# PREVALENCE OF UNCONTROLLED HYPERTENSION AND ASSOCIATED FACTORS AMONG ELDERLY HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINICS IN MBEYA REGIONAL REFERRAL HOSPITAL, TANZANIA

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**A dissertation submitted in (partial) fulfilment of the requirements for the degree of Masters of Science in Cardiovascular in Nursing of Muhimbili University of Health and Allied Sciences**

**October, 2024**

## CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation titled **"PREVALENCE OF UNCONTROLLED HYPERTENSION AND ASSOCIATED FACTORS AMONG ELDERLY HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINICS IN MBEYA REGIONAL REFERRAL HOSPITAL, TANZANIA",** in (partial) fulfilment of the requirements for the degree of Masters of Science in Cardiovascular in Nursing of Muhimbili University of Health and Allied Sciences.

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## DECLARATION AND COPYRIGHT

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## DEDICATION

I dedicate this work to my immediate lovely family for having endured my absence at time they could have needed me most.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| AHA | American Heart Association |
| ARB | Angiotensin Receptor Blocker |
| BP | Blood pressure |
| BMI | Body mass index |
| BSA | Body surface area |
| DBP | Diastolic blood pressure |
| DASH | Dietary Approach to Stop Hypertension |
| ECG | Electrocardiogram |
| HTN | Hypertension |
| MUHAS | Muhimbili University of Health and Allied Sciences |
| NYHA | New York Heart Association |
| NCDs | Non communicable Diseases |
| MRRH | Mbeya Regional Referral Hospital |

## DEFINITION OF OPERATIONAL TERMS

**Body Mass Index:** -Calculated as weight in kilograms divided by height in square meters and in the general population, it is classified into five categories:

1. Normal weight (BMI 18.5-24.9 kg/$m^2$),
2. Class I obesity - overweight (BMI 25.0-29.9 kg/$m^2$),
3. Class II obesity - obesity (BMI 30.0-39.9 kg/$m^2$),
4. Class III obesity - extreme obesity (BMI > 40 kg/$m^2$ )(1)

**Controlled Hypertension** Is defined as Systolic Blood Pressure < 140 mm Hg and Diastolic Blood Pressure < 90 mm Hg for individuals below the age of 60; Systolic Blood Pressure < 150 mm Hg and Diastolic Blood Pressure < 90mmHg as a result of pharmacologic treatment among the hypertensive for individuals age of 60 years and above (2)

**Elderly**: Is the individual with age ≥55 years(3) (4)

**Estimates:** Refers to the calculated value or statistical measure representing the prevalence of uncontrolled hypertension and its associated factors within a specific population (5,6).

**Frailty**: Is defined as a clinically recognizable state of increased vulnerability resulting from an ageing-associated decline in reserve and function across multiple physiologic systems such that the ability to cope with every day or acute stressors is comprised of increased risk of poor health outcomes, hospitalization, falls, and incident disability (7).

**Hypertensive patient in the clinic:** Refers to a hypertensive patient on hypertension medication for at least 3 months.

**Physically active**: An individual who performs physical exercise for at least 30 minutes per day for at least 5 days per week(8).

**Physically inactive**: An individual who performs physical exercise for less than 30 minutes per day for less than 5 days per week (8).

**Prevalence of uncontrolled hypertension:** Refers to the existing proportion of individuals within a population who have systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm despite treatment or management efforts (9).

**Uncontrolled hypertension** Is a state of systolic blood pressure ≥140 mm Hg and/or diastolic blood pressure ≥90 mm Hg even though the patients are on antihypertensive medication and management (10).

**Unhealthy behaviors** Are considered as heavy alcohol consumption, low or medium adherence to dietary recommendations, sedentary physical activity level, and being overweight (11).

## ABSTRACT

**Background:** In Tanzania, research studies have provided sufficient evidence of the increase in the hypertension burden, even within local regions away from big cities. Improvements in disease management have enabled affected people to live longer to old ages with diseases including hypertension. In the elderly, studies associate uncontrolled hypertension with male sex, living alone, alcohol consumption, and medication non-compliance. We were not sure of the status of elderly hypertensive populations in the regions; hence, this study is necessary so we can intervene to save lives. Thus, this study aimed to determine the prevalence of uncontrolled hypertension and associated factors among elderly hypertensive patients attending outpatient clinics in Mbeya Regional Referral Hospital, Tanzania.

**Methods**: The hospital-based analytic cross-sectional study were conducted at the chronic illness clinic at Mbeya Regional Referral Hospital. We included 389 hypertensive patients on antihypertensive medications, and consented patients participated in determining the prevalence of uncontrolled hypertension among the elderly from 31st May to 30th June 2024. Univariate and multivariate analysis were used to determine factors associated with uncontrolled hypertension and p-value $\leq$ 0.05 for final multivariable analysis was considered significant.

**Results** The prevalence of uncontrolled hypertension was 241(62.0%) among elderly attending clinic. Farmers had a significantly lower risk of uncontrolled hypertension compared to the self-employed (AOR 0.5, 95% CI [0.31-0.89], p = 0.02). Obesity was significantly increased risk of uncontrolled hypertension (AOR 3.5, 95% CI [1.06-11.30], p = 0.04). Additionally, the absence of diabetes was associated with a lower risk of uncontrolled hypertension (AOR 0.3, 95% CI [0.12-0.75], p = 0.010).

**Conclusion;** The prevalence of uncontrolled hypertension was high. Obesity and diabetes, smoking, salt intake, physical inactivity, and the use of herbal medications were associated with uncontrolled hypertension. These findings call for Continuous health education on lifestyle practices and hypertension-related complications in each follow-up visit through

nurses, physicians, and pharmacists are very essential to avert the problem among elderly attending cardiac clinics in Tanzania hospitals.

# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background

Globally, the World Health Organization (WHO) reported that uncontrolled hypertension is the most common risk factor for death and disability, especially in developing countries, including Tanzania (12). Uncontrolled hypertension is a medical condition that is unsatisfactory for individuals with hypertension since it is a sign of a high rate of morbidity and mortality for the patients who are receiving treatment. The most frequent risk factor for death and the leading cause of disability worldwide is uncontrolled hypertension, which affects almost one billion people worldwide (13). Only 6% of hypertensive patients in the United Kingdom have achieved controlled hypertension, and less than 30% of hypertensive patients in the United States have blood pressure readings lower than 140/90 mmHg. Data from countries like Australia, Canada, Finland, India, Scotland, and Spain indicate that just 20% of people would achieve this aim (6,14).

When the systolic blood pressure (SBP) is greater than or equal to 140 mm Hg and/or the diastolic blood pressure (DBP) is greater than or equal to 90 mm Hg, the condition is referred to as hypertension(15,16). These calculations are based on the average of at least two carefully measured blood pressure (BP) measurements taken during each of at least two visits by hypertensive patients to a hypertension clinic (17). Uncontrolled hypertension is characterized as having a blood pressure (BP) reading of at least 140/ 90 mmHg in hypertensive people on medication (18,19). Although substantial efforts have been made to identify and treat hypertension, the usually recommended target blood pressure (BP) of less than 140/90 mmHg(20) has not been reached.

Hypertension is sometimes called "the silent killer." It is the single most significant risk factor for heart disease and a condition without any early symptoms (15). The two primary root causes of hypertension problems are either long-term blood pressure rises that lead to alterations in the heart and blood vessels or concomitant atherosclerosis that is exacerbated by persistent hypertension (15). Even with modern hypertension treatment, worldwide hypertensive patients' blood pressure regulation is still subpar. About 21% of adults have uncontrolled high blood pressure, according to the World Health Organization, Tanzania

included (11)**.** Even though these people may not exhibit any symptoms, their uncontrolled hypertension poses a significant risk of developing additional illnesses such as heart attack, kidney disease, stroke, and, at times, sudden death (21)(22).

According to the Sustainable Development Goals (SDGs), 80% of hypertension control rates must be achieved by 2030. This emphasizes the need for efficient, safe, and effective therapies to enhance hypertension control and dramatically lower the rate of hypertension-related morbidity and mortality among hypertensive patients in low- and middle-income countries (LMICs) (22). Uncontrolled hypertension was described by the Eight Joint National Committee Report (JNC) as having a systolic blood pressure of at least 140 mmHg and a diastolic blood pressure of at least 90 mmHg while taking antihypertensive medication (23) (22). The calculation should be based on the average or two carefully measured blood pressure measurements. Ageing is considered a universal phenomenon. The increase in life expectancy and the decrease in fertility in the world have caused the elderly to have the promptest population growth among various age groups. According to the latest population forecasts, the “life expectancy” at birth in the world has risen from 64.2 in 1990 to 72.6 in 2019 and is expected to exceed 77.1 in 2050 (24). Despite of increase in life expectance and advancement in hypertension management elderly still suffer from mortality and morbidity due to uncontrolled hypertension(25).

In SSA, the prevalence of controlled hypertension was less than 30.5%, while the prevalence of uncontrolled hypertension among patients with comorbidities has been reported to be 78.6% and 79.8% (24,26). In SSA, hypertension is becoming a more significant public health issue and is believed to have the highest prevalence of uncontrolled hypertension and the lowest rates of hypertension therapy (27). Research conducted in SSA suggests that hypertension is a pervasive issue, with reports of up to 38% in certain groups. Ten to twenty million of the estimated 650 million people living in SSA may have hypertension. However, exact data on the incidence of uncontrolled hypertension is still lacking in many of the region's countries (22,28). Despite advances in the understanding of hypertension therapy and the accessibility of affordable drugs, uncontrolled hypertension (UHTN) in SSA remained an issue if proper plans and management are not sought.

In SSA, a systematic analysis done in 2013 revealed that 97% of patients had uncontrolled hypertension despite the disease having meagre treatment rates of (18%). Also, uncontrolled hypertension-related morbidities, such as stroke, are expensive to treat and place a strain on the already underdeveloped healthcare systems in SSA. When uncontrolled hypertension rates are high, there are consequences for the economy and public health (29). Therefore, high rates of morbidity and mortality related to uncontrolled hypertension are robbing the country of a significant portion of the workforce. This reduces economic production and mentoring and coaching opportunities within the existing workforce as most of the newly recruited workforce is relatively young.

In Tanzania, the combined prevalence of uncontrolled hypertension throughout the 13 studies was 48%. The burden of hypertension and uncontrolled hypertension is expected to increase significantly in Tanzania and in other developing countries due to increasing urbanization and ongoing epidemiological transition if proper measures are not considered (30). Local studies in Tanzania provided sufficient evidence of Tanzania's rising hypertension burden, with variations in prevalence. There was also adequate evidence that Tanzania's rising chronic illness burden affects the country's rural and urban populations (28,31). In rural areas, the prevalence of hypertension varied between 3% and 27% and 5% and 39% between 1990 and 2000. A study done in 2019 in Northern Tanzania revealed complications of uncontrolled hypertension, such as ischemic heart disease, chronic kidney disease, heart failure, stroke, and renal failure, as the leading cause of morbidity and mortality (32).

Tanzania cannot stand out in this regard. Uncontrolled hypertension seem to be the most common chronic disease of the elderly and an essential modifiable cause of mortality and morbidity in urban and rural areas (21). Thus, this study estimated the prevalence of uncontrolled hypertension and its associated factors and interventions among elderly hypertensive patients attending outpatient clinics in Mbeya Regional Referral Hospital. This would inform healthcare planning and improve healthcare policy regarding the specific strategies for this critical group.

## 1.2 Problem statement

Hypertension is a major public health concern globally and is particularly prevalent among the elderly population. The uncontrolled hypertension significantly increases the risk of cardiovascular disease,stroke,kidney failure and other complications, contributing to increased morbidity and mortality rates.

In Tanzania, Health care policy for the elderly does not give particular strategies on how to manage uncontrolled hypertension among elderly patients. Since the burden of uncontrolled hypertension is enormous, despite of the availability of antihypertensive medications and health care facilities ,many elderly struggle to maintain controlled blood pressure levels and it is bound to be much more pronounced in the elderly since hypertension is associated with age and also the prevalence of other comorbidities in the same among the elderly.

We are not sure with the factors that would worsen hypertension in the elderly; it may likely be social or economic or simply due to frailty of old age, and this is certainly not yet documented by in the Tanzania population. Considering that this population is anticipated to increase life expectancy, it is essential to have particular interventions that would assist in monitoring hypertension among the elderly to be at optimal health levels, as the national health insurance coverage for the elderly is insufficient.

However, living longer leads us to expect a larger elderly population, and the burden of health care will lean towards out-of-pocket expenditure for health interventions. Since we were not sure with the factors that ascertain the level of optimal BP control among elderly hypertensive patients nor the rate of uncontrolled hypertension among the elderly in Mbeya Regional Referral Hospital, the study aimed to determine the prevalence of uncontrolled hypertension and elucidate factors associated with it to aid planning and interventions of the burden.

### 1.2.1 Theoretical Self-care Interventions model

In the context of uncontrolled hypertension, adapted theoretical self-care intervention model would likely focus on empowering individuals to manage their blood pressure through life style modifications and self-monitoring techniques. This could involve strategies such as dietary changes, regular physical activities, stress management

techniques, medication adherence, and regular monitoring of blood pressure levels. It also may address factors such as social support, health literacy and motivation to sustain behaviour change over time(33).

The model has significant benefits of evidence-based hypertension self-care behaviours in improving blood pressure, but hypertensive patients may have low compliance with the recommended self-care behaviours. Various studies all over the world suggest a high prevalence of uncontrolled hypertension among hypertensive individuals (9). One approach that may advance blood pressure control and be practicable for most hypertensive patients is patient compliance with self- care behaviors (34). According to various findings of a meta-analysis that examined the results of 87 studies indicated that optimal self-care in hypertensive patients could reduce systolic and diastolic blood pressure by 5 and 4.3 mmHg, respectively(26,35). Self- care for people with high blood pressure includes a diet rich in fruits and vegetables, cessation of smoking, sufficient physical activity, antihypertensive medication, reduction in weight, saturated and total fat and sodium, and moderate alcohol consumption interventions(36). Despite the benefits of evidence-based hypertension self-care behaviours in improving blood pressure, hypertensive patients may not be following medical or lifestyle recommendations and compliance with self-care behaviours in these patients is not desirable in controlling hypertension. Therefore, below is a schematic conceptual logic of how the factors contribute to uncontrolled hypertension

## CONCEPUAL FRAMEWORK

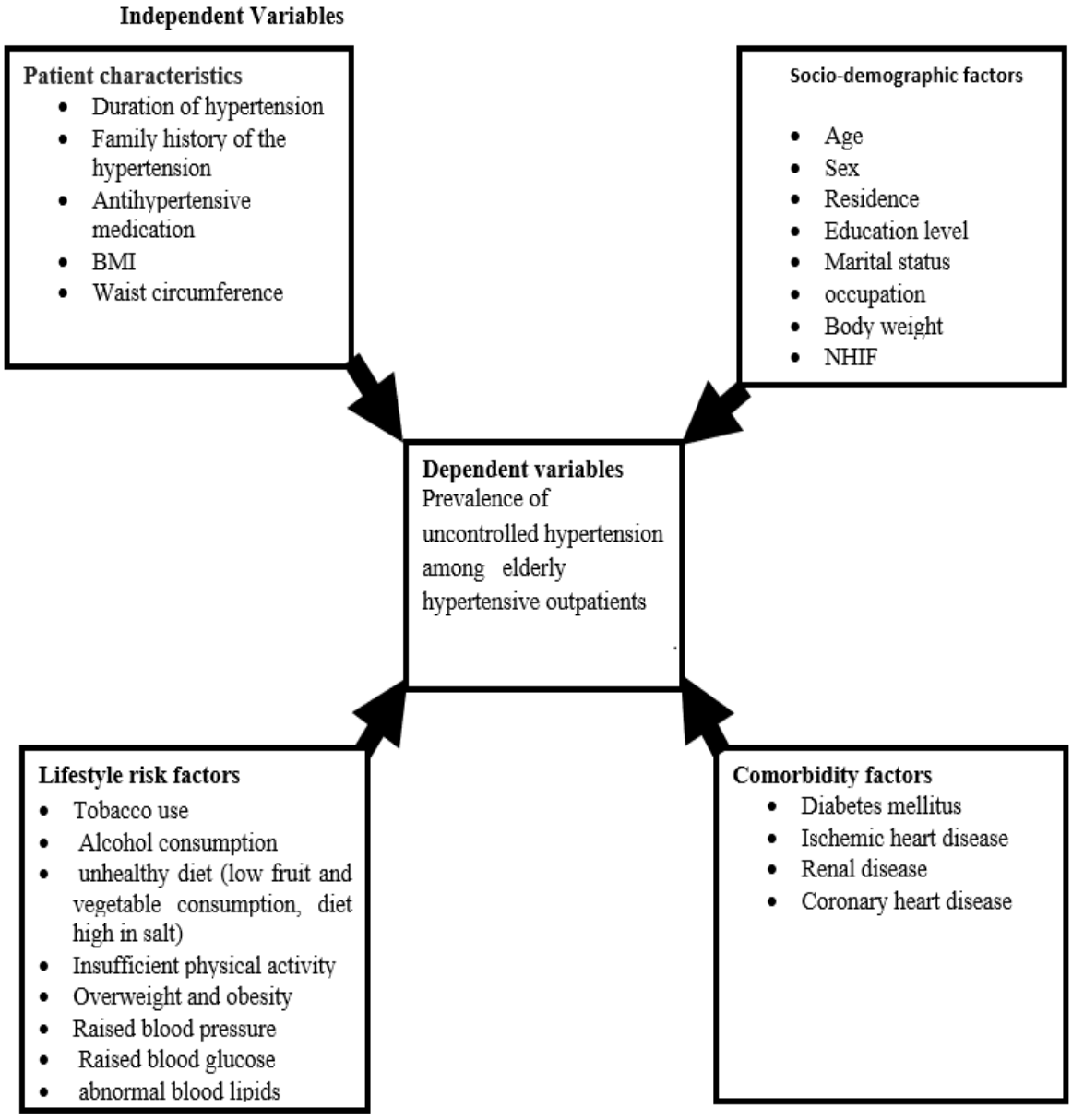



**Figure 1. Conceptual framework showing relationship between uncontrolled hypertension and associated factors. Adapted *from:* Dorothea Orem's theory**

## 1.3 Rationale

As people live longer, they become more susceptible to non-communicable diseases (NCDs), with hypertension being one of the most common, affecting over one billion people globally. Effective management of hypertension is crucial to prevent severe complications like cardiovascular diseases, stroke and kidney failure. However, despite access to medication and follow-up care, over half of patients struggle to control their blood pressure, often due to non-adherence to medication and unhealthy lifestyles.

This highlighted the need for tailored interventions addressing individual needs, which brings us to the question of how we can devise a better strategy to make them comfortable with the disease and prevent complications. Quantifying the burden of uncontrolled hypertension among the elderly and identifying the associated factors will inform realistic interventions to improve their quality of life and prevent complications. This study aimed to provide essential insights to guide healthcare planning and develop strategic interventions, especially given the limited interventions outlined in current health policies.

## 1.4 Main research question

What is the prevalence of uncontrolled hypertension and associated factors among elderly hypertensive patients attending outpatient clinics in MRRH**?**

### 1.4.1 Specific research questions

1. What is the prevalence of uncontrolled hypertension among elderly hypertensive patients attending outpatient clinics in MRRH?
2. What are the associated factors for uncontrolled hypertension among elderly hypertensive patients attending outpatient clinics in MRRH?
3. What are the additional healthcare needs of patients to promote optimal blood pressure control among elderly hypertensive patients attending outpatient clinics in MRRH?

## 1.5 Main research objective

To estimate the prevalence of uncontrolled hypertension and associated factors among the elderly hypertensive patients attending outpatient clinics in MRRH.

### 1.5.1 Specific objectives

1. To determine the prevalence of uncontrolled hypertension among the elderly hypertensive patients attending outpatient clinics in MRRH.
2. To describe associated factors for uncontrolled hypertension among elderly hypertensive patients attending outpatient clinics in MRRH.
3. To address additional healthcare needs from patients to promote optimal blood pressure control among elderly hypertensive patients attending outpatient clinics in MRRH.

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

### 2.1 The prevalence of uncontrolled hypertension among elderly hypertensive patients

Uncontrolled hypertension in individuals with hypertension poses a serious public health concern in both developed and developing countries, as it can lead to premature mortality and disability on a global level(27). In low- and middle-income countries (LMIC), uncontrolled hypertension is unacceptable. A growing body of research indicates that uncontrolled hypertension raises the risk of early cardiovascular disease and mortality(32). The global standard of blood pressure measurement is still below average, even with notable advancements in the treatment of hypertension (37). The Sustainable Development Goals, which call for 80% control rates by 2030 (22), stress how urgently hypertension management must be addressed. Sufficient, safe, and effective interventions may drastically decrease hypertension-related morbidity and mortality rates in low- and middle-income countries (LMICs)(38,39). Around 17 million deaths worldwide are attributed to cardiovascular disease each year, and 9.4 million deaths are caused by hypertension complications, which make up nearly one-third of the total (7,22,37). At least 45% of deaths from ischemic heart disease and heart disease are caused by hypertension. 51% of stroke-related deaths(6) . Approximately 1 in 5 persons with hypertension have uncontrolled (21). The worldwide goal for non-communicable diseases includes a 33% decrease in the prevalence of hypertension by 2030 (40). According to studies conducted in various areas, the prevalence of hypertension ranges from 28.5% in high-income(6).

With the growing urbanization and ongoing epidemiological shift, it is anticipated that the burden of both uncontrolled and hypertension will rise dramatically(32). In Tanzania, hypertension affects approximately 25.9%(19,41) and the prevalence of uncontrolled hypertension ranges from 25.7-45 % in rural to urban settings respectively (42). The need for improvement in hypertension among elderly hypertensive continues to be a primary public concern. Among the elderly, there are significant financial, social, and medical expenses linked to uncontrolled hypertension among the elderly.

According to a systemic review and meta-analysis of research evaluating the prevalence of uncontrolled hypertension in patients with comorbidities in SSA, the prevalence in patients without chronic renal disease was 75.9%, while the overall prevalence was 78.6%(26,35). In cross-sectional studies conducted in different parts of Africa, the prevalence of uncontrolled hypertension among adult hypertensive patients undergoing follow-up was found to be 57.7% at Jimma Hospital, 66% in Dar es Salaam, 70.1% in Mwanza, 58.5% in Dodoma, and 60.3% in the Mbeya region(11,42–44), respectively. Uncontrolled hypertension is more common in older adults and men, with poor adherence to antihypertensive medication, poor diet quality, stress, physical inactivity, and uneasily accessible healthcare facilities (45). Comorbid conditions like diabetes mellitus, obesity, and chronic kidney disease have also been linked to an increased risk of uncontrolled hypertension among elderly hypertensive outpatients (13,46).

## 2.2 Factors associated with uncontrolled hypertension among elderly hypertensive patients

Several associated factors with uncontrolled hypertension among elderly hypertensive outpatients had been reported in previous studies done in different areas worldwide, which have evidenced that age, sex, non-adherence to low salt diets, obesity, smoking, and the number of medications taken (poly-pharmacy) are among of the associated factor for uncontrolled hypertension(27). The most prevalent health issue affecting older persons is hypertension. As people age, their arteries stiffen, which raises their blood pressure and leads to uncontrolled blood pressure(22). Uncontrolled hypertension can result in major health issues such as cardiovascular disease, which includes heart attacks and strokes, vascular dementia, eye disorders, and renal disease, if lifestyle modifications and medicines are not implemented (3). Hypertension is an increasingly important medical and public health issue. The significance of managing hypertension in the older population can be comprehended from the study's findings, which indicated that the strategy for controlling hypertension interacted with correcting frailty and cognitive deficits that worsen with age (21).

A local study in the tertiary Hospital in Dodoma examined the prevalence and associated factors of uncontrolled hypertension among 352 hypertensive patients and found that the associated factors were alcohol use, age ≥50, adherence to antihypertensive medication,

overweight/obesity, and stage 3 chronic kidney disease (42). In the same region, a study documented the association of age with increased risk of CKD and CKD progression, where studies have demonstrated that younger onset and increase age are associated with more rapid progression of CKD (25). The Median age of the participants with uncontrolled hypertension was 55 years. Age≥ 50 years had 5 times increased odd of unchecked hypertension among patients with early CKD. Also, the study conducted in LMICs where the onset of CKD in SSA is significantly higher in younger people compared with the developed countries where the onset of CKD is more common among the elderly (18,42,46). A study in Ethiopia found in addition to being male, being older than 55, non-adherence to medication, and poor self-care habits were also a problem (28).

A study done in Tertiary Hospital Dodoma, Tanzania, reported a high prevalence of 58.5% uncontrolled hypertension among 352 participants, with 73.3% having second-level education (42) with a median age of 50-60 years. In another study done in Northern Ethiopia, among 391 hypertensive respondents with a mean age of 24- 89 years with a prevalence of uncontrolled hypertension of 48.6%, 25.8 % were college-level education, and 80.8% were urban dwellers were by 47.3% of respondents had poor knowledge on the control of hypertension (46). The prevalence of uncontrolled hypertension among 354 hypertensive patients in Lupane district, Zimbabwe, was 62.7 and 52% with primary level education which most of them had to receive health education on hypertension in the protection of uncontrolled hypertension(10). Among 10710 hypertensives on treatment, 6003 (62.9%) had uncontrolled hypertension patients, with a prevalence of participants with lower education levels. In this study, the high prevalence of uncontrolled hypertension was associated with a low level of education (47).

At saint Paul's Hospital Medical college, Addis Ababa, the prevalence of uncontrolled hypertension were 52.1% among 474 hypertensive patients aged ≥ 56 years old, 21% of being of secondary education and from urban 37.6%,17.5 % government employment individuals with a length of diagnosis were > 6 years(28). In Bale hospital, southern Ethiopia, among 421 hypertensive patients, with the results of social demographic characteristics of 55.3% were male, 45-59 years of age, 93% were married, 62.4 from urban, 52% were Muslim, and 35.2% did not learn formal education(37). In a systemic review in 2016, uncontrolled hypertension had a pooled prevalence rate of 62% and a

prevalence rate of 73% in low-income countries(6). Studies have shown that the higher prevalence of uncontrolled hypertension may be due to socioeconomic factors, social networks, family support, and low education status. Therefore, there is a need at MRRH to find out the association between the level of education and the prevalence of uncontrolled hypertension among elderly hypertensive outpatients.

Body mass index (BMI) is positively and independently associated with morbidity and mortality from hypertension (31,48). Lifestyle modification is the foundation of preventive management in individuals with hypertension. It is recommended as an initial treatment before the start of drug therapy and as an adjunct to medication in those already on drug therapy. Lifestyle modification may facilitate drug step-down and drug withdrawal in highly motivated individuals who achieve and maintain lifestyle changes. A lifestyle modification includes weight reduction, salt restriction, physical activity, smoking cessation, and abstaining from alcohol aids in controlling hypertension. The balance of energy intake and exercise is essential in controlling resistance hypertension. As suggested by WHO, the average weight for an adult over 18 years is less than or equal to 18.5–24.9. A BMI that is greater than this puts one at risk of obesity-related diseases such as high blood pressure(49). Physical inactivity causes 9% of premature mortality or more than 5.3 million of the 57 million deaths. In Africa, as elsewhere, obesity and sodium intake are risk factors for hypertension. In industrialized societies such as the United States, obesity accounts for 25% of cases of hypertension. However, due to the relative leanness of Africans, the contribution of obesity to high blood pressure is only around 10%(42,50).

Unhealthy behaviours, including overweight/obesity, excessive alcohol intake and smoking, are associated with uncontrolled hypertension(19)**.** Uncontrolled deposition of adipose tissue leads to elevated blood pressure, which accounts for 65-75% of all primary hypertension and is a known significant cause of the development of type 2 diabetes mellitus, dyslipidemia, chronic kidney disease, ischemic heart disease, stroke, dementia, several malignancies, nonalcoholic fatty liver disease, and obstructive sleep apnea. (51)

Multiple pathophysiologic mechanisms play a role in the development of hypertension in obesity, which in turn propagates end-organ damage, including cardiovascular disease and chronic kidney disease. These highly interrelated mechanisms include insulin resistance, inflammation, oxidative stress, adipokines (such as adiponectin and leptin), the

sympathetic nervous system, and the renin-angiotensin-aldosterone system (52,53). Many of these factors interact in bidirectional pathways and are exacerbated by more significant degrees of adiposity. Broadly, their activity can induce endothelial dysfunction and alter hemodynamics throughout the body, promoting the elevation in blood pressure commonly observed in obesity. More specifically, increased adiposity strongly correlates with endothelial dysfunction, partly attributed to amplified oxidative stress and reduced availability of nitric oxide (54). Obesity is also linked to elevated circulating markers of inflammation, including C-reactive protein, erythrocyte sedimentation rate, and plasminogen activator inhibitor 1, as well as inflammatory cytokines such as tumor necrosis factor-alpha and interleukin-6 (55)(56). In addition to oxidative stress, the literature suggests that altered intestinal micro biota may be an essential underlying mechanism in promoting inflammation in obesity by affecting intestinal permeability. The heightened inflammatory activity observed in obesity often results in vascular dysfunction and the development of hypertension in this patient population(57). Insulin resistance and oxidative stress observed in the setting of increased visceral adiposity contribute to heightened sympathetic nervous system activity(58). Obstructive sleep apnea, which is extremely common in obesity, also causes sympathetic stimulation, further contributing to elevated blood pressure in this patient population (31). Therefore, this study aims to determine the prevalence of uncontrolled hypertension and associated factors among elderly hypertensive patients attending outpatient clinics at MRRH.

# CHAPTER THREE

# 3.0 MATERIALS AND METHODS

## 3.1 Study design

This hospital-based analytical cross-sectional study design conducted at Mbeya Regional Referral Hospital from 31 May to 30 June of 2024. It determined the prevalence of uncontrolled blood pressure and its associated factors among elderly patients with hypertension attending the outpatient clinic at MRRH.

## 3.2 Study area

The study conducted at Mbeya Region Referral Hospital in Mbeya region, Tanzania. MRRH serves as a level II referral center for the region, with a catchment area that includes Mbarali District, Chunya District Council, Rungwe District Councils, Kyela District Council, Busokelo District Council, Mbeya District Council, Songwe District Council, Mbeya City Council, and beyond. The total population of Mbeya region was 2,343,754 (males 1,123,828-47.9%, female 1,219,926-52.1% as per Tanzania national housing census projection with an estimated annual population change of 3.2% with a population density of 62.17/$km^2$ and 37,700 $km^2$ area. (Census,2022).

Mbeya Regional Referral Hospital provides Outpatient services (OPD) and Inpatient Services (IPD) to an average of 100–150 clients daily. The Hospital has a bed capacity of 365 beds. The inpatient services include Pediatrics, Obstetrics and Gynecology, surgical, and Internal Medicine. Outpatient services include hypertension, diabetics clinics, Laboratory, Eye, Dental, Pharmacy, Physiotherapy, emergency medicine Department, Social Welfare, Prosthetics, Radiology, and Care and Treatment Clinic (CTC). Other services provided by the Hospital are administration, mortuary, and laundry.

There has been an increased morbidity and mortality rate among hypertensive patients. As per the top ten conditions of 2022, hypertension was the leading condition among the 32,165 patients who attended, and 7,356 (13.55%) were hypertensive patients based on the hospital records (DHIS2).

Therefore, this study conducted in the Outpatient department at the hypertension clinic at Mbeya Regional Referral Hospital. It has been of interest for study because it has

approximately 500 patients per month with an average of 25 patients with hypertension per day attended with numerous numbers of patients with uncontrolled hypertension.

### 3.3 Study population

The source of population was all patients with hypertension who were on follow up at Mbeya Referral Regional Hospital .The study populations included all consented elderly (≥55 years old) hypertensive patients receiving antihypertensive follow-up treatment in a hypertension clinic for at least three months during data collection. A list of all hypertensive patients obtained from respective records registered with the number, and a sample frame constructed for all 500 hypertensive patients attending the hypertensive clinic at MRRH.

The population was enough to meet the general presentation of the population with hypertension attending the outpatient clinic. Therefore, all patients attending the hypertension clinic included and excluded in this study by adhering to the following criteria;

#### 3.3.1 Inclusion criteria

All hypertensive patients under antihypertensive medicine, over the age of 55 years who had been on follow up at clinic for over 3 months at MRRH and come to the outpatient department of medicine for follow up visits during the study period.

#### 3.3.2 Exclusion criteria

The study excluded patients with compromised mental faculties, those who are very sick and unconscious, as they were not be able to give out crucial and significant information to the researcher. Also, all patients with no laboratory tests were excluded as they lack essential information on the investigations the researcher needs.

### 3.4 Sample size calculation

The appropriate sample size was calculated using (59) formula based on a 95% confidence interval and assuming the prevalence of uncontrolled hypertension of 60 % based on data from a previous study in the similar region (60)(9)(44).

A single population proportion formula was used to calculate the sample size as follows:

$$\text{Sample size} = \frac{Z_{1-a/2}^2 P(1-P)}{d^2}$$

$Z_{1-a/2=}$ is standard normal variate (at 5% type 1 error ($p<0.05$, it is 1.96, and at 1% type 1 error ($p<0.01$), it is 2.58).as in the majority of studies, the P values are considered significant below 0.05 hence 1,96 is used in formula.

P= Expected proportion of uncontrolled hypertension in the study region is 60% (58.
absolute error or precision -has to be decided by the researcher.

$n_0 = Z_{1-a/2}^2 P(1-P)/ d^2$

$n_0 = (1.96)^2\ 0.6\ (1-0.6) / (0.05)^2$

$n_0 = 0.921984 /0.0025$

$n_0 = 0.921984 + ((10\%)\ n_0)$ (Note: 10%–15% are standard percentages normally added for increasing the sample size to adjust for non-response.)

$n_0 = 368.7936 + 20.55682444 = 389.35042444 \approx 389.$

Therefore, a sample size of 389 was obtained.

### 3.5 Sampling technique and procedure methods:

The participants selected using a simple random sampling technique with a consecutive sampling procedure (61). Every participant who meets the inclusion criteria during the study period were enrolled.Therefore, 389 patients with hypertension were enrolled among 500 hypertensive patients attending the follow-up clinic at MRRH.

### 3.6 Data collection procedure and Laboratory procedures

The data were collected by using an adapted structured WHO questionnaire on chronic disease risk factors and surveillance of NCDs. It consists of social demography, behavioural analysis, and physical measurement. Medical records reviewed for eligible patients, and a data extraction form filled out to get the comorbid conditions and hypertensive medication taken.

Two nurses with degree levels were recruited to conduct the data collection and supervision, respectively, based on their experience in data collection and ability to speak English and Swahili. Training and practical demonstrations on interview techniques and measurement procedures was given to data collectors one day before data collection. The researcher supervised data collection.

## 3.7 Study variables

### 3.7.1 Dependent variable

The prevalence of uncontrolled hypertension was a dependent variable where AHA defined uncontrolled blood pressure as a systolic blood pressure of ≥ 140mmhg and a diastolic blood pressure ≥ 90 mmHg, despite medical treatment (37). To measure blood pressure, the researcher used an automatic blood pressure machine to calculate the mean of three BP measurements based on the American Heart Association guidelines for blood measurements.

### 3.7.2 Independent variables

The socioeconomic demographics of the participants in this study will include age, sex, residence, marital status, educational background, occupation, body mass index, and NHIF status.

Associated factors variable included smoking, alcoholism, Physical activities, treatment adherence, table-added salt, vegetable intake, family history, and hypertension duration.

In the study, I used the 14-item version of the Hill-bone compliance scale to assess compliance with high blood pressure treatment(22)(50). The compliance scale measures three important behavioral domains of high blood pressure, 9 items, treatment appointment keeping (3 items), diet (2 items) and medication adherence (9 items). The hill-bone compliance scale is a globally credible instrument with good internal validity and reliability for assessing compliance with high blood pressure treatment(22)(19).

#### 3.7.2.1 Associated risk factors

The risks to be screened in the study will be history of hypertension, history of diabetes mellitus, Family history of hypertension, stroke diabetes mellitus, history of smoking, BMI, waist circumference, blood pressure, fasting blood glucose, fasting HDL, and Fasting triglyceride.

Hypertension was taken as a positive history in the use of antihypertensive drugs or uncontrolled hypertension (>140/90 mmHg). At the same time, diabetes mellitus was regarded as a positive history in the use of hypoglycemic agents or a fasting plasma glucose> 126 mg/dl (7.0mmol/L). The total cholesterol was considered high if it is 200 mg/dl. LDLc was considered raised if it is> 130mg/dl, triglycerides were deemed to be

high if it is>150mg/dl, and DHL was considered to be low if it is <35mg/dl and <39 mg/dl in men and women respectively.

Obesity defined using the WHO classification; participants classified as having metabolic syndrome using the modified WHO definition:

The individual has diabetic has impaired fasting glucose (IFG)> 5.6 and then has at least two of the following:

1. BMI≥30kg/$m^2$
2. Serum triglyceride ≥ 150mg/dl, or HDL cholesterol< 35mg/dl in men and <39 mg/dl in women.
3. Blood pressure ≥140/90 mmHg

### 3.7.3 Clinical measurements

**Height and Weight**

The weight measured while the subjects wear light clothes without shoes using the SECCA weighing scale. The weighing scale calibrated daily; reading was taken to the nearest 0.5 kilograms.

Height measurement was taken barefoot using a portable Harpenden stadiometer Holtain Ltd, and recorded to the nearest 0.5 centimetres. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters. BMI≥ 25kg/m2 will be regarded as overweight.

**Waist circumference**

Waist circumference measured using a non-stretchable tape measure at the level of the uppermost edge of the hip bone on an abdomen with the tape parallel to the ground and recorded to the nearest 0.5 centimeters. The measurements above 102 cm and 88cm in men and women respectively was considered central obesity.

**Blood pressure**

Blood pressure was measured with a digital sphygmomanometer after 5 minutes of rest at the upper arm (brachial artery); the average of two readings was recorded as the respondent's blood pressure.

The blood pressure was classified as per JNC V11 criteria in adults≥ 18 years as follows:

| BP classification | SBP (mmHg) | | DBP (mmHg) |
|---|---|---|---|
| Normal | <120 | And | <80 |
| Prehypertension | 120-139 | Or | 80-89 |
| Stage 1 hypertension | 140-159 | Or | 90-99 |
| Stage 11 hypertension | ≥160 | Or | ≥100 |

National Heart, Lung, and Blood Institute.JNC7 express. The seven reports of the joint National Committee on the Prevention, detection, Evaluation and Treatment of High Blood Pressure 2003.

### 3.8 Data collection methods

A structured pretested questionnaire designed purposely for the study used. All patients were physically screened in privacy, and confidentiality was observed. All hypertensive patients would have weight, height, and BP taken as explained above. A total of 20 patients were evaluated per day.

#### 3.8.1 Laboratory Investigations

Patients attending the hypertension clinic are undergoing blood testing, including biochemical and Hematological investigations, such as fasting blood glucose count to define diabetes mellitus, total cholesterol ≥5mmol/L (190mg/dl), triglycerides ≥2mmol/L (175mg/dl), low-density lipoprotein cholesterol ≥3mmol/L (115mg/dl) and high-density lipoprotein cholesterol ≤ 1mmol/L40mg/dl will define dyslipidemias. Other laboratory investigations such as complete blood picture, haemoglobin level, and urinalysis were depending on an individual patients based on the ability of payments as the hospital charges for every investigation. Therefore, the researcher was not guaranteed with payment of any inquiry to each respondent but were followed up for all who have done investigations to pick all critical information needed in the study.

## 3.9 Data management and statistical analysis

### 3.9.1 Data management plan;

Data collected in an enclosed room within the outpatient department to ensure privacy and confidentiality. All filled-out questionnaires were checked daily for completeness and consistency. Data were entered, cleaned, proofread, coded, and analyzed using the Statistical Package for Social Sciences software (SPSS version 27.0)

### 3.9.2 Data analysis

**Univariate level analysis**

At this level, frequency and percentage distribution was used to present selected social demographic characteristics of the respondents and in situations of backup analysis following relation analysis.

**Bivariate level analysis**

Cross tabulation done to obtain the proportion rate of uncontrolled hypertension against the various independent variables such as age, level of education, employment status, and others. Associations between the categorical independent variables and the dependent variable analyzed using the logistic regression model.

The strength of associations at the bivariate level was stated as crude Odds ratios (COR) with their 95% confidence intervals and p-values. An association was considered significant at $P < 0.05$ and a 95% confidence interval. Variables with a P-value of $< 0.2$ at the bivariate level were included in the Multivariable analysis model to determine the independent factors associated with uncontrolled hypertension among elderly outpatients.

**Multivariate level analysis**

Multivariate analysis conducted using a logistic regression model for an independent variable significantly associated with the dependent variable at the bivariate level. Back and forth stepwise multivariable logistic regression mode fitted systematically to identify factors associated with uncontrolled hypertension. The results of the multivariate analysis were expressed as adjusted odds ratio (AOR) with 95% confidence intervals and p-value. Multivariate as (adjusted) analysis was critical to control for confounding factors and effects modifiers leading to spurious association conclusions.

### 3.10 Validity and Reliability

The validity of an instrument is the extent to which it measures what it is intended to measure. Validity in a study refers to how well the results among the study participants represent true findings among similar individuals outside the study(62) (63). To check whether the questionnaire was well understood, 38 patients (which is recommended for the questionnaire pre-test (64) with hypertensive outpatient clinic were invited in day one and day two to participate in the piloting of the questionnaire. The piloting was conducted in the same study area. Piloting the study helped to estimate the time for the interview and helped in refining the questionnaire before introducing it to the study participants. Additionally, helped to determine the duration of data collection, the tool's structure, response rate, the calibre of data to be gathered, and any logistical or technical difficulties that may have arisen throughout the study.

It should be noted that the pilot study's participants were not part of the larger investigation and the completed questionnaire was not included in the analysis during data collection.

Reliability is the degree to which the assessment tool yields result that are consistent, predictable, and error-free. It demonstrates that the observed score of a measure faithfully captures the measure's true score(65) (66). Reliability measures the consistency or stability of the questionnaire measuring variables(62)(63). The questionnaire was administered by a researcher on two different days at MRRH to 38 participants and then responses were compared to check test-retest reliability. To ensure the reliability, items of the questionnaire were assessed by using Cronbach's alpha which provided a measure of the internal consistency of a test or scale that is expressed as a number between 0 and 1 (67). Finally, Cronbach’s alpha was performed and was found to be 0.92. Therefore, the tool was reliable and consistent to measure the prevalence of uncontrolled hypertension and associated factors among elderly hypertensive patients attending outpatient clinics in MRRH.

### 3.11 Ethical considerations and clearance

Ethical clearance sought from the Research and Publications Committee of MUHAS, and permission to conduct the study were obtained from the Ethics Department of MRRH.

Informed consent forms were available for all patients for participation in the study while providing information as to the potential risks and benefits of partaking in a study ensured on the voluntary nature of the study. All participants were advised before participation in the survey while obtaining various measurements and their results after calculation.

All patients with uncontrolled hypertension and other comorbid conditions were advised and guided for medical management and lifestyle modification**.** All patient information were confidential and only accessible to the principal investigator and researcher assistants. Patient identification and contacts were used to follow up on and give patients feedback on their laboratory test results.

# CHAPTER FOUR

## 4.0 RESULTS

### 4.1 The social demographic characteristics of the study participants

A total of 389 elderly hypertensive attending the outpatient's hypertension clinic at Mbeya Regional Hospital were interviewed with response rate of 100%. The mean age of 64.90 years (SD ± 10.54, 95% CI [63.82-66.01]). The majority of patients were aged 50-59 years, with 147 (37.8%) in this age group. Females comprised a higher percentage of the population at 264 (67.9%). Most patients resided in urban areas, accounting for 297 (76.3%). In terms of marital status, a significant portion were married, 221 (56.8%), or widowed, 156 (40.1%). Educationally, 196 (50.4%) had primary education. Regarding employment status, 198 (50.9%) were farmers. Monthly earnings indicated that the majority, 250 (64.3%), earned less than 100,000 Tsh. Lastly, 253 (65.0%) of the patients had national health insurance.

Employment status was significantly associated with uncontrolled hypertension, with a higher prevalence among self-employed patients (50.8%) compared to employees (21.6%) and unemployed individuals (50%). Monthly earnings were also significant, with patients earning less than 100,000 Tsh per month having a higher prevalence of uncontrolled hypertension (63.0%) compared to those earning more than 110,000 Tsh (37.0%) and Other demographic variables such as age, sex, residence, marital status, education level, number of adults in the household, and national health insurance status did not show significant differences in the prevalence of uncontrolled hypertension.

The details are in table 1.

**Table 1: The social demographic characteristics of the study participants attending hypertension clinic at MRRH (n=389)**

| Variable | Category | Controlled hypertension(n=148) | Uncontrolled hypertension(n=241) | Frequency (%) |
|---|---|---|---|---|
| **Age (years)** | 50-59 | 59 (39.9) | 88 (36.5) | 147 (37.8) |
| | 60-69 | 42 (28.4) | 79 (32.8) | 121 (31.1) |
| | 70 or more | 47 (31.7) | 74 (30.7) | 121 (31.1) |
| **Sex** | Male | 41 (27.7) | 84 (34.8) | 125 (32.1) |
| | Female | 107 (72.3) | 157 (65.2) | 264 (67.9) |
| **Residence** | Urban | 111 (75.0) | 186 (77.2) | 297 (76.3) |
| | Rural | 37 (25.0) | 55 (22.8) | 92 (23.7) |
| **Marital status** | Married | 74 (50.0) | 147 (61.0) | 221 (56.8) |
| | Widowed | 69 (46.6) | 87 (36.1) | 156 (40.1) |
| | Others | 8 (3.4) | 9 (2.9) | 17 (3.1) |
| **Education level** | Primary or less | 115 (29.5) | 179 (46.0) | 294 (75.5) |
| | Secondary and above | 33 (8.5) | 62 (16.0) | 95 (24.5) |
| **Employment status** | Self employed | 134 (34.4) | 198(50.8) | 332 (85.0) |
| | Employed | 18 (4.6) | 52 (21.6) | 57 (15.0) |
| **Earning per month (Tsh)** | <100,000 | 98 (66.2) | 152 (63.0) | 250 (64.3) |
| | >110,000 | 50 (33.8) | 89 (37.0) | 139 (35.7) |
| **National Health insurance status** | Yes | 98 (66.2) | 155 (64.3) | 253 (65.0) |
| | No | 50 (33.8) | 86 (35.7) | 136(35.0) |

**Others=not married and divorced, self-employed includes farmer, unemployed and employed includes public employment, private employment and retired officer**

## 4.2 Prevalence of uncontrolled hypertension among the elderly hypertensive

The result of this study showed the burden of uncontrolled hypertension among elderly hypertensive patients attending outpatient's clinic at MRRH was 241(62.0%) among 389, with the mean systolic pressure among uncontrolled hypertension of 167 ±20 (95% CI 156.58-180.96), diastolic 103± 14 (95% CI 98.78-105.22) and pulse rate was 98.58 ± 13.21 (95% CI 94.02-105.07). The mean systolic pressure for controlled hypertension 128 ±17 (95% CI 112.82-134.44), diastolic 73± 9 (95% CI 69.99-78.42) and pulse rate was 71.58 ± 9.21 (95% CI 67.02-75.07). Meanwhile the mean systolic blood pressure of general study population was 138 ±22 (95% CI 136.58-140.96), diastolic 80± 13 (95% CI 78.68-81.46) and pulse rate was 93.58 ± 15.26 (95% CI 92.02-95.07). The highest uncontrolled hypertension was found to elderly women aged 55years with systolic of 219 mmHg, diastolic of 133mmHg, heart rate of 171, BMI of 45.7 kg/$m^2$ and waist circumference of 110cm.

### 4.3 Clinical profile and behavioral factors of study population

The clinical profile of the study population attending the hypertensive clinic showed that the mean BMI was 28.97 ±5.83 kg/m $^2$ (CI= 28.42-29.56) with the higher proportion 146 (37.5%) having obesity. The mean waist circumference was 98.44±15.16 cm (CI=96.96-99.95) with majority having abnormal waist circumference 236 (60.7%). About 118 (30.3%) were diabetic and total cholesterol was elevated in 88 (22.6%) while majority of patients 200 (51.4%) cholesterol was not measured. Urine creatinine was abnormal in 168 (43.2%) of patients, while sodium in urine was not measured in majority of patients 367 (94.3%). A family history of hypertension was reported by 212 (54.5%) of patients. Most patients, 204 (52.4%), reported no comorbidity conditions. Antihypertensive medication was used by 367 (94.3%) of patients, with dual therapy being the most common at 200 (51.4%). Herbal medication use was reported by 349 (89.7%) of patients. Smoking history was present in 29 (7.5%) of patients. Alcohol was not used by majority 233 (59.9%) of patients, with soda being the most common drink at 230 (59.1%). Fruit usage was rare (less than 2 days servings per week) for 235 (60.4%) of patients, while vegetable usage was sometimes (2-3 days servings per week) for 186 (47.8%). Salt was never added to food by 210 (53.9%) of patients, and normal salt intake (1 teaspoon per day) was reported by 223 (57.3%) of patients. Processed food was never consumed by 239 (61.4%) of patients, and physical exercise was low for 193 (49.6%) of patients. The results are in table 2

**Table 2: Distribution of clinical aspects and behaviour factors associated with uncontrolled hypertension among elderly hypertensive patients attending outpatient clinic at MRRH( n=389)**

| Variable | Category | Hypertension | | Frequency | P Value |
|---|---|---|---|---|---|
| | | Controlled hypertension(n=148) | Uncontrolled hypertension(n=241) | | |
| **BMI** | Underweight/Normal weight | 68 (46.0) | 62 (25.7) | 130 (33.4) | 0.000 |
| | Over weight | 41 (27.7) | 72 (29.9) | 113 (29.1) | |
| | Obese | 39 (26.3) | 107 (44.4) | 146 (37.5) | |
| **Waist circumference** | Normal | 72 (48.6) | 81 (33.6) | 153 (39.3) | 0.003 |
| | Abnormal | 76 (51.4) | 160 (66.4) | 236 (60.7) | |
| **Diabetic status** | Yes | 32 (21.6) | 86 (35.7) | 118 (30.3) | 0.003 |
| | No | 116 (78.4) | 155 (64.3) | 271 (69.7) | |
| **Total cholesterol** | optimal level/Intermediate | 41 (27.7) | 60 (24.9) | 101 (26.0) | 0.050 |
| | High | 23 (15.5) | 65 (27.0) | 88 (22.6) | |
| | Not measured | 84 (56.8) | 116 (48.1) | 200 (51.4) | |
| **HDL-c** | Optimal/Intermediate | 49 (23.6) | 64 (26.6) | 113 (29.1) | 0.041 |
| | High | 12 (8.1) | 42 (17.4) | 54 (13.9) | |
| | Not measured | 87 (58.8) | 135 (56.0) | 222 (57.0) | |
| **LDL-c** | Optimal (<3.36mmol/L, / Intermediate (3.36-4.11mmol/L) | 29 (19.6) | 30 (12.5) | 57 (15.2) | 0.067 |
| | high (>4.11mmol/L,) | 31(20.9) | 75 (31.1) | 106 (27.2) | |
| | Not measured | 88 (59.5) | 136 (56.4) | 224 (57.6) | |
| **Urine creatinine** | normal creatinine (women=2.55-20.0mmol, men=3.54-24.6mmol/L | 9 (6.1) | 11 (4.6) | 20 (5.1) | 0.422 |
| | Abnormal creatinine(women>20.0mmol/L, men>24.6mmo/L | 58 (39.2) | 110 (45.6) | 168 (43.2) | |
| | Not measured | 81 (54.7) | 120 (49.8) | 201 (51.7) | |
| **Duration of JHTN** | 1-5 Years | 94 (63.5) | 160 (66.4) | 254 (65.3) | 0.563 |
| | > 5 Years | 54 (36.5) | 81 (33.6) | 135 (34.7) | |
| **Family history of HTN** | Yes | 69 (46.6) | 143 (59.3) | 212 (54.5) | 0.002 |
| | No | 79 (53.3) | 98 (40.7) | 173 (46.1) | |
| **Comorbidity** | Yes | 62 (41.9) | 123 (51.0) | 185 (47.6) | 0.080 |
| | No | 86 (58.1) | 118 (49.0) | 204 (52.4) | |
| **Comorbidity Type** | Diabetic | 37 (25.0) | 66 (27.4) | 103 (26.5) | 0.002 |
| | Stroke/ Heart failure/CAD/RF | 14 (9.4) | 29 (12.0) | 43 (11.1) | |
| | Others | 8 (5.5) | 33 (13.7) | 41(10.5) | |
| | None | 89 (60.1) | 113 (46.9) | 202 (51.9) | |
| **Home monitoring of BP** | Yes | 16 (10.8) | 25 (10.4) | 41 (10.5) | 0.892 |
| | No | 132 (89.2) | 216 (89.6) | 348 (89.5) | |
| **Health education** | Yes | 8 (5.4) | 27 (11.2) | 35 (9.0) | 0.052 |
| | No | 140 (94.6) | 214 (88.8) | 354 (91.0) | |
| **History of stroke** | Yes | 14 (9.5) | 35 (14.5) | 49 (12.6) | 0.144 |
| | No | 134 (90.5) | 206 (85.5) | 340 (87.4) | |
| **Use of ant hypertensive** | Yes | 144 (97.2) | 223 (92.5) | 367 (94.3) | 0.112 |
| | No | 4 (2.8) | 18(7.5) | 22(5.7) | |

| Variable | Category | Hypertension | | Frequency | P Value |
|---|---|---|---|---|---|
| | | Controlled hypertension(n=148) | Uncontrolled hypertension(n=241) | | |
| **Number of anti-hypertensives** | Single | 58 (39.2) | 76 (31.5) | 134 (34.5) | 0.172 |
| | Dual therapy | 74 (50.0) | 126 (52.3) | 200 (51.4) | |
| | More than triple therapy | 16 (10.8) | 39 (16.2) | 55 (14.1) | |
| **Use of herbal medication** | Yes | 8 (5.4) | 32 (13.3) | 40 (10.3) | 0.013 |
| | No | 140 (94.6) | 209 (86.7) | 349 (89.7) | |
| **History of smoking** | Yes | 7 (4.7) | 22 (9.1) | 29 (7.5) | 0.109 |
| | No | 141 (95.3) | 219 (90.9) | 360 (92.5) | |
| **Alcohol use** | Yes | 66 (44.6) | 90 (37.3) | 156 (40.1) | 0.157 |
| | No | 82 (55.4) | 151 (62.7) | 233 (59.9) | |
| **Type of drinks** | Beer/wine/energy /sprits | 15 (10.2) | 62 (25.7) | 77 (19.9) | 0.000 |
| | Local homemade alcohol | 40 (27.0) | 26 (10.8) | 66 (16.9) | |
| | Soda | 85 (57.4) | 145 (60.2) | 230 (59.1) | |
| | None | 8 (5.4) | 8 (3.3) | 16 (4.1) | |
| **Amount of alcohol** | 1-3 bottle | 46 (31.1) | 66 (27.4) | 112 (28.8) | 0.407 |
| | >4 bottle | 15 (8.8) | 19 (7.9) | 32 (8.2) | |
| | None | 87 (58.8) | 146 (60.6) | 233 (59.0) | |
| **Fruit usage** | <2 days servings/week | 93 (62.8) | 142 (58.9) | 235 (60.4) | 0.285 |
| | >3 days servings/ week | 55 (37.2) | 99 (41.1) | 154 (39.6) | |
| **Vegetable usage** | <2 servings per day/week | 55 (37.2) | 94 (39.0) | 149 (38.3) | 0.883 |
| | >3 days servings per week | 93 (62.8) | 147 (61.0) | 240 (61.7) | |
| **Table Salt use** | Always | 57 (38.5) | 121(50.2) | 178(49.8) | 0.063 |
| | Never | 91 (61.5) | 120 (49.8) | 211 (50.2) | |
| **Amount salt intake per day** | Normal 1 tea spoon(2300mg/day) | 95 (64.2) | 128 (53.1) | 223 (57.3) | 0.099 |
| | Abnormal >2 tea spoon(4600mg/day) | 53 (35.8) | 113 (46.9) | 166 (42.7) | |
| **Processed food use** | Always | 41(27.7) | 109 (45.2) | 150 (38.6) | 0.002 |
| | Never | 107 (72.3) | 132 (54.8) | 239 (61.4) | |
| **Physical exercise** | Low activity | 114 (77.0) | 215 (89.2) | 329 (84.6) | 0.003 |
| | High activity | 34 (23.0) | 26 (10.8) | 60 (15.4) | |

OTHERS*= Prostate Hypertrophy, HIV, Arthritis, Peptic ulcer, Psychiatric BMI-body mass index, HDL-C -high density lipoprotein cholesterol, LDH-Low Density Lipoprotein

## 4.4 The association between the social demographic characteristics and uncontrolled hypertension

The social demographics factors associated with uncontrolled hypertension among patients attending the hypertensive clinic identified employment as significant factor. Farmers had a significantly lower risk of uncontrolled hypertension compared to the self-employed (AOR 0.5, 95% CI [0.31-0.89], p = 0.02). Other factors such as age, sex, residence, marital status, education level, number of adults in the household, having national health insurance and

monthly earnings were not found to be significant in influencing uncontrolled hypertension in the multivariate analysis. The details are in table 3

**Table 3: Regression analysis for social demographic characteristics associated with and uncontrolled hypertension n =241**

| Variable | Category | Univariate analysis | | | | Multivariate analysis | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | COR | 95% CI | | P value | AOR | 95% CI | | P value |
| | | | Lower | Upper | | | Lower | Upper | |
| **Age (years)** | 50-59 | Ref | | | | | | | |
| | 60-69 | 1.261 | .766 | 2.077 | .362 | | | | |
| | 70 or more | 1.056 | .645 | 1.727 | .829 | | | | |
| **Sex** | Male | Ref | | | | | | | |
| | Female | .716 | .458 | 1.120 | .143 | | | | |
| **Residence** | Urban | Ref | | | | | | | |
| | Rural | .887 | .550 | 1.431 | .624 | | | | |
| **Marital status** | Not married | Ref | | | | | | | |
| | Married | .795 | .151 | 4.193 | .786 | | | | |
| | widowed | .504 | .095 | 2.679 | .422 | | | | |
| | divorced | .267 | .024 | 3.020 | .286 | | | | |
| **Education level** | No formal education | Ref | | | | | | | |
| | Primary | .918 | .557 | 1.511 | .735 | .774 | .461 | 1.299 | .331 |
| | Secondary | .978 | .534 | 1.794 | .944 | .526 | .249 | 1.114 | .093 |
| | College/ University | 3.639 | .771 | 17.175 | .103 | 1.360 | .232 | 7.982 | .733 |
| **Employment status** | Self employed | Ref | | | | | | | |
| | Employed | 1.833 | .804 | 4.183 | .150 | 1.413 | .544 | 3.670 | .477 |
| | Unemployed | .778 | .311 | 1.943 | .591 | .788 | .305 | 2.032 | .622 |
| | Farmer | .625 | .393 | .995 | .047 | .522 | .308 | .886 | .016 |
| **Number of adults in household** | <8 | Ref | | | | | | | |
| | >8 | .856 | 0.267 | 2.747 | .793 | | | | |
| **Earning per month (Tsh)** | <100,000 | Ref | | | | | | | |
| | 110,000-200000 | .698 | .416 | 1.174 | .176 | .573 | .321 | 1.022 | .059 |
| | >210000 | 2.303 | 1.208 | 4.388 | .011 | 1.770 | .823 | 3.808 | .144 |
| **National Health insurance status** | Yes | Ref | | | | | | | |
| | No | 1.087 | .707 | 1.673 | .703 | | | | |

## 4.5 Clinical profile of hypertensive patients associated with uncontrolled hypertension

The study showed uncontrolled hypertension among patients at the hypertensive outpatient's clinic was associated with significant factors. Obesity was significantly associated with uncontrolled hypertension (AOR 3.5, 95% CI [1.06-11.30], p = 0.04), indicating a higher risk compared to individuals with normal weight or underweight. Additionally, the absence of diabetes was associated with a lower risk of uncontrolled hypertension (AOR 0.3, 95% CI [0.12-0.75], p = 0.01). Patients without comorbidity conditions also had a reduced risk of uncontrolled hypertension (AOR 0.2, 95% CI [0.03-0.77], p = .04)

Other clinical factors, such as waist circumference, total cholesterol levels, urine creatinine levels, duration of hypertension, family history of hypertension, and home monitoring of blood pressure, were not found to be significant in influencing uncontrolled hypertension in the multivariate analysis.

**Table 4; Regression analysis for Clinical profile associated with uncontrolled hypertension(n=241)**

| Variable | Category | Univariate | | | | Multivariate | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | COR | 95% CI | | p-value | AOR | 95% CI | | p-value |
| | | | Lower | Upper | | | Lower | Upper | |
| BMI | Normal weight/Underweight | Ref | | | | Ref | | | |
| | Over weight | 1.926 | 1.151 | 3.224 | .013 | 2.603 | .780 | 8.688 | .120 |
| | Obese | 3.009 | 1.820 | 4.975 | .000 | 3.464 | 1.061 | 11.302 | **.040** |
| Waist circumference | Normal | Ref | | | | Ref | | | |
| | Abnormal | 1.871 | 1.231 | 2.844 | .003 | .628 | .210 | 1.875 | .404 |
| Diabetic status | Yes | Ref | | | | Ref | | | |
| | No | 0.497 | .310 | .797 | .004 | .294 | .115 | .748 | **.010** |
| Total cholesterol | optimal level | Ref | | | | Ref | | | |
| | Intermediate | 1.619 | .595 | 4.408 | .346 | 1.843 | .493 | 6.884 | .363 |
| | High | 2.135 | 1.113 | 4.096 | .022 | 1.658 | .669 | 4.106 | .275 |
| Urine creatinine | normal creatinine | Ref | | | | Ref | | | |
| | Abnormal creatinine | 1.222 | .067 | 22.401 | .892 | | | | |
| Duration of hypertension | 1-5 Years | Ref | | | | Ref | | | |
| | > 5 Years | 0.881 | .574 | 1.352 | .563 | | | | |
| Family history of hypertension | Yes | Ref | | | | Ref | | | |
| | No | .724 | .464 | 1.128 | .153 | 1.444 | .666 | 3.131 | .352 |
| Comorbidity Condition | Yes | Ref | | | | Ref | | | |
| | No | .692 | .458 | 1.045 | .080 | 0.214 | .028 | .766 | **.042** |
| Home monitoring of BP | Yes | Ref | | | | Ref | | | |
| | No | 1.047 | .539 | 2.034 | .892 | | | | |

### 4.6 Behavioral factors associated with uncontrolled hypertension

Several behavioral factors were associated with uncontrolled hypertension among patients at hypertensive clinics. Not using herbal medication was associated with a significantly lower risk of uncontrolled hypertension (AOR 0.36, 95% CI [0.16-0.81], p = 0.01). Non-smokers had a significantly lower risk compared to smokers (AOR 0.09, 95% CI [0.01-0.63], p = 0.02). Patients who did not add salt to their food had a significantly lower risk of uncontrolled hypertension (AOR 0.6, 95% CI [0.35-0.86], p = 0.01). Additionally, physical exercise was significantly associated with reduced risk of uncontrolled hypertension (AOR 0.960, 95% CI [0.197-0.891], p = 0.006).

Other factors such as alcohol use, fruit usage, and vegetable usage did not show significant associations with uncontrolled hypertension in the multivariate analysis.

**Table 5; Regression analysis for Behavioral factors associated with uncontrolled hypertension (n=241)**

| Variable | Category | Univariate | | | | Multivariate | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | COR | 95% CI | | P-value | AOR | 95% CI | | p-value |
| | | | Lower | Upper | | | Lower | Upper | |
| **Use of herbal medication** | Yes | Ref | | | | Ref | | | |
| | No | .373 | .167 | .834 | .016 | .355 | .156 | .809 | **.014** |
| **History of smoking** | Yes | Ref | | | | Ref | | | |
| | No | .494 | .206 | 1.187 | .115 | .093 | .014 | .626 | **.015** |
| **Alcohol use** | Yes | Ref | | | | Ref | | | |
| | No | 1.350 | .891 | 2.047 | .157 | 1.538 | .978 | 2.419 | .062 |
| **Fruit usage** | Rarely <2 days/week | Ref | | | | | | | |
| | Sometimes 2-3days/week | 1.343 | .845 | 2.136 | .212 | | | | |
| | More often 4-5 days/week | .778 | .381 | 1.589 | .491 | | | | |
| **Vegetable usage** | Rarely<2 days/week | Ref | | | | | | | |
| | Sometimes 2-3 days/week | .948 | .607 | 1.479 | .813 | | | | |
| | More often 4-5days/week | .851 | .450 | 1.609 | .620 | | | | |
| **Salt table use** | Yes | Ref | | | | Ref | | | |
| | No | .621 | .410 | .942 | .025 | .550 | .354 | .855 | **.008** |
| **Physical exercise** | No | Ref | | | | Ref | | | |
| | Yes | .464 | .299 | .721 | .001 | 0.1860 | .197 | .891 | **.006** |

**Note: AOR=Adjusted Odds Ratio, COR=Crude Odds Ratio, CI= Confident interval (95%)**

### 4.7 The additional healthcare needs addressed from patients to promote optimal blood pressure control among elderly hypertensive patients attending outpatient clinics in MRRH.

The other healthcare needs addressed by the participants attending the hypertension outpatient's clinic at Mbeya Regional Hospital as primary factors for promoting optimal blood pressure control among elderly, highlighted several key areas for improvement. The most frequently addressed needs were for health education on the DASH plan, with 141 (36.2%) of participants. Good services were reported by 54 (13.9%) of participants, while 50 (12.9%) highlighted the need for special care for the elderly. The provision of a permanent doctor at the clinic, along with better communication and punctuality of staff, was mentioned by 38 (9.8%) of participants. Additionally, 25 (6.4%) of participants indicated a need for the hospital to facilitate the provision of National Health Insurance and to ensure the availability of EEG and ECHO during visits. Other results are in table below

**Table 6: Addressed healthcare needs for promoting optimal blood pressure control among elderly (n=389)**

| Variable | **Frequency** | **Percent (%)** |
|---|---|---|
| The hospital to facilitate provision of National health insurance. | 25 | 6.4 |
| The availability of special care to elderly | 50 | 12.9 |
| To have permanent Dr at clinic | 38 | 9.8 |
| On visit to have ECG and ECHO measurements | 25 | 6.4 |
| To get the right medicine of hypertension | 18 | 4.6 |
| Good services | 54 | 13.9 |
| To reduce cost of treatment to elderly | 19 | 4.9 |
| Health education on DASH plan | 141 | 36.2 |
| At visit to be checked all measurements of lipid, glucose level | 3 | .8 |
| The hospital to employ more staff | 14 | 3.6 |
| The hospital to improve on medicine availability | 2 | .5 |

NOTE: DASH Plan=Dietary Approach to Stop Hypertension, ECG=Electrocardiogram, ECHO=Echocardiogram

# CHAPTER FIVE

# 5.0 DISCUSSION

## 5.1 Discussion

In elderly hypertensive patients, maintaining proper blood pressure control leads to favorable therapeutic outcomes, such as a reduction in hypertension related mortality and cardiovascular complications, which lowers the disease's global toll. Studies have shown that a significant majority of hypertensive patients still have uncontrolled hypertension despite receiving treatment(31)(12)

The study conducted at Mbeya Regional Referral Hospital (MRRH) revealed a significant prevalence of uncontrolled hypertension among elderly hypertensive patients, with a rate of 62.0%. This finding is consistent with several studies conducted across Sub-Saharan Africa. For instance, a prevalence of 57.7% was reported at Jimma Hospital in Ethiopia, 66% in Dar es Salaam, and 70.1% in Mwanza (42–44). These similarities can be attributed to common factors such as inadequate healthcare infrastructure, limited access to medications, and poor adherence to antihypertensive treatment protocols. Additionally, socioeconomic challenges such as poverty and low educational levels further exacerbate the issue by limiting access to healthcare services and information (32).

The study found that demographic factors such as age, sex, residence, marital status, education level, and monthly earnings were not significantly associated with uncontrolled hypertension, except for employment. Farmers had a significantly lower risk of uncontrolled hypertension compared to the self-employed (AOR .522, 95% CI [0.308-0.886], p = .016). This contrasts with other studies where age and sex were significant factors. Older age and male sex have been commonly associated with a higher prevalence of uncontrolled hypertension (21,45). The difference in our study might be due to the specific population characteristics at MRRH, where the majority of the study population resided in urban areas and had primary education. The lower risk among farmers could be due to their higher levels of physical activity and potentially lower stress levels compared to self-employed individuals.

The clinical characteristics of the study population showed a high prevalence of obesity, with a mean BMI of 28.97 ±5.83 kg/m², and 37.5% of the participants classified as obese. Obesity was significantly associated with uncontrolled hypertension (AOR 3.464, 95% CI [1.061-11.302], p = .040). This finding aligns with other studies that have established a strong link between obesity and hypertension. Obesity contributes to hypertension through mechanisms such as insulin resistance, inflammation, and increased sympathetic nervous system activity, which in turn can lead to endothelial dysfunction and elevated blood pressure (51). The high prevalence of obesity in our study population is concerning and undersees the need for interventions targeting weight reduction as part of hypertension management.

The study also identified the absence of diabetes as being associated with a lower risk of uncontrolled hypertension (AOR 0.294, 95% CI [0.115-0.748], p = .010). This is consistent with the literature, which suggests that diabetes is a significant comorbid condition that complicates hypertension management due to its impact on blood vessel health and the increased risk of cardiovascular complications (28). Furthermore, the presence of multiple comorbid conditions was found to increase the risk of uncontrolled hypertension. Patients without comorbidity conditions had a reduced risk of uncontrolled hypertension (AOR 0.214, 95% CI [0.028-0.766], p = .042). This aligns with findings from other studies that highlight the challenge of managing hypertension in patients with multiple health issues (28).

Behavioral factors played a significant role in the prevalence of uncontrolled hypertension. Not using herbal medication (AOR 0.355, 95% CI [0.156-0.809], p = 0.014), non-smoking (AOR 0.093, 95% CI [0.014-0.626], p = 0.015), not adding salt to food (AOR 0.550, 95% CI [0.354-0.855], p = 0.008), and engaging in physical exercise (AOR 0.860, 95% CI [0.197-0.891], p = 0.006) were all associated with a lower risk of uncontrolled hypertension. These protective effects are well-supported by the literature, as smoking and high salt intake are established risk factors for hypertension, while physical activity is known to lower blood pressure (42,49). The lower risk associated with not using herbal medications may reflect the potential negative interactions or the unregulated nature of herbal remedies, which could interfere with conventional hypertension treatments (37). Also in this study, elderly hypertensive patients who

added salt to their food had 2.5 times higher odds of uncontrolled hypertension compared to hypertensive patients who never used salt in their food. This finding is consistent with studies from the University of Gondar Referral Hospital and Debre Tabor District Hospital in Northwest Ethiopia(28) which found that patients who used top-added salt on a plate were less likely to have optimal BP control than patients who did not use top-added salt. Studies from Zimbabwe(10) and Southern China (68) have also shown an association between salt consumption and BP. This can be explained by the fact that salt affects the body's natural sodium balance, leading to fluid retention and raising the pressure imposed by the blood-on-blood vessel walls, resulting in high blood pressure(18)

The additional healthcare needs identified by participants to promote optimal blood pressure control among elderly hypertensive patients attending outpatient clinics in MRRH, included health education on the DASH (Dietary Approaches to Stop Hypertension) plan, better services, special care for the elderly, permanent doctors, improved communication, punctuality of staff, and availability of medical equipment like EEG and ECHO. Similar needs have been highlighted in other studies, emphasizing that patient education and comprehensive healthcare services are critical for managing chronic conditions like hypertension(7). The focus on educational interventions undersees the importance of patient knowledge in achieving optimal blood pressure control (28). This study showed that patients who were non-adherent to their anti-hypertensive drugs and use of traditional medicine were more likely to have uncontrolled blood pressure than those who were adherent as there could be antagonistic interaction of medicines and lead to acute kidney disease. This is because anti-hypertensive drugs decrease their power in controlling high blood pressure by boosting vasodilatation, reducing vasoconstriction, raising urine output, and preventing sympathetic heart activation(15,52)(69) and good antihypertensive medication compliance is crucial for managing hypertension and lowering uncontrolled hypertension.

Overall, the findings from this study undersee the high prevalence of uncontrolled hypertension among elderly hypertensive patients at MRRH and highlight several associated demographics, clinical, and behavioral factors. Comparing these results with

other studies reveals both similarities and differences, suggesting that while certain risk factors are universally significant, local context and population-specific characteristics also play crucial roles. Addressing these factors through targeted interventions, improved healthcare services, and patient education is essential for better hypertension management in this population

## 5.2 Study limitations

Some blood tests were not in the system one day as measurement may be delayed. This can limit the ability to get information on the same day during data collection.

The researcher mitigated by making follow up of blood tests that were not on the next day in order to complete the questionnaire of missed information due to delay of the results.

The classes of drugs used and their impact on uncontrolled blood pressure control was not investigated in detail. Moreover, there might be recall and social desirability biases since the study participants' behavioral practices were based on self-reports, and the performance of these behaviors was not observed or validated.

# CHAPTER SIX

# 6.0 CONCLUSION AND RECOMMENDATIONS

## 6.1 Conclusion

The study at Mbeya Regional Referral Hospital (MRRH) revealed a substantial prevalence of uncontrolled hypertension among elderly hypertensive patients, with a rate of 62.0%. The study identified several factors associated with uncontrolled hypertension, including clinical characteristics such as obesity and diabetes, and behavioral factors like smoking, salt intake, physical inactivity, and the use of herbal medications. These findings align with other studies in Sub-Saharan Africa, indicating common challenges in hypertension management across the region. Differences in the association of demographic factors such as age and sex with uncontrolled hypertension highlight the need for context-specific approaches in addressing this health issue.

## 6.2 Recommendations

Enhanced Patient Education: There is a need for comprehensive educational programs focusing on the importance of medication adherence, dietary modifications (such as the DASH diet), and lifestyle changes, including increased physical activity and smoking cessation.

Targeted Interventions for Obesity and Diabetes: Implementing targeted interventions to address obesity and diabetes is essential, given their significant association with uncontrolled hypertension. Weight management programs and diabetes control strategies should be integrated into routine hypertension management.

Promotion of Physical Activity: Encouraging regular physical exercise among patients can significantly reduce the risk of uncontrolled hypertension. Community-based programs and initiatives that promote active lifestyles should be prioritized.

Regulation of Herbal Medication Use: There should be awareness campaigns about the potential risks of using unregulated herbal medications, and patients should be encouraged to discuss all their treatments with healthcare providers to avoid negative interactions with prescribed antihypertensive drugs.

Holistic Approach to Comorbid Conditions: Managing hypertension in patients with multiple comorbidities requires a holistic approach that addresses all underlying health issues. Multidisciplinary teams should be involved in the care of these patients to provide comprehensive and coordinated care.

Further qualitative research aimed at understanding and addressing the unique challenges of hypertension management in the elderly population are needed.

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# 8.0 APPENDICES

## 8.1 Appendix A1: Questionnaire (English version)

**TITTLE:** PREVALENCE OF UNCONTROLLED HYPERTENSION AND ASSOCIATED FACTORS AMONG ELDERLY HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINICS IN MBEYA REGIONAL REFERRAL HOSPITAL, TANZANIA

**SERIAL NO……HOSPITAL REG NO: ---------- DATE: ----------**

**PART A: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF STUDY PARTCIPANTS**

**Please answer all questions and put a tick (√) on the box provided for the best answer**

1. What is your age? ---------- years
2. What is your sex?
   i. Male ☐
   ii. Female ☐
3. Where do you reside?
   i. Urban ☐
   ii. Rural ☐
4. What is the marital status?
   i. Single ☐
   ii. Married ☐
   iii. Widowed ☐
   iv. Divorced ☐
5. What is your highest level of education?
   a. No formal education ☐
   b. Primary ☐
   c. Secondary ☐
   d. High school graduate ☐
   e. Higher studies ☐
   f.

6. What is your employment status?

   i. Self employed ☐
   ii. Public employment ☐
   iii. Private employment ☐
   iv. Unemployed ☐
   v. Farmer ☐

7. How many people older than 18 years, including yourself live in your house hold?

   i. ≤8 ☐
   ii. >8 ☐

8. Can you give estimates of your monthly household Income (Tsh)?

   i. ≤100,000 ☐
   ii. 110,000-200,000 ☐
   iii. ≥210,000 ☐

9. Do you have Nation health insure?

   i. Yes ☐
   ii. No ☐

**PART B: PHYSICAL MEASUREMENTS**

10. Are you hypertensive and you are on clinic?

   i. Yes ☐
   ii. No ☐

11. What are today blood pressure readings?

   i. Systolic---------- mmHg,
      Diastolic---------- mmHg
   ii. Systolic---------- mmHg
      Diastolic---------- mmHg

12. Heart rate:

   i. Reading 1---------- beats per minutes
   ii. Reading 2---------- beats per minutes

13. Height and height measurements

i. Height in centimeter ----------cm

ii. Waight in kilogram ---------- kg

iii. The body mass index (BMI) estimates----------$kg/m^2$

14. Waist circumference in centimeter ----------cm

**BIOCHEMICAL MEASUREMENTS**

15. Are you diabetic?

i. Yes ☐

ii. No ☐

16. Have you taken random blood glucose (RBG) to day

i. Yes ☐

ii. No ☐

iii. Results of Fasting blood Glucose----------mmol/L----------mg/dl

17. Are you on insulin use or any other drug prescribed by doctors or any health care personnel

a. Yes ☐

b. No ☐

**BLOOD LIPIDS**

18. Total cholesterol ----------mmol/L---------- mg/dl

a. HDL---------- mmol/L---------- mg/dl

b. LDL----------mmol/L---------- mg/dl

**URINALYSIS**

19. Urinalysis results

i. sodium----------
mmol/L

ii. creatinine ----------
mmol/L

**PART C: HEALTH PROFILE OF THE STUDY PARTCIPANTS**

20. For how long have you diagnosed with hypertension?
    i. 1-5 years ☐
    ii. ≥5 years ☐
21. Is there any history of hypertension in your family?
    i. Yes ☐
    ii. No ☐
22. Do you have other comorbidly medical conditions apart from hypertension?
    i. Yes ☐
    ii. No ☐
23. If yes which one? tick all that applies
    i. Diabetics ☐
    ii. Stroke ☐
    iii. Heart failure ☐
    iv. coronary artery disease ☐
    v. Renal failure ☐
    vi. Any other----------
24. Do you monitor your blood pressure at home?
    i. Yes ☐
    ii. No ☐
25. Have you ever been told by a doctor or other health worker that you have raised cholesterol?
    i. Yes ☐
    ii. No ☐
26. Have ever had a heart attack or chest pain from heart disease angina or a stroke (cerebral accident or incidence?
    i. Yes ☐
    ii. No ☐
27. Are you current taking antihypertensive drug?
    i. Yes ☐
    ii. No ☐

28. How many antihypertensive medicines are you taking?
    i. Single therapy ☐
    ii. Dual therapy ☐
    iii. > Triple therapy ☐
    iv. Please mention the type of drugs…….
29. Where do you get the antihypertensive medicines?
    i. Private pharmacy ☐
    ii. Hospital pharmacy ☐
    iii. Any other place ----------
30. Are you currently taking any herbal or traditional medicine for your blood pressure and cholesterol treatment?
    i. Yes ☐
    ii. No ☐

**PART C: BEHAVIORL/ LIFESTYLE CHARACTERISTICS**

31. Do you currently smoke any tobacco products, such as cigarettes, cigars, pipes?
    i. Yes ☐
    ii. No ☐

**If yes go to question no 31,32,33&34 and if no ask question no35&36.**

32. Do you currently smoke tobacco product daily?
    i. Yes ☐
    ii. No ☐
33. How old were you when started smoking? ----------years
34. During the past 12 months have you tried to stop smoking?
    i. Yes ☐
    ii. No ☐
35. During any visit to a doctor or health worker in the past 12 month where you advised to quit smoking?
    i. Yes ☐
    ii. No ☐
    iii. Not visited ☐

36. In the past, did you ever smoke any tobacco product?

    i. Yes ☐
    ii. No ☐

37. For how long did you stopped smoking? ---------- years

38. Are you taking alcohol?

    i. Yes ☐
    ii. No ☐

39. Which type of alcohol are taking? Tick all reported

    i. Beer ☐
    ii. Wine ☐
    iii. Energy drink ☐
    iv. Spirits ☐
    v. Any other mention

    …….

40. On average how many standard drinks of you can drinks per day?

    i. 1-3 bottle ☐
    ii. 4-6 bottle ☐
    iii. 7-10 bottle ☐

**Diet habit**

41. How many days do you eat fruits per week? ---------- days.
42. How many savings of fruits do you eat on one of those days? ---------- servings.
43. How many days do you eat vegetable per week? ---------- days.
44. How many servings of vegetable do you eat on one of those days? ---------- servings

**Dietary salt**

45. How often do you add salt or a salty sauce such as soy sauce to your food right before you eat or as you are eating it?

**i.** Always ☐

**ii.** Sometimes ☐

**iii.** Never ☐

**iv.** Don't know ☐

46. How often do you eat processed food high in salt such as salty snacks, canned salt food including pickles and preserves, salt food prepared at fast food restaurant, cheese, becon and processed meat.

a. Always ☐

b. Sometimes ☐

c. Never ☐

d. Don't know ☐

47. How much table salt you think you consume per day?

a. 1 tea spoon ☐

b. 2 tea spoons ☐

c. 3 tea spoons ☐

**d.** Any other amount mention……

**Physical activity**

**48.** Does your work involve vigorous -intensity activity that cause large increase in breathing or heart rate like carrying or lifting heavy load, digging or construction work.

i. Yes ☐

ii. No ☐

49. In a typical week on how many days do you do vigorous intensity activity as part of your work? ---------- number of days

50. How much time do you spend doing vigorous intensity activities at work on a typical day?

i. ---------- hours

ii. ---------- minutes

51. Do you do any vigorous intensity sports, fitness or recreational activity that cause large increases in breathing or heart rate like running or footballing?
    i. Yes ☐
    ii. No ☐
52. In a typical week on how many days do you do vigorously intensity sports, fitness or recreational? ----------day.

53. How much time do you spend doing vigorously intensity sports, fitness or recreational activities on a typical day? ----------hours---------- minutes.
54. How much time do you usually spend sitting or reaching on a typical day? ---------- hours----------minutes.
55. Identify additional healthcare needs from patients to promote optimal blood pressure control among elderly hypertensive patients attending outpatient clinics in MRRH
    ---
    ---
    ---

**Thank you for cooperation**

## 8.2 Kiambatisho A2: Dodoso (Toleo la Kiswahili)

**KICHWA CHA TAFITI: MAKADIRIO YA SHINIKIZO LA JUU LA DAMU LISILOSHUKA NA VISABABISHI KWA WAZEE WENYE UGONJWA WA SHINIKIZO LA DAMU WANAOHUDHURIA KLINIC KATIKA HOSPITALI YA RUFAA MKOA MBEYA, TANZANIA**

**KUMBU NA…… USAJILI WA HOSPITALI NA: ----------TAREHE: ----------**

**SEHEMU A: TAARIFA BINAFSI ZA WASHIRIKI WA UTAFITI**

Tafadhali jibu maswali yote kwa kuandika kwenye nafasi na weka tiki (√) kwenye sanduku lililotolewa kwa jibu bora:

1. Una umri wa miaka mingapi? ……. Miaka
2. Jinsia yako ni ipi?
    a. Kiume ☐
    b. Kike ☐
3. Unakaa wapi?
    a. Mjini ☐
    b. Vijijini ☐
4. Hali yako ya ndoa ni ipi?
    a. Sijaolewa ☐
    b. Nimeoa/Nimeolewa ☐
    c. Mjane ☐
    d. Nimeachana ☐
5. Je! Una kiwango gani cha elimu?
    a. Sijasoma ☐
    b. Elimu ya shule ya msingi ☐
    c. Elimu ya sekondari ☐
    d. Ngazi ya chuo ☐
    e. Elimu ya juu ☐
6. Hali yako ya ajira ni ipi?
    a. Mwenyewe ☐
    b. Ajira ya Umma ☐
    c. Ajira ya Kibinafsi ☐

d. sijawahi kuajiriwa ☐
e. Mkulima ☐
f. Mstaafu ☐

7. Watu wangapi wenye umri zaidi ya miaka 18, pamoja na wewe mwenyewe, wanaishi katika kaya yako?
   a. ≤8 ☐
   b. >8 ☐
8. Je, unaweza kutoa makisio ya mapato yako ya kaya kila mwezi (Tsh)?
   a. ≤100,000 ☐
   b. 110,000-200,000 ☐
   c. ≥210,000 ☐
9. Je, una bima ya afya ya kitaifa?
   a. Ndiyo ☐
   b. Hapana ☐

**SEHEMU B: VIPIMO VYA MWILI**

**10.** Je, una shinikizo la juu la damu na unahudhuria kliniki?
   a. Ndiyo ☐
   b. Hapana ☐

11. Matokeo ya kipimo cha BP leo ni nini? jaza kwenye nafasi.
   a. systolic---------- mmHg,
      Diastoliki---------- ------ mmHg
   b. systolic---------- mmHg
      Diastoliki---------- mmHg

12. Mapigo ya moyo:
   a. Soma 1---------- mapigo kwa dakika
   b. Soma 2---------- mapigo kwa dakika

13. Urefu na vipimo vya uzito na vifaa vilitumika kupima , pima na andika:
   a. Urefu kwa sentimita (CM) ---------- cm
   b. Uzito wa leo kwa kilogramu (kg) ---------- kg
   c. Jaza Body mass index (BMI)----------$kg/m^2$

14. Mzunguko wa kiuno pima kwa sentimita (cm)----------

**VIWANGO VYA BIOKEMIKALI**

**KIPIMO CHA SUKARI KWENYE DAMU**

**15.** Je, wewe una kisukari cha juu?

a. Ndiyo ☐

b. Hapana ☐

16. Je leo umepima Kiwango cha sukari kwenye damu cha haraka (RBG)?

a. Ndiyo

b. Hapana

c. Jaza Matokeo ya kiwango cha sukari ya damu ----------mmol/L-----mg/dl

17. Je, leo umetumia insulini au dawa nyingine iliyopendekezwa na daktari au mfanyakazi wa afya kwa kiwango cha juu cha sukari?

a. Ndiyo ☐

b. Hapana ☐

**KIPIMO CHA KOLESTEROL KWENYE DAMU**

**18.** Jumla ya kolesterol ----------mmol/L----------mg/dl

a. HDL---------- mmol/L---------- - mg/dl

b. LDL----------mmol/L---------- mg/dl

**KIPIMO CHA MKOJO**

19. Matokeo ya kipimo cha mkojo:Je, umefunga kula au kunywa chochote kabla ya

a. Kiwango cha Sodium kwenye mkojo---------- mmol/L

b. Kreatinini ya mkojo ---------- mmol/L

**SEHEMU C: HISTORIA YA AFYA WA WASHIRIKI WA UTAFITI**

20. Kwa muda gani umedhibitishwa na shinikizo la juu la damu?

a. 1-5 miaka ☐

b. ≥5 miaka ☐

21. Je, kuna historia ya shinikizo la juu la damu katika familia yako?

a. Ndiyo ☐

b. Hapana ☐

22. Je, una magonjwa mengine zaidi ya shinikizo la juu damu?
    a. Ndiyo ☐
    b. Hapana ☐
23. Ikiwa ndio ni ugonjwa upi? (weka alama sehemu zote zinazofaa)
    a. Kisukari ☐
    b. Kiharusi ☐
    c. Moyo kushindwa ☐
    d. Ugonjwa wa mishipa ya moyo ☐
    e. Kushindwa kwa figo ☐
    f. Lingine lolote taja----------
24. Je, unajipima shinikizo lako la damu nyumbani?
    a. Ndiyo ☐
    b. Hapana ☐
25. Je, umewahi kuambiwa na daktari au mtumishi yoyote wa afya kuwa una kiwango cha juu cha kolesterol?
    a. Ndiyo ☐
    b. Hapana ☐
26. Je, umewahi kupatwa na kiharusi ?
    a. Ndiyo ☐
    b. Hapana ☐
27. Je, Kwa sasa unatumia dawa za kutibu shinikizo la juu la damu?
    a. Ndiyo ☐
    b. Hapana ☐
28. Unatumia dawa ngapi za kutibu shinikizo la juu la damu??
    a. dawa moja ☐
    b. Dawa mbili ☐
    c. zaidi ya dawa tatu ☐
    d. zitaje dawa hizo…….
29. Unapata dawa za kupunguza shinikizo la juu la damu wapi?
    a. Duka la dawa la kibinafsi ☐
    b. Duka la dawa la hospitali ☐
    c. Mahali pengine popote taja ----------

30. Je, kwa sasa unatumia dawa za mitishamba au za jadi kwa ajili ya kupunguza shinikizo lako la juu la damu na kolesterol?

    a. Ndiyo ☐
    b. Hapana ☐

**SEHEMU D: TABIA ZA MAISHA**

**31.** Je, unatumia bidhaa yoyote ya tumbaku kwa sasa, kama sigara, sigara za kienyeji, ugoro au kiko?

    a. Ndiyo ☐
    b. Hapana ☐

**Ikiwa ndio uliza swali la 32,33,34 na 35 na ikiwa Hapana uliza swali la 36, na 37**

Je, unatumia bidhaa ya tumbaku kila siku?

    a. Ndiyo ☐
    b. Hapana ☐

32. Ulipokuwa na umri gani ulipoanza kuvuta sigara? ----------miaka

33. Katika miezi 12 iliyopita, je, umewahi kujaribu kuacha kuvuta sigara?

    a. Ndiyo ☐
    b. Hapana ☐

34. Wakati wowote ulipotembelea daktari au mfanyakazi mwingine wa afya katika miezi 12 iliyopita, walipendekezwa kuacha kuvuta sigara?

    a. Ndiyo ☐
    b. Hapana ☐
    c. Sijatembelea ☐

35. Zamani, je, umewahi kuvuta bidhaa yoyote ya tumbaku?

    a. Ndiyo ☐
    b. Hapana ☐

36. Kwa muda gani umesitisha kuvuta sigara? ---------- miaka

37. Je, unakunywa pombe?

    a. Ndiyo ☐
    b. Hapana ☐

38. Aina gani ya pombe unakunywa? (weka alama aina zote unazotumia)

    a. Bia ☐
    b. Divai/mvinyo ☐

c. Energy drink ☐

d. Gongo ☐

e. Aina nyingine ya pombe taja…….

39. Kwa wastani, unakunywa kiasi gani cha pombe kwa siku?

a. 1-3 chupa ☐

b. 4-6 chupa ☐

c. 7-10 chupa ☐

**SEHEMU D: TABIA KATIKA LISHE**

**Matumizi ya matunda na mboga**

40. Unakula matunda mara ngapi kwa wiki? ----------siku.
41. Unakula vipande vingapi vya matunda kwenye moja ya siku hizo? --------- kwa mlo
42. Unakula mboga za majani mara ngapi kwa wiki? ---------- siku.
43. Unakula vijiko vingapi vya mboga kwenye mlo kwa siku moja? ---------- kwa mlo

**Matumizi ya chumvi kwenye mlo**

44. Mara ngapi unaweka chumvi au mchuzi wenye chumvi kama vile soyasosi kwenye chakula chako kabla ya kula au unapokula?

a. Daima ☐
b. Mara chache ☐
c. Kamwe ☐
d. Sijui ☐

45. Mara ngapi unakula vyakula vilivyosindikwa vilivyo na chumvi nyingi kama vitafunio vyenye chumvi, vyakula vya makopo pamoja na tango na jam, vyakula vyenye chumvi vilivyoandaliwa kwenye migahawa ya haraka, jibini, beconi na nyama iliyosindikwa.

a. Daima ☐
b. Mara chache ☐
c. Kamwe ☐
d. Sijui ☐

46. Unavyofikiria unakula chumvi au mchuzi wa chumvi kiasi gani?

a. Kijiko 1 cha chai ☐

b. Vijiko 2 vya chai ☐

c. Vijiko 3 vya chai ☐

d. Kiasi kingine taja …….

**Mazoezi ya mwili**

47. Je, kazi yako inahusisha shughuli zenye nguvu - shughuli za mzunguko ambazo husababisha ongezeko kubwa la kupumua au mapigo ya moyo kama kubeba mizigo mizito, kuchimba au kazi ya ujenzi.
    a. Ndiyo ☐
    b. Hapana ☐
48. Katika wiki ya kawaida, unafanya shughuli gani zenye kutumia nguvu kama sehemu ya kazi yako? ---------- idadi ya siku
49. Unatumia muda gani kufanya shughuli zenye nguvu kazini katika siku ya kawaida?
    a. ---------- saa
    b. ---------- dakika
50. Je, unafanya michezo, mazoezi ya mwili au burudani zenye nguvu ambazo husababisha ongezeko kubwa la kupumua au mapigo ya moyo kama kukimbia au kucheza mpira?
    a. Ndiyo ☐
    b. Hapana ☐
51. Katika wiki ya kawaida, unafanya michezo, mazoezi ya mwili au burudani zenye nguvu ngapi? ----------siku
52. Unatumia muda gani kufanya michezo, mazoezi ya mwili au burudani zenye nguvu katika siku ya kawaida? ---------- saa ---------- dakika.
53. Unatumia muda gani kwa kawaida kukaa katika siku? --------saa---------- dakika.

54. Je unafikiri ni huduma gani ya Afya inayoweza kutolewa zaidi ili kushusha shinikizo lako la juu la damu katika Hospitali ya Mkoa ya Rufaa ya Mbeya?

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***Asante kwa ushirikiano wako***

## 8.3 Appendix A3: Informed Consent (English Version)

**A CONSENT TO PARTICIPATE IN AS A STUDY TITLED ESTIMETES OF UNCOTROLLED HYPERTENSION AND ASSOCIATED FACTORS AMONG ELDERLY HYPERTENSIVE OUTPATIENTS IN MBEYA REGIONAL REFERRAL HOSPITAL.TANZANIA.**

ID NO:

| | | | |
|---|---|---|---|
| | | | |

Greeting! My name is Nolasca Mtega, currently, I am a student at Muhimbili University of Health and allied Sciences pursuing MSc in Cardiovascular Nursing. I am conducting research on the title: **Prevalence of Uncontrolled Hypertension and Associated Factors Among Elderly Hypertensive patients attending Outpatient clinic in Mbeya Regional Referral Hospital. Tanzania**.

**Purpose e of study**

The study will help to determine the prevalence of uncontrolled hypertension, describe the associated factors for uncontrolled hypertension and describe other health care assistances that could help in controlling hypertension among elderly hypertension outpatients.

**Involved Participation**

This study will involve all hypertensive outpatients who will attend hypertension and diabetic clinic for follow up. I ask your permission to participate in my study and you are free to decide either to participate in this study or not. If you are agreeing to participate in this study. I will request you to read careful the research questions then answer all questions.

**Confidentiality.**

The information that you will provide in this study will be treated as strictly confidential and will be used for research purpose only and not for other reasons.

Your name will not be used for identification during data analysis and report development instead of the number will be used.

**Risks**

The researcher expects nor harm will happen to you when you participate in this study.

**Benefits**

There will no direct financial benefits to you, however, participation in this research has potential for your knowledge on controlling the hypertension through recommendation that will be made for the improvements.

**Right to withdraw and alternatives**

To participate in the study is voluntary. You can free to choose whether to participate or not.

Refusal to participate or withdrawal from the study will not entail punishment. However, we would like you to participate in this study since you are extremely essential.

**Whom to contact**

In case of any emergency concern, you may contact the researcher through the following address: Nolasca Mtega, school of nursing, MUHAS P.O.BOX 65001, Dar es Salaam: email address: nolascamtega@yahoo.com.Mobile no 0764227659.

If you have a serious matter about this research related to violation of your rights, and you feel that the researcher has not been able to help you are free to contact Directorate of research and publications ,innovations, MUHAS, P.O.BOX 65001, Dar es Salaam, phone number 255-22-2152489.

**Agreement of Participation**

I----------, Identification number ----------

Age _____ years old. I am willing to participate in this study.

Informant's signature. ---------- Date ----------

Assistant researcher signature---------- Date----------

Researcher's signature---------- Date ----------

### 8.4 Kiambatisho A4: Fomu ya kuomba ridhaa (Toleo la Kiswahili)

**KUSHIRIKI KWENYE UTAFITI WA MAGONJWA YA SHINIKIZO LA JUU LA DAMU NA VISABABISHI HATARI KWAWATU WAZIMA WENYE UGONJWA WA SHINIKIZO LA JUU LA DAMU WANAOHUDHURIA KILINIC, MBEYA HOSPITALI YA MKOA YA RUFAA.**

NAMBA

| | | | |
|---|---|---|---|
| | | | |

Habari! Mimi naitwa **Nolasca Mtega** ni Mwanafunzi wa shahada ya pili wa Sayansi ya Afya ya Moyo katika chuo kikuu cha Afya na Sayansi Shirikishi Muhimbili (MUHAS). Ninafanya utafiti wa kujua idadi ya wagonjwa wenye shinikizo la juu la damu na sababu zinazosababisha kutoshuka kwa shinikizo la juu la damu na kupata maoni nini kifanyike katika taasisi zaidi ili kuwahudumia vizuri.

**Dhumuni la utafiti**

Utafiti huu utasaidia kugundua idadi na visabishi vya shininikizo la juu la damu kwa wagonjwa wa shinikizo la juu la damu wanaohudhuria kiliniki, itasaidia kugundua mapema visababishi vinavyopelekea kutokushuka kwa shinikizo la juu la damu ili kuzuia madhara. yanaweza kutokea kama shinikizo la damu la juu halitaweza kushuka.

**Watu watakaoshiriki**

Utafiti huu unawahusu akina baba na akina mama waliogundulika na shinikizo la juu la damu kuendendelea kuhudhulia kiliniki kwa ufuatiliaji zaidi.

**Usiri**

Taarifa ambazo utazitoa katika utafiti huu zitahifadhiwa vizuri na hakuna mtu yeyote atakayeweza kuzitoa kwa mtu mwingine, usiri utazingatiwa, hizi taarifa ni kwa ajili ya matumizi ya ofisi tu na si vinginevyo. Jina lako halitaandikwa katika karatasi hizi, badala yake tutatumia namba tu wakati wa utafiti.

**Madhara**

Hakutakuwa na madhara yotote yale kwa kushiriki kwako katika utafiti huu.

**Faida**

Hakuna faida yoyote utakayopata kwa kushiriki kwako katika utafiti huu. kushiriki kwako ni muhimu kutaongeza mbinu za kuweza kuzuia shinikizo la damu na madhara yake na kutoa mapendekezo kwa ajili ya uboreshaji wa huduma katika taasisi.

**Watu wa kuwasiliana nao**

Kama kutakuwa na tatizo lolote lile unaweza kuwasilisiliana na **Nolasca Mtega kwa simu namba 0764227659, Chuo Cha Afya ya Sayanzi shirikishi Muhimbili, P.O.BOX 65001, Dar es Salaam. Barua pepe: nolascamtega@yahoo.com.**

Kama utakuwa na tatizo lolote linaloweza kuhatarisha usalama wako na umeona mtafiti hawezi kulitatua Uwe huru kuwasiliana na **Kurugenzi ya utafiti na uchapishaji. MUHAS, P.O.BOX 65001, Dar es Salaam kwa simu namba 255-22-2152489.**

**Makubaliano ya ushiriki.**

Namba ya ushiriki ---------- Umri----------

Mimi ---------- niliyopewa nathibitisha kuelewa maelezo yaliyo andikwa hapo juu na kuridhika na maelezo kwa maswali yangu yote. Nami kwa hiari yangu mwenyewe bila kushurutishwa na mtu, ninakubali kushiriki kwenye utafiti huu.

Sahihi ya mshiriki---------- Tarehe----------

Sahihi ya mtafiti msaidizi---------- Tarehe ----------

Sahihi ya mtafiti ---------- Tarehe ----------

## 8.5 Appendix 7: Approval letter for data collection

**UNITED REPUBLIC OF TANZANIA**

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS

Ref. No.DA.282/298/01.C/2261 Date: 31/05/2024

MUHAS-REC-05-2024-2261
NOLASCA MTEGA
SHOOL OF NURSING
MUHAS

**RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: PREVALENCE OF UNCONTROLLED HYPERTENSION AND ASSOCIATED FACTORS AMONG ELDERLY HYPERTENSIVE PATIENTS ATTENDING OUTPATIENT CLINICS IN MBEYA REGIONAL REFERRAL HOSPITAL, TANZANIA.**

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

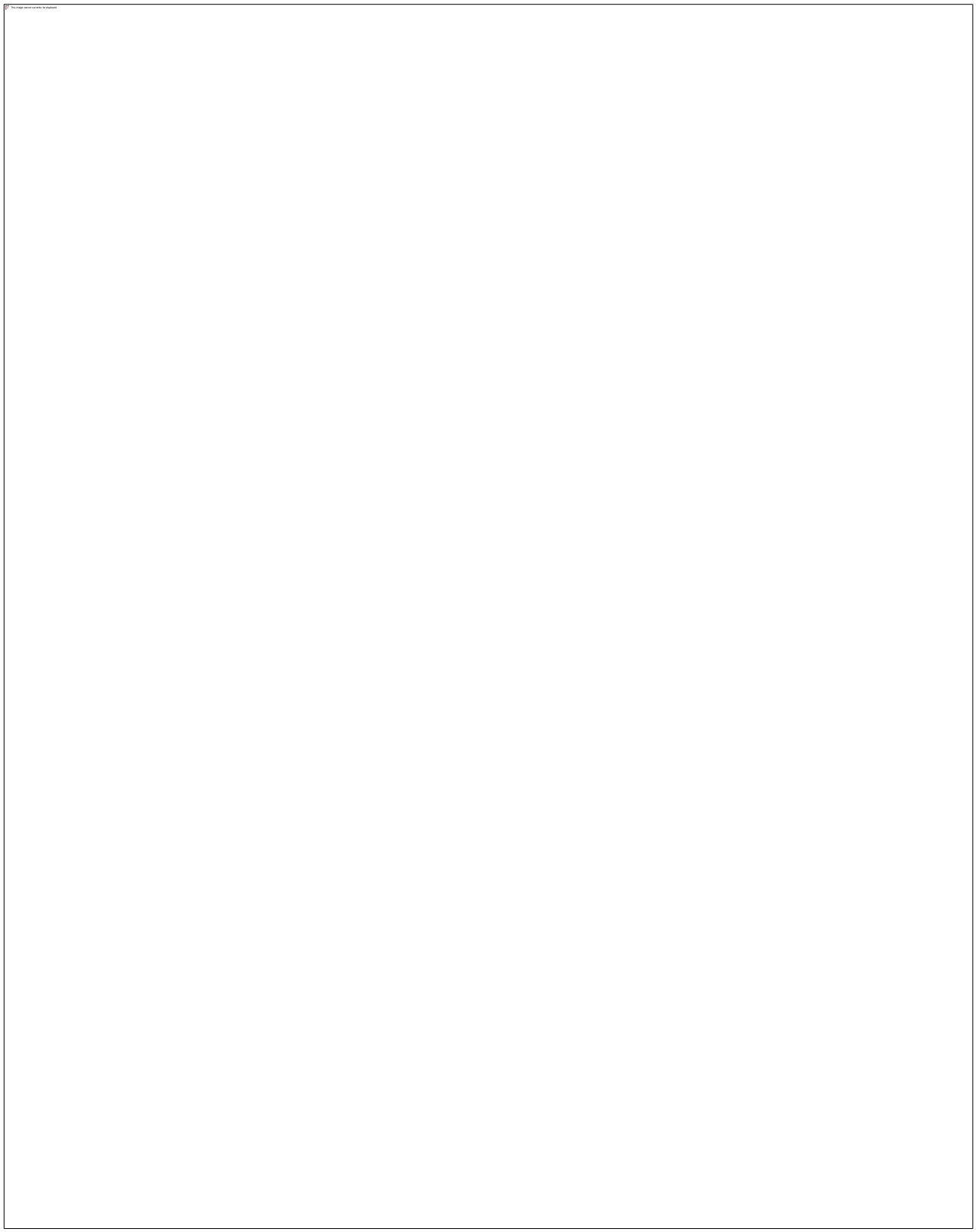
APPROVAL DATE: 31/05/2024
EXPIRATION DATE OF APPROVAL: 31/05/2025

**STUDY DESCRIPTION:**
**Purpose:**
The purpose of this observational cross-sectional study is to determine the prevalence of uncontrolled hypertension and associated factors among the elderly hypertensive patients attending outpatient clinics in Mbeya Regional Referral Hospital .

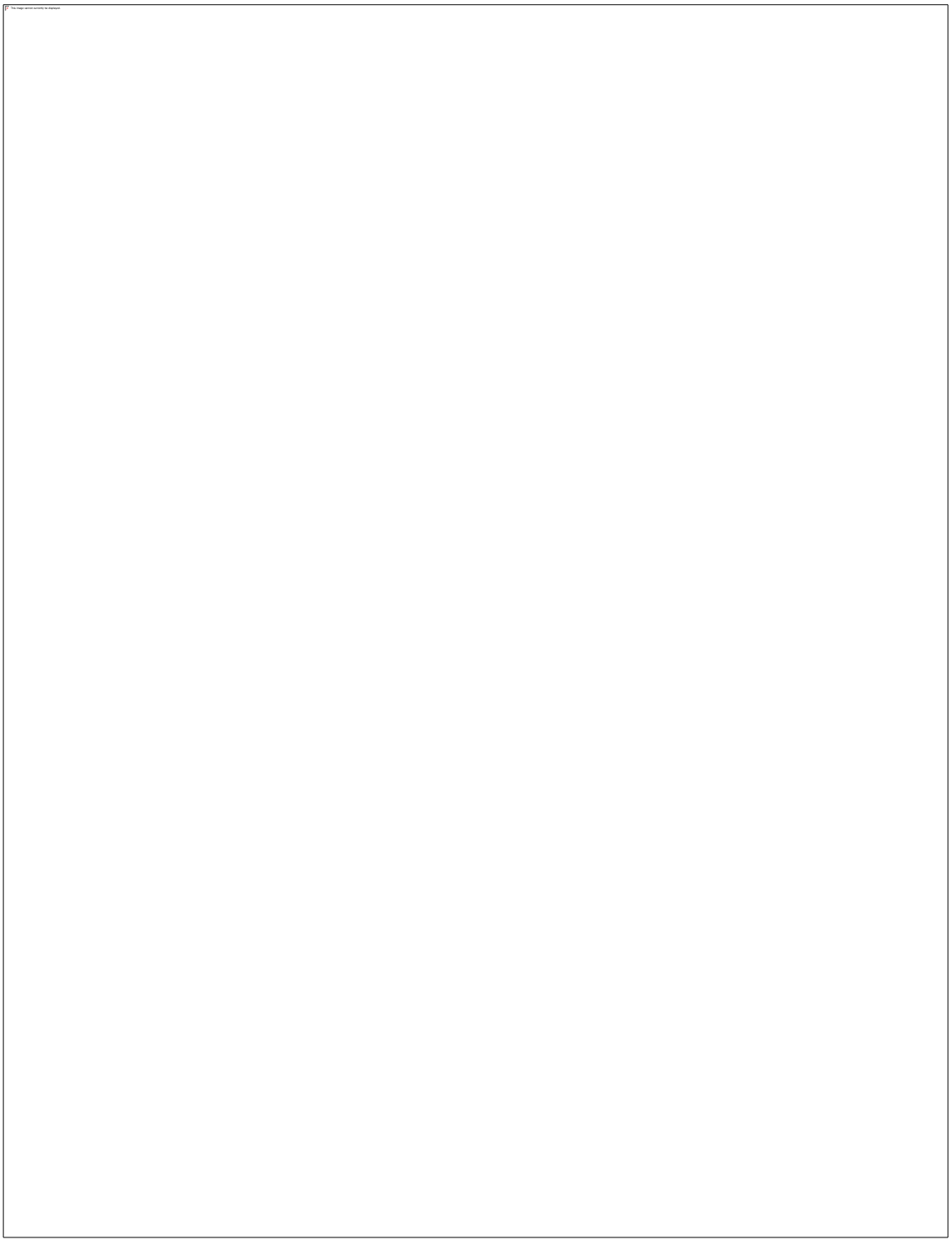
The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015444.pdf and in the MUHAS archives.


This image cannot currently be displayed.

## 8.6 Appendix 9: Permission letter for data collection



## 8.7 Appendix 4 : Receipt for anti-plagiarism



## 8.8 Appendix 6: Anti-plagiarism report

