in real-world settings: Barriers and opportunities for sustainability. *Patient Preference and Adherence*, *11*, 71–74. https://doi.org/10.2147/PPA.S120070

Sekhon, C., Kaur, R., & Airi, M. (2024). Incidence of hypertension and its risk factors: A systematic review. *International Journal Of Community Medicine And Public Health*, *11*, 1282–1290. https://doi.org/10.18203/2394-6040.ijcmph20240633

Shakya, R., Shrestha, S., Gautam, R., Rai, L., Maharjan, S., Satyal, G. K., KC, B., & Rai, M. K. (2020). Perceived Illness and Treatment Adherence to Hypertension Among Patients Attending a Tertiary Hospital in Kathmandu, Nepal. *Patient Preference and Adherence*, *14*, 2287–2300. https://doi.org/10.2147/PPA.S270786

Sharkiya, S. H. (2023). Quality communication can improve patient-centred health outcomes among older patients: A rapid review. *BMC Health Services Research*, *23*(1), 886. https://doi.org/10.1186/s12913-023-09869-8

Sharma, J., Mabhida, S., Myers, B., Apalata, T., Nicol, E., Benjeddou, M., Muller, C., & Johnson, R. (2021). Prevalence of Hypertension and Its Associated Risk Factors in a Rural Black Population of Mthatha Town, South Africa. *International Journal of Environmental Research and Public Health*, *18*, 1215. https://doi.org/10.3390/ijerph18031215

Shehab, A., Bhagavathula, A., & Alhajri, N. (2021). Sex differences in the antihypertensive treatment and risk of uncontrolled hypertension in 5308 hypertensive patients in the United Arab Emirates. *Blood Pressure Monitoring*, *Publish Ahead of Print*. https://doi.org/10.1097/MBP.0000000000000539

Shi, Z., Papier, K., Yieng-Sbirakos (Yiengprugsawan), Dr. V., Kelly, M., Seubsman, S.-A., & Sleigh, A. (2018). Dietary patterns associated with hypertension risk among adults in Thailand: 8-year findings from the Thai Cohort Study. *Public Health Nutrition*, *22*, 1–7. https://doi.org/10.1017/S1368980018002203

Shrestha, B., Ferdoush, Z., Rabbi, F., & Hossain, A. (2018). Adherence to medications among Nepali hypertensive population: A hospital-based cross-sectional study. *Biomedical Research and Clinical Practice*, *3*. https://doi.org/10.15761/BRCP.1000159

Smith, D. A., Akira, A., Hudson, K., Hudson, A., Hudson, M., Mitchell, M., & Crook, E. (2017). The effect of health insurance coverage and the doctor-patient relationship on health care utilization in high poverty neighborhoods. *Preventive Medicine Reports*, *7*, 158–161. https://doi.org/10.1016/j.pmedr.2017.06.002

Soares, L., Leal, T., Faria, A. L., Aguiar, A., & de Carvalho, C. (2023). Cardiovascular Disease: A Review. *Biomedical Journal of Scientific & Technical Research*, *51*. https://doi.org/10.26717/BJSTR.2023.51.008101

Soltani, S., Arablou, T., Jayedi, A., & Salehi-Abargouei, A. (2020). Adherence to the dietary approaches to stop hypertension (DASH) diet in relation to all-cause and cause-specific mortality: A systematic review and dose-response meta-analysis of prospective cohort studies. *Nutrition Journal*, *19*, 37. https://doi.org/10.1186/s12937-020-00554-8

Sun, K., Lin, D., Li, M., Mu, Y., Zhao, J., Liu, C., Bi, Y., Chen, L., Shi, L., Li, Q., Yang, T., Wan, Q., Wu, S., Wang, G., Luo, Z., Qin, Y., Tang, X., Chen, G., Huo, Y., … Yan, L. (2022). Association of education levels with the risk of hypertension and hypertension control: A nationwide cohort study in Chinese adults. *Journal of Epidemiology and Community Health*, *76*(5), 451–457. https://doi.org/10.1136/jech-2021-217006

Suri, S., Kumar, V., Kumar, S., Goyal, A., Tanwar, B., Kaur, J., & Kaur, J. (2020). DASH Dietary Pattern: A Treatment for Non-communicable Diseases.

Current Hypertension Reviews, *16*(2), 108–114. https://doi.org/10.2174/1573402115666191007144608

Taherdoost, H. (2021). *Data Collection Methods and Tools for Research; A Step-by-Step Guide to Choose Data Collection Technique for Academic and Business Research Projects*.

Takyi, S. A., Basu, N., Arko-Mensah, J., Botwe, P., Amoabeng Nti, A. A., Kwarteng, L., Acquah, A., Tettey, P., Dwomoh, D., Batterman, S., Robins, T., & Fobil, J. N. (2020). Micronutrient-rich dietary intake is associated with a reduction in the effects of particulate matter on blood pressure among electronic waste recyclers at Agbogbloshie, Ghana. *BMC Public Health*, *20*(1), 1067. https://doi.org/10.1186/s12889-020-09173-8

Tam, H. L., Wong, E., & Cheung, K. (2020). Effectiveness of Educational Interventions on Adherence to Lifestyle Modifications Among Hypertensive Patients: An Integrative Review. *International Journal of Environmental Research and Public Health*, *17*, 2513. https://doi.org/10.3390/ijerph17072513

Thulaseedharan, J. V., Sarma, P. S., Thankappan, K. R., Soman, B., Varma, R. P., Srinivasan, K., Nair, M. R., Jeemon, P., & Kutty, V. R. (2021). Consumption of fruits, vegetables and salt in the context of control of type 2 diabetes and hypertension in Kerala, India. *Journal of Family Medicine and Primary Care*, *10*(7), 2646–2654. https://doi.org/10.4103/jfmpc.jfmpc_2469_20

Treciokiene, I., Postma, M., Nguyen, T., Fens, T., Petkevicius, J., Kubilius, R., Gulbinovic, J., & Taxis, K. (2021). Healthcare professional-led interventions on lifestyle modifications for hypertensive patients – a systematic review and meta-analysis. *BMC Family Practice*, *22*. https://doi.org/10.1186/s12875-021-01421-z

Ukoha-Kalu, B. O., Isah, A., Biambo, A. A., Samaila, A., Abubakar, M. M., Kalu, U. A., & Soyiri, I. N. (2023). Effectiveness of educational interventions on hypertensive patients' self-management behaviours: An umbrella review protocol. *BMJ Open*, *13*(8), e073682. https://doi.org/10.1136/bmjopen-2023-073682

Venkatesh, U., Grover, A., Vignitha, B., Ghai, G., Malhotra, S., Kishore, J., Jaswal, N., Yashwanth, R. D., Durga, R., Goel, S., & Kishore, S. (2022). Urban–rural disparities in blood pressure and lifestyle risk factors of hypertension among Indian individuals. *Journal of Family Medicine and Primary Care*, *11*(9), 5746–5756. https://doi.org/10.4103/jfmpc.jfmpc_573_22

Vynckier, P., Ferrannini, G., Rydén, L., Jankowski, P., Backer, T., Gevaert, S., De Backer, G., & De Smedt, D. (2021). Gender gap in risk factor control of coronary patients far from closing: Results from the European Society of Cardiology EUROASPIRE V registry. *European Journal of Preventive Cardiology*, *29*. https://doi.org/10.1093/eurjpc/zwaa144

Wagenmakers, M., Roerink, S., Gil, L., Plantinga, T., Smit, J., Netea-Maier, R., & Hermus, A. (2015). Persistent centripetal fat distribution and metabolic

abnormalities in patients in long-term remission of Cushing's syndrome. *Clinical Endocrinology*, *82*(2), 180–187. https://doi.org/10.1111/cen.12639

Walekhwa, S. N., & Kisa, A. (2021). Tobacco Use and Risk Factors for Hypertensive Individuals in Kenya. *Healthcare*, *9*(5), 591. https://doi.org/10.3390/healthcare9050591

Wang, C., Sun, J., Hui, Z., Ren, X., Lei, S., Han, W., Wang, X., & Wang, M.-X. (2023). Consumption frequencies of beverages and the hypertension risk in adults: A cohort study in China. *BMJ Open*, *13*(4), e072474. https://doi.org/10.1136/bmjopen-2023-072474

Wang, Y., Yao, Y., Chen, Y., Zhou, J., Wu, Y., Fu, C., Wang, N., Liu, T., & Xu, K. (2022). Association between Drinking Patterns and Incident Hypertension in Southwest China. *International Journal of Environmental Research and Public Health*, *19*(7), 3801. https://doi.org/10.3390/ijerph19073801

Wei, J., Mi, Y., Li, Y., Xin, B., & Wang, Y. (2021). Factors associated with awareness, treatment and control of hypertension among 3579 hypertensive adults in China: Data from the China Health and Nutrition Survey. *BMC Public Health*, *21*, 423. https://doi.org/10.1186/s12889-021-10417-4

WEI, J.-L., WANG, X.-Y., LIU, F.-C., CHEN, J.-C., CAO, J., LI, J.-X., HU, D.-S., SHEN, C., LU, F.-H., ZHAO, Y.-X., HUANG, J.-F., & LU, X.-F. (2020). Associations of soybean products intake with blood pressure changes and hypertension incidence: The China-PAR project. *Journal of Geriatric Cardiology : JGC*, *17*(7), 384–392. https://doi.org/10.11909/j.issn.1671-5411.2020.07.005

Wilunda, C. (2020). Prevalence and Risk Factors of Elevated Blood Pressure and Elevated Blood Glucose among Residents of Kajiado County, Kenya: A Population-Based Cross-Sectional Survey. *International Journal of Environmental Research and Public Health*, *17*. https://doi.org/10.3390/ijerph17196957

Wordu, G., & O.M, A. (2018). Dietary Pattern and Prevalence of High Blood Pressure among Adult Traders in Port Harcourt, Nigeria. *Asian Journal of Medicine and Health*, *11*, 1–7. https://doi.org/10.9734/AJMAH/2018/37430

Zaman, M. A., Awais, N., Satnarine, T., Ahmed, A., Haq, A., Patel, D., Gutlapalli, S. D., Hernandez, G. N., Seffah, K., & Khan, S. (n.d.). Comparing Triple Combination Drug Therapy and Traditional Monotherapy for Better Survival in Patients With High-Risk Hypertension: A Systematic Review. *Cureus*, *15*(7), e41398. https://doi.org/10.7759/cureus.41398

Zemaitis, M. R., Boll, J. M., & Dreyer, M. A. (2024). Peripheral Arterial Disease. In *StatPearls*. StatPearls Publishing. http://www.ncbi.nlm.nih.gov/books/NBK430745/

Zhang, M., Shi, Y., Zhou, B., Huang, Z., Zhao, Z., Li, C., Zhang, X., Han, G., Peng, K., Li, X., Wang, Y., Ezzati, M., Wang, L., & Li, Y. (2023). Prevalence,

awareness, treatment, and control of hypertension in China, 2004-18: Findings from six rounds of a national survey. *BMJ*, *380*, e071952. https://doi.org/10.1136/bmj-2022-071952

Zhao, Y., Tang, C., Tang, W., Zhang, X., Jiang, X., Duoji, Z., Kangzhu, Y., Zhao, X., Xu, X., Hong, F., & Liu, Q. (2023). The association between tea consumption and blood pressure in the adult population in Southwest China. *BMC Public Health*, *23*(1), 476. https://doi.org/10.1186/s12889-023-15315-5

Zhou, D., Xi, B., Zhao, M., Wang, L., & Veeranki, S. P. (2018). Uncontrolled hypertension increases risk of all-cause and cardiovascular disease mortality in US adults: The NHANES III Linked Mortality Study. *Scientific Reports*, *8*, 9418. https://doi.org/10.1038/s41598-018-27377-2

APPENDICES

Appendix I: Consent Form

TITLE OF STUDY: DETERMINANTS OF BP CONTROL AMONG HYPERTENSIVE PERSONS AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY

Introduction:

You have been invited to take part in a study. Naomi Wachira, an MPH-M&E student at Mt. Kenya University, is doing the research. The info attained from you will be preserved with strict discretion and used exclusively for the envisioned objectives.

Study Purpose

The study's objective is to determine demographic, patient-related, lifestyle, and well-being care system reasons that impact the control of BP in hypertensive individuals. During this research, you will be asked to comprehensive an electronic survey that will take about 15 minutes of your time and will be conducted by an interviewer.

Benefits

No immediate gains or incentives, but the data will aid in recognizing gaps so that actions to decrease unmet demands can be implemented.

Risks and distresses

I don't anticipate any risks or embarrassment from your involvement in the study.

Reimbursement

There will be no remuneration for participating in the research.

Voluntary partaking

contribution in the research is entirely optional, and you may withdraw at any time. Nobody will influence your decision, and it will be cherished.

Privacy

Contributors' privacy will be guaranteed throughout data gathering and after the research. Participants never revealed their name in the questionnaire to guarantee anonymity; instead, codes will be utilized.

Having any query, please reach out to the investigator using the info provided below.

Researcher; Naomi Wachira; 0736991633 Email address: naomiw59@gmail.com

Supervisor; Dr. Atei Kerochi…. Email address: akerochi@mku.ac.ke

Supervisor; Dr. Juma Nyamai Email address: nyamaijuma@gmail.com

Signatures.

I agree to partake in the aforementioned research by Naomi Wachira. All concepts about this research have been clarified to me and would like to participate in it willingly.

Autograph of applicant.....Date.....

Autograph of investigator.....Date…….....

Appendix II: Questionnaire

Please indicate the numbers 1, 2, 3, 4, 5, or 6 as appropriate.			
	Questions	Answers	
SECTION A. DEMOGRAPHIC INFO			
	status of employment?	Working Entrepreneurial Student Jobless Discharged Others(specify)	☐☐
	Your occupation	Farmer Driver Businessman/lady Teacher Other(specify) ……..	
	monthly income?	Less than Ksh 10000 Ksh10,000 to 19,999 Ksh 20,000 to 29,999 Ksh 30,000to 39,999 Ksh 40,000to 49,999 Ksh 50,000 and above	☐
SECTION B. PATIENT-RELATED FACTORS			
	Frequency of BP check	Every Week In two weeks time Monthly in two months in three months Other (specify)…….	☐
	Where do you often measure you blood pressure from	1. At this clinic 2.Home	☐

		3. Nearest clinic/pharmacy 4. Others (specify)……	
	Presence of medication side effect	Yes No	☐
	If your answer to the above question is **YES** which side effects have you experienced?	Erectile dysfunction Headache Weakness mouth that is dry Libido Others specify_____	☐ ☐
	What did you do when you experienced the side effects?	1. I came back to the clinic 2. I went back to the Pharmacy 3. Asked advice from friends 4. Used traditional medicines 5. Others (specify)……	☐

6. Kindly respond to the following

Questions	**Yes**	**No**
overlook to take my drugs?		
Sometimes people miss taking their medications for motives not known. Were there any days when you did not take your medicine?		
Do you have a supporter who reminds you to take the drug?		
Stopped taking meds without seeking doctors' advice due their side effect		
Living alone makes you forget to take meds		
took my pills yesterday?		
I stop taking meds when I felt the symptoms of BP are under control		
plan? Does taking your meds every day a strenuous process		

	Level of agreement in the following announcement ?					
	For these queries, indicate the appropriate number (Disagree toughly, 2=Disagree). 3 = Ambiguous, 4 =Reach agreement, and 5 = Agree Toughly	1	2	3	4	5
	Im knowledgeable about my BP aillment					
	I'm knowledgeable on normal blood pressure levels					
	I'm aware of BP symptoms					
	I'm aware of complications linked to BP that is uncontrolled					
	I'm aware of high blood pressure symptoms are dealt with					
	I'm aware of meds related to high BP					
	I'm aware of meds side effects that I'm on					

SECTION C: LIFESTYLE FACTORS

	Have you ever smoked cigarettes or used other tobacco or nicotine products in the past?	Yes No Not aware	☐
	If yes, do you still smoke cigarettes or use of other tobacco or nicotine products?	Yes No	☐
.	If No when did you stop smoking?	< 3 months 3 to 6 months > 6 months ago	☐
.	Why did you stop smoking?	Advice from HCW Due to health problem Others (specify)…….	
.	Do you normally engage in exercise or participate in physical activity?	Yes No	☐
.	If yes, in what kind of situations do you engage in exercise/physical activity?	walking to work every day, in the farm,	

		walking to market, going to gym jogging	
.	If yes for how many days per week?	……days	☐
.	What is the average duration of physical activity per day?	……minutes	☐
.	Have you ever consumed alcohol? If no, skip to question 21	Yes No	☐
.	Do you still consume alcohol	Yes No (skip to Q)	
.	If no, when did you stop:	<3 months ago 3 to 6 months ago >6 months ago	
.	How much alcohol do you take per seating?	1 drink 2 drinks 3 drinks 4 drinks 5 or more drinks	☐
.	Frequency of alcohol taking	Once a week 1 to 2 epochs a week 3 to 4 epochs a week 5 or more epochs a week	☐
.	Stress is when someone feels tense, nervous or anxious or can't sleep because their mind is troubled. How stressed are you today?	Not at all (0) A little bit (1) Somewhat (1) Quite a bit (1) Very much (1) I choose not to answer this question	☐
.	Frequency of being upset due to abrupt events	0 - never 1 - almost never	☐

		2 - sometimes 3 - fairly often 4 - very often	
.	Frequency of being unable to manage life events in the last one month	0 - not ever 1 - seldom 2 - from time to time 3 - fairly often 4 - very often	☐
.	Have you felt stress and nervous in the past month Frequency of being stressed in the last one month	0 - never 1 - rarely 2 - occasionally 3 - fairly often 4 - very often	☐
.	Frequency of being upset due to being unable to control life event	0 - never 1 - rarely 2 - from time to time 3 - fairly often 4 - very often	☐
.	Frequency of feeling difficulty in overcoming challenges in the previous month	0 - never 1 - rarely 2 - occasionally 3 - fairly often 4 - very often	☐
.	Do you add any amount of salt to your food at the table?	Yes No	☐
.	Do you add any salt to food during preparation?	1.Yes 2. No 3. Do not take food added with salt even at cooking	☐ ☐
.	What type of fruits are frequently consumed in your food?	1. Oranges 2. Banana	☐

		3. Watermelon 4. Mangoes 5. Others (specify)……..	
.	How frequently do you consume the fruits per week?	1. Everyday 2. 2- 3 times 3. Once 4. Never 5.Others(specify)	☐
.	Are vegetables part of your diet?	Yes No	☐
.	If yes, what portions of vegetables are consumed in a day?	…….	
SECTION D: HEALTH SYSTEM FACTORS			
.	How far do you stay from this health facility?	Less the 5 km 5 to 10 Km 10 to 15 Km More than 15 km	☐ ☐ ☐ ☐
.	How do you reach a health facility?	PSV Personal vehicle Walking Boda boda Others (specify)……	☐ ☐ ☐ ☐ ☐
.	How much do you spend for transport?	> Ksh 200 Ksh 200-500 Ksh 500-1000 More than Ksh 1000	☐ ☐ ☐ ☐
.	The distance required to access the medical center	Less than 1 hour More than 1 hour	☐
.	The staff in this health facility are respective	Yes No	☐

.	Do you always find all medicines in the health facility?	Yes No	☐
	If no, how frequent do you buy the medicine from private pharmacies when they are unavailable?	…….	
.	How would you rate the cost of medicine and general consultation at the health facility?	Affordable Costly	☐

Appendix III: Data Extraction Tool

Name of Investigation subordinate_____ Date of data obtained _____

Age_____ Sex_____ Height_____ Weightiness_____

Status of marriage _____ Profession_____

Code……

	BP	**Weight**	**Height**	**BMI**	**Creatinine (Most recent)**
Date of current appointment:					
(Preceding 2 measurements): Preceding Nomination Date 1:					
Aforementioned Nomination Date 2:					
Date of 1st nomination:					

Drugs used in the management of BP

Class	Drug(examples)	Drug	Dose	Frequency	In use/ Stopped
A-Angiotensin Converting Enzyme Inhibitors(ACEIs) and Angiotensin Receptive Blockers(ARBs)	Enalapril, Captopril Losartan				
B- Beta Blockers(BB)	Atenolol, Carvedilol, Nebivolol				
C- Calcium Channel Blockers (CCBs)	Nifedipine, Amlodipine				
D- Thiazide Diuretics	Spironolactone, HCTZ				
Z-others(Sympatholytics, Alpha adrenergic blockers, Centrally acting alpha 2-agonists and Direct Arterial Vasodilators	Methyldopa Hydralazine				

Stock for drugs in the previous 1 year

Drug Name	Eminence											
	J	F	M	A	M	J	J	A	S	O	N	D

Comorbidities – Write the confirmed diagnosis

Ailment	Current state period	Absent
Diabetes		
Failure of the Kidney		
Stroke		
Failure of Heart		
Myocardial infarction		
Hyperlipidemia		
Others		

Lifestyle aspects

Past of lifestyle aspects	Duration
Alcohol	
Smoking	
Lack of exercises	
Others	

Appendix IV: Key Informant Interview Guide

Defendant Title_____

Section_____

Conference Date_____

1. How long have you worked at the HTN clinic?
2. Challenges faced when handling HTN individuals at the clinic regarding controlling blood pressure?
3. What interventions have been embarrassed to curb the problem
4. What do you as staff at the hypertension clinic think about?

a. Your patients' discernment of blood pressure control?

b. Your patients' knowledge of HTN illness and the difficulties arising from uncontrolled HTN?

5. What are the compliance levels you have recorded over the years if any?
6. What are the main challenges facing the hypertension patients at this clinic, especially on their compliance?
7. Do the patients get all the services they need to ensure their compliance?
8. Which services are not offered to the patients?
9. From your familiarity over the years, what do you contemplate needs to be embraced to increase blood pressure management levels at your hospital and other clinics in general?
10. HTN is a major silent killer ailment, What are your endorsements to increase its consciousness and management

Appendix V: Focus Group Discussion

PART A: Common Info

Date of the FGDs:	
FGDs Number:	
Time consultation ongoing:	
Time consultation completed:	
Notetaker's name:	
Interviewer's name:	
Calligraphy code:	

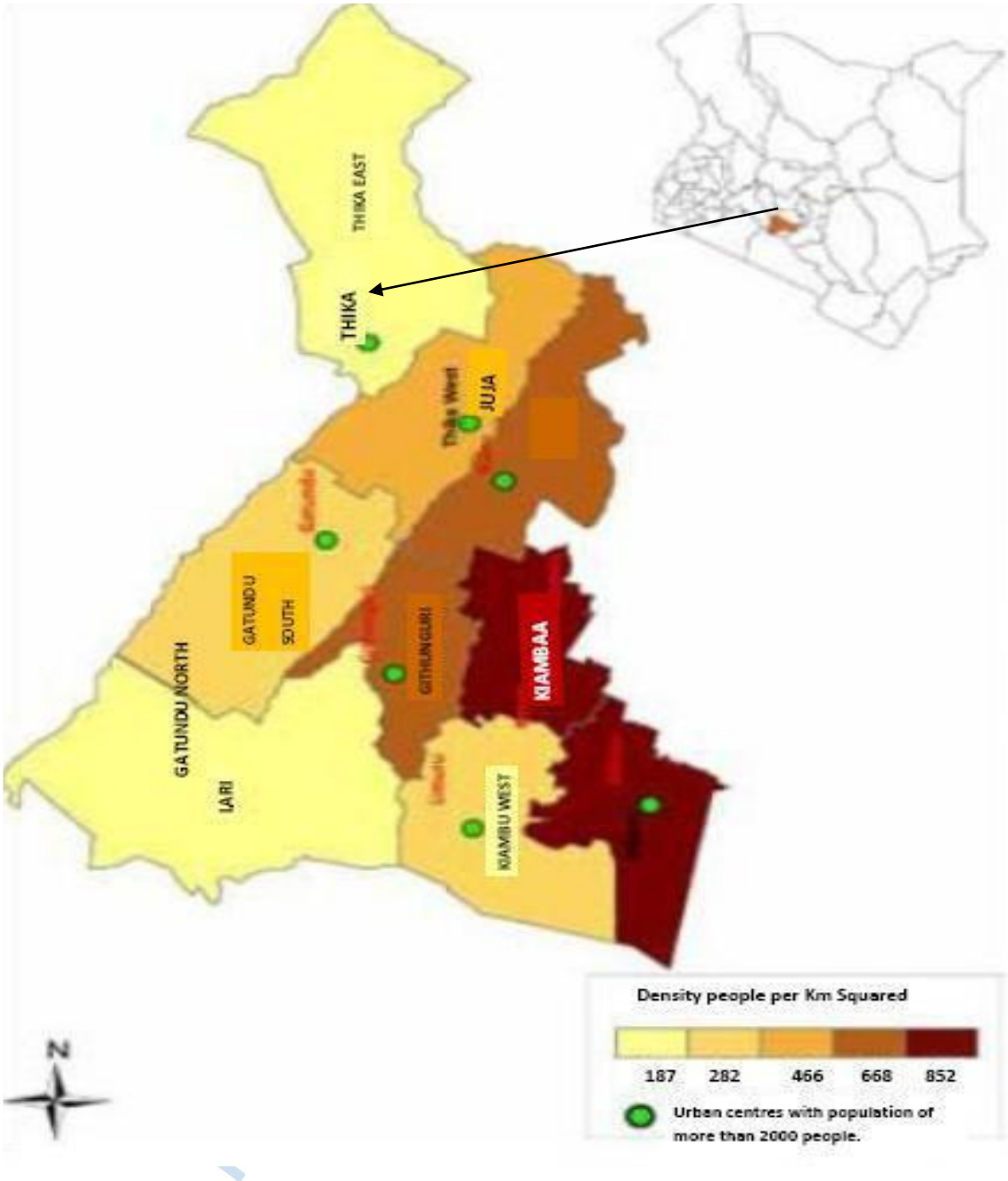
PART B: INTERVIEW GUIDE QUESTIONS

1. What's your take on the problem of BP that is uncontrolled in this region?

2. What are the barricades to getting controlled BP management?

3. Actions to be taken to improve the level of care provided at the medical facility will facility for maintaining controlled BP.

Appendix VI: Study Area/Map



Appendix VII: Letters of Introduction

Mount Kenya University

SCHOOL OF POSTGRADUATE STUDIES

MPH/2017/63242

16th November, 2020

The Director, Research Coordination Division
National Commission for Science, Technology & Innovation
Utalii House, 8th & 9th Floor
P.O Box 30623- 00100
NAIROBI

Dear Sir/Madam,

RE: NAOMI MUTHONI WACHIRA – REGISTRATION NO. MPH/2017/63242

The purpose of this letter is to introduce the above named student who is pursuing **Master of Public Health** in the Department of **Epidemiology and Biostatistics** in the School of **Public Health.**

The title of her research is *"Determinants of Blood Pressure Control among Hypertensive Patients at Thika Level 5 Hospital, Kiambu County. Kenya: A Case Control Study."*

She has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data for her research between **November 2020 and January 2021.**

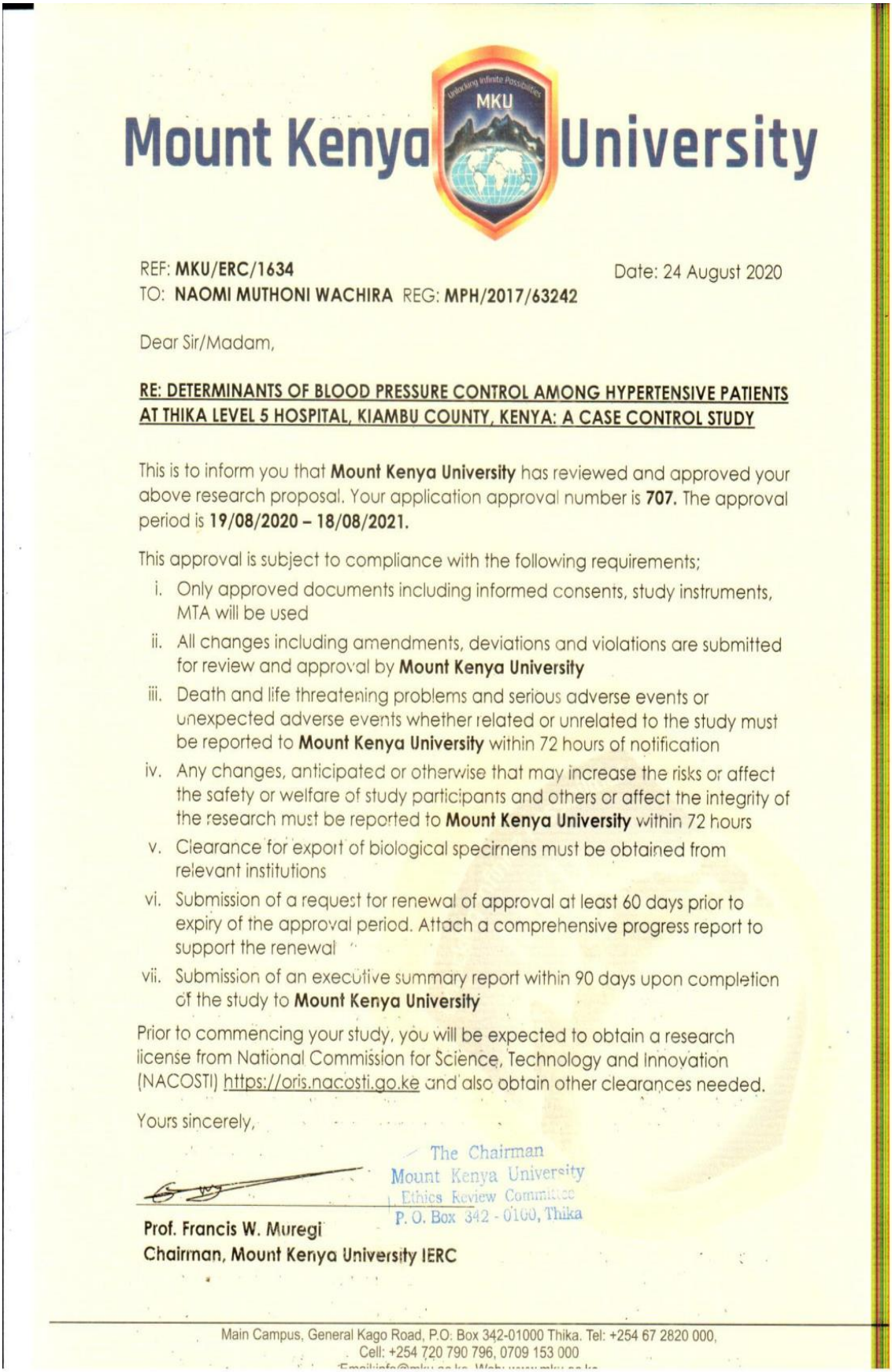
Any assistance accorded to him will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Dr. Samuel M. Kahonga, Ph.D.
Director, Graduate Studies
Enc.

Appendix VIII: Ethical Clearance Certificate



Mount Kenya University

REF: **MKU/ERC/1634** Date: 24 August 2020
TO: **NAOMI MUTHONI WACHIRA** REG: **MPH/2017/63242**

Dear Sir/Madam,

RE: DETERMINANTS OF BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA: A CASE CONTROL STUDY

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **707.** The approval period is **19/08/2020 – 18/08/2021.**

This approval is subject to compliance with the following requirements;

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

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

Prof. Francis W. Muregi
Chairman, Mount Kenya University IERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika. Tel: +254 67 2820 000,
Cell: +254 720 790 796, 0709 153 000

Appendix IX: Research Permit from NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **467963**

Date of Issue: **06/January/2021**

RESEARCH LICENSE

This is to Certify that Ms.. Naomi Muthoni Wachira of Mount Kenya University, has been licensed to conduct research in Kiambu on the topic: DETERMINANTS OF BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA: A CASE CONTROL STUDY for the period ending : 06/January/2022.

License No: **NACOSTI/P/21/8194**

467963

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix X: Similarity index report

DETERMINANTS OF BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINIC AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA.

by Naomi Muthoni Wachira

Submission date: 04-Jul-2024 10:33AM (UTC+0300)
Submission ID: 2412408985
File name: Naomi_Muthoni_Wachira_Final_Thesis.docx (4.27M)
Word count: 32003
Character count: 191026

DETERMINANTS OF BLOOD PRESSURE CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINIC AT THIKA LEVEL 5 HOSPITAL, KIAMBU COUNTY, KENYA.

ORIGINALITY REPORT

17%	14%	10%	8%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	ouci.dntb.gov.ua Internet Source	1%
2	erepository.uonbi.ac.ke Internet Source	1%
3	Submitted to University of Wales Swansea Student Paper	1%
4	Submitted to Capella University Student Paper	1%
5	ir.jkuat.ac.ke Internet Source	1%
6	Submitted to Kenyatta University Student Paper	1%
7	Submitted to Adtalem Global Education Student Paper	1%

A systematic review and meta-analysis", PLOS ONE, 2024
Publication

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	On		

Appendix XI : Additional tables

Table 4. 25: Dietary practices among study participants

	Controlled		**Uncontrolled**		Total	
Adding Salt to food at the table	N	%	N	%	N	%
Yes	21	16.2%	43	11.9%	64	13.0%
No	109	83.8%	319	88.1%	428	87.0%
Total	130	100.0%	362	100.0%	492	100.0%
Adding Salt to food during preparation						
Yes	115	88.5%	328	90.6%	443	90.0%
No	15	11.5%	34	9.4%	49	10.0%
Total	130	100.0%	362	100.0%	492	100.0%
Frequency of fruit consumption per day						
Everyday	6	4.6%	18	5.0%	24	4.9%
2-3 times	57	43.8%	171	47.2%	228	46.3%
Once	67	51.5%	171	47.2%	238	48.4%
Never	0	0.0%	2	0.6%	2	0.4%
Total	130	100.0%	362	100.0%	492	100.0%
Vegetables as part of diet						
Yes	126	96.9%	350	96.7%	476	96.7%
No	4	3.1%	12	3.3%	16	3.3%
Total	130	100.0%	362	100.0%	492	100.0%
Number of vegetable servings						
0	0	0.0%	2	0.6%	2	0.4%
1	44	35.5%	119	34.3%	163	34.6%
2	55	44.4%	177	51.0%	232	49.3%
3	25	20.2%	49	14.1%	74	15.7%
Total	124	100.0%	347	100.0%	471	100.0%
Engage in Physical Activity						
Yes	100	76.9%	300	82.9%	400	81.3%
No	30	23.1%	62	17.1%	92	18.7%
Number of Days Engaged in Physical Activity per Week						
Groups	**Controls (N=300)**	**Cases (N=100)**				
Mean	5.1	1.42				
Standard Deviation	5.0	1.38				
Duration Engaged in Physical Activity (mins) (N=						
Groups	**Controls** (N=100)	**Cases** (N=299)				
Mean	83 (C.1 62-84)	73 (76-89				
Standard Deviation	54	56				

Table 4. 26: Smoking, Alcohol Drinking, physical activity and compliance to medication

Ever smoked tobacco or nicotine products	Groups				Total	
	Controlled		**Uncontrolled**			
	N	**%**	**N**	**%**	**N**	**%**
Yes	28	21.5%	79	21.8%	107	21.7%
No	102	78.5%	283	78.2%	385	78.3%
Total	130	100.0%	362	100.0%	492	100.0%
Current Smoking Status						
Yes	1	6.9%	11	13.4%	12	11.7%
No	27	93.1%	71	86.6%	98	88.3%
Total	28	100.0%	82	100.0%	110	100.0%
Ever consumed alcohol						
Yes	37	28.5%	99	27.3%	136	27.6%
No	93	71.5%	263	72.7%	356	72.4%
Total	130	100.0%	362	100.0%	492	100.0%
Engage in Physical Activity						
Yes	100	76.9%	300	82.9%	400	81.3%
No	30	23.1%	62	17.1%	92	18.7%
Total	130	100.0%	362	100.0%	492	100.0%
Forget to take pills						
Yes	47	36.2%	120	33.1%	167	33.9%
No	83	63.8%	242	66.9%	325	66.1%
Total	130	100.0%	362	100.0%	492	100.0%

Table 4. 27: Test of Association between Smoking, Alcohol use behaviour and BP Control

	Groups				χ^2 (df), p-value
	Controlled		Uncontrolled		
Ever consumed alcohol	**N**	**%**	**N**	**%**	
Yes	37	28.5%	99	27.3%	*0.059(1), p=0.808*
No	93	71.5%	263	72.7%	
Total	130	100.0%	362	100.0%	
Number of Alcohol Per Seating					
1 drink	0	0.0%	2	7.1%	*3.214(3), p=0.360*
2 drinks	4	50.0%	11	39.3%	
3 drinks	2	25.0%	13	46.4%	
4 drinks	2	25.0%	2	7.1%	
Total	8	100.0%	28	100.0%	
Engage in Physical Activity					
Yes	100	76.9%	300	82.9%	*2.227(1), p=0.136*
No	30	23.1%	62	17.1%	
Total	130	100.0%	362	100.0%	
Ever Smoked					
Yes	28	21.5%	79	21.8%	*0.05(1), p=0.946*
No	102	78.5%	283	78.2%	
Total	130	100.0%	362	100.0%	
Forget to take pills					
Yes	47	36.2%	120	33.1%	*0.385(1), p=0.535*
No	83	63.8%	242	66.9%	
Total	130	100.0%	362	100.0%	

Table 4. 28: Health System-related factors attested by Study participants

	Groups					
	Controls		Cases		Total	
Means to Health Facility						
PSV	91	70.0%	287	79.3%	378	76.8%
Personal vehicle	18	13.8%	50	13.8%	68	13.8%
Walking	14	10.8%	14	3.9%	28	5.7%
Boda-boda	7	5.4%	11	3.0%	18	3.7%
Total	130	100.0%	362	100.0%	492	100.0%
Cost of Transport						
Less than Ksh 200	46	35.4%	148	40.9%	194	39.4%
Ksh 200-500	55	42.3%	143	39.5%	198	40.2%
Ksh 500-1000	29	22.3%	71	19.6%	100	20.3%
Total	130	100.0%	362	100.0%	492	100.0%
Estimated Duration to Health facility						
Less than 1 hour	72	55.4%	220	60.8%	292	59.3%
More than 1 hour	58	44.6%	142	39.2%	200	40.7%
Total	130	100.0%	362	100.0%	492	100.0%
Respective nature of Health Care Workers						
Yes	114	88.4%	325	90.5%	439	90.0%
No	15	11.6%	34	9.5%	49	10.0%
Total	129	100.0%	359	100.0%	488	100.0%