FACTORS ASSOCIATED WITH HYPERTENSION CONTROL STATUS AMONG HYPERTENSIVE PATIENTS ATTENDING CLINIC AT AMANA REGIONAL REFERRAL HOSPITAL IN DAR ES SALAAM, TANZANIA.

Tunu Zablon Mdonya, (MD)

Master of Public Health

Muhimbili University of Health and Allied Sciences

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School of Public Health and Social Sciences

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Tunu Zablon Mdonya

A Dissertation Submitted in Partial Fulfillment of the Requirement for the Degree of Master of Public Health

Muhimbili University of Health and Allied Sciences

October, 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance by the Muhimbili University of Health and Allied Sciences a dissertation titled **'Factors Associated with Hypertension Control status among Hypertensive Patients attending Clinic at Amana Regional Referral Hospital in Dar es Salaam, Tanzania'** in partial fulfillment of the requirement for the degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

_____

Prof. Anna Tengia-Kessy

(Main Supervisor)

Date_____

_____

Mr. Suleiman Y. Chombo

(Co-Supervisor)

Date_____

DECLARATION AND COPYRIGHT

I, Tunu Zablon Mdonya, declare that this dissertation is my original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature_____ **Date** _____

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DEDICATION

I dedicate this dissertation to my beloved family whose unwavering love and support have been the driving force behind my academic pursuits. My son who has been my greatest source of strength, to my parents who instilled in me the value of education and hard work, my partner and siblings for their constant motivation and belief in my abilities.

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LIST OF ABBREVIATIONS AND ACRONYMS

APR	Adjusted Prevalence Ratio
BMI	Body Mass Index
BP	Blood Pressure
CI	Confidence Interval
HTN	Hypertension
IQR	Interquartile Range
MUHAS	Muhimbili University of Health and Allied Sciences.
NCDs	Non-Communicable Diseases
PR	Prevalence ratio
SDGs	Sustainable Development Goals
WHO	World Health Organization

DEFINITION OF KEY TERMS

Hypertension: WHO defines hypertension as a systolic blood pressure of 140mmHg or more, or a diastolic blood pressure of 90mmHg or more.

Controlled hypertension: The Seventh Joint National Committee (JNC-7) defines controlled hypertension as systolic blood pressure of <140mmHg and diastolic blood pressure of <90mmHg.

ABSTRACT

Background: Hypertension is a global public health concern it is estimated to affect approximately 1.39 billion people worldwide. Despite the presence of improved diagnostic choices for hypertension and antihypertensive drugs which have demonstrated benefits in lowering cardiovascular morbidity and mortality, the rates of blood pressure control remain significantly insufficient. This study aimed to determine the prevalence and factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam, Tanzania.

Methodology: A hospital based cross-sectional study was conducted involving 395 participants selected using systematic random sampling method. Data were collected using an interview form and were analyzed using Stata version 17. Modified Poisson regression model was used to identify factors associated with hypertension control status. In the bi-variable analysis, a p-value of < 0.2 was used as cut off point to select variables for multivariable modified Poisson regression so as to control for potential confounders. The Prevalence ratio (PR) with 95% confidence interval (CI) was used to identify factors associated with hypertension control status whereas a p-value < 0.05 was considered statistically significant.

Results: The median age of the respondents was 60 years [IQR 52-69] and 221 (55.9%) were females. 52.9% of participants had controlled hypertension and 47.1% had uncontrolled hypertension (95% CI: 42.2%-52.0%).Age 50-64 years (APR 0.61,95% CI 0.40-0.92;p=0.02), 65 years and above (APR 0.33, 95% CI 0.19-0.57; p=<0.001), male sex (APR 1.27,95% CI 1.01-1.60; p=0.039),college education and above (APR 1.34, 95% CI 1.02-1.75; p=0.03), Co-morbidities (APR 1.32, 95% CI, 1.06-1.66; p=0.015) and depression (APR 1.63, 95% CI:1.17-2.28; p=0.004) were significantly associated with uncontrolled hypertension.

Conclusion: The prevalence of uncontrolled hypertension is relatively high. Significant factors associated with hypertension control included age, male sex, college education and above, presence of co-morbidities and depression. More tailored programs focusing on managing hypertension are needed to enhance well-being of hypertensive patients.

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background

Hypertension is a global public health concern contributing significantly to high rates of disability, morbidity and mortality(1). It is estimated to affect approximately 1.39 billion people worldwide (2) with more than three-quarters of people suffering from hypertension residing in low- and middle-income countries. In Africa, the prevalence of hypertension is notably high, with a 33% rate across the continent and prevalence rates ranging from 30.0% to 31.1% in Sub-Saharan Africa(3). Tanzania, in particular, experiences a significant impact, with a prevalence rate of 29.3% (4).

Worldwide almost one billion individuals have uncontrolled hypertension with a proportion of 66.8% in developed and 61.6% in developing countries. Globally the prevalence of controlled hypertension is 21% (5) and in Sub Saharan Africa is 22.6% (6). In Tanzania studies have reported that proportion of hypertensive patients with controlled hypertension range from 20.6% to 29.9% (4,7).

Despite the presence of improved diagnostic choices for hypertension and antihypertensive drugs which have demonstrated benefits in lowering cardiovascular morbidity and mortality, the rates of blood pressure control remain significantly insufficient(8).Uncontrolled hypertension have threatening complications such as stroke, heart attack, kidney failure leading to premature death (1,8). Studies conducted in Iran, Kenya and Ethiopia shows that age, sex, non-adherence to antihypertensive medications, high salt intake, alcohol intake, smoking, overweight/obesity, physical inactivity, number of medications, disease duration and presence of comorbidities are among the major contributing factors to uncontrolled hypertension (5,8,9).

Increase in blood pressure (BP) by 20mmHg in systolic BP to > 115 mmHg or 10 mmHg increase in diastolic BP to > 75 mmHg doubles the risk of stroke, kidney and cardiovascular diseases (1,8). Cardiovascular disease is the leading cause of deaths in the world, causing about 17.3 million deaths per year which is expected to increase to more than 23.6 million by 2030 (10).

Prevention of hypertension complications depend on the recognition of the blood pressure control and accomplishment of solutions(11,12). It is important to attain proper control of high blood pressure among hypertensive patients so as to reduce cardiovascular disease risks and eliminate the associated burden of illness(13) .

Several antihypertensive agents are required so as to attain controlled hypertension especially elderly patients or those with comorbidities such as diabetes mellitus (DM) or stroke. All drugs are equally useful in controlling Hypertension and the goal of the treatment should be to maximize the reduction of cardiovascular diseases (CVD) (11). A combination of antihypertensive drugs and lifestyle modification have been recommended to control blood pressure in hypertensive patients(14).Non-adherence to pharmacological and non-pharmacological management of hypertension poses a significant threat to public health.

Standard treatment guideline for hypertension in Tanzania recommends both pharmacological treatment and non-pharmacological treatment. Non-pharmacological treatment for hypertension includes weight reduction, adoption of Dietary Approaches to Stop Hypertension (DASH), reduction of dietary sodium intake, physical activity, stop using all tobacco products and moderation of alcohol consumption.

Studies done in United Kingdom, Tanzania and United States reported that adherence to antihypertensive medications, physical activity, the number of medications, presence of comorbidities and level of income contribute to controlled hypertension (15–17).

In Tanzania the annual deaths related to non-communicable diseases including hypertension is still high. Identifying factors that affects blood pressure control is crucial so as to reduce uncontrolled hypertension among hypertensive patients. In Tanzania few studies have been done to assess the magnitude of hypertension control hence little is known about how well hypertensive patients control their blood pressure and factors associated with hypertension control status. This study aims to identify factors associated with hypertension uncontrolled hypertension among hypertensive patients in Dar es Salaam, Tanzania.

1.2 Problem statement

Hypertension control is a big problem with around one billion hypertensive individuals globally having uncontrolled hypertension (8). Globally, only 21% of all hypertensive patients have controlled hypertension (5). In Tanzania, the prevalence of controlled hypertension ranges from 20.6% to 29.9% (4,7). Studies have reported that uncontrolled hypertension can damage the heart, hardening the arteries and hence reducing blood flow to the heart that leads to chest pain, heart attack, heart failure and eventually death (1,10). Great socio-economic burden of uncontrolled hypertension exists on individuals and the society (18).

Factors like adherence to antihypertensive medications, physical activity, the number of medications, presence of comorbidities and level of income have been identified to contribute to hypertension control (15–17).

Tanzania has set strategies such as establishing integrated chronic care services at primary care levels and strengthening capacity of non-communicable diseases like hypertension at secondary and tertiary levels and conducting health promotion campaigns for reduction of harmful use of alcohol. Behavioral interventions like lifestyle modification which includes physical activity, stop use of tobacco and reducing sodium intake through programs such as Dietary Approaches to Stop Hypertension (DASH) have been designed to address hypertension control but the prevalence is still low. This is due to the rise of factors associated with hypertension control which necessitate further research.

Little is known on the extent of hypertension control among hypertensive patients in Tanzania. Identifying specific factors associated with controlling hypertension among patients can lead to reduction of uncontrolled hypertension and its related morbidities and mortalities. This will inform hospital management, clinicians and patients on areas of intervention to increase the magnitude of controlled hypertension and ultimately mitigate the burden of complications of uncontrolled hypertension.

1.3 Conceptual framework

This study was guided by a conceptual framework made from literatures reviewed and it comprises of clinical, behavioral and psychosocial factors; whereas the outcome variable was hypertension control status.

Behaviors like alcohol intake, physical inactivity, may predispose patients to have high body mass index (BMI) and comorbidities such as diabetes. Exposure to alcohol increased blood pressure potentially resulting in earlier onset of hypertension and longer duration of anti-hypertensive use.

Clinical factors such as comorbidities and high BMI can lead to depression and poor social support by increasing individuals' physical and emotional burden, and reducing their ability to cope effectively and impacting their quality of life.

Psychosocial factors such as social support and depression may have impact on blood pressure control. Behaviors like physical activities, salt diet intake, smoking and alcohol use have effect on BP hence have an impact on hypertension control status of hypertensive patients. Clinical factors such as comorbidities can complicate hypertension control but effective management of comorbidities results to controlled hypertension. Normal BMI reduce strain on cardiovascular system and improve hypertension control while high BMI may have negative effect on hypertension control. Also, number of antihypertensive medications have effect on hypertension control.

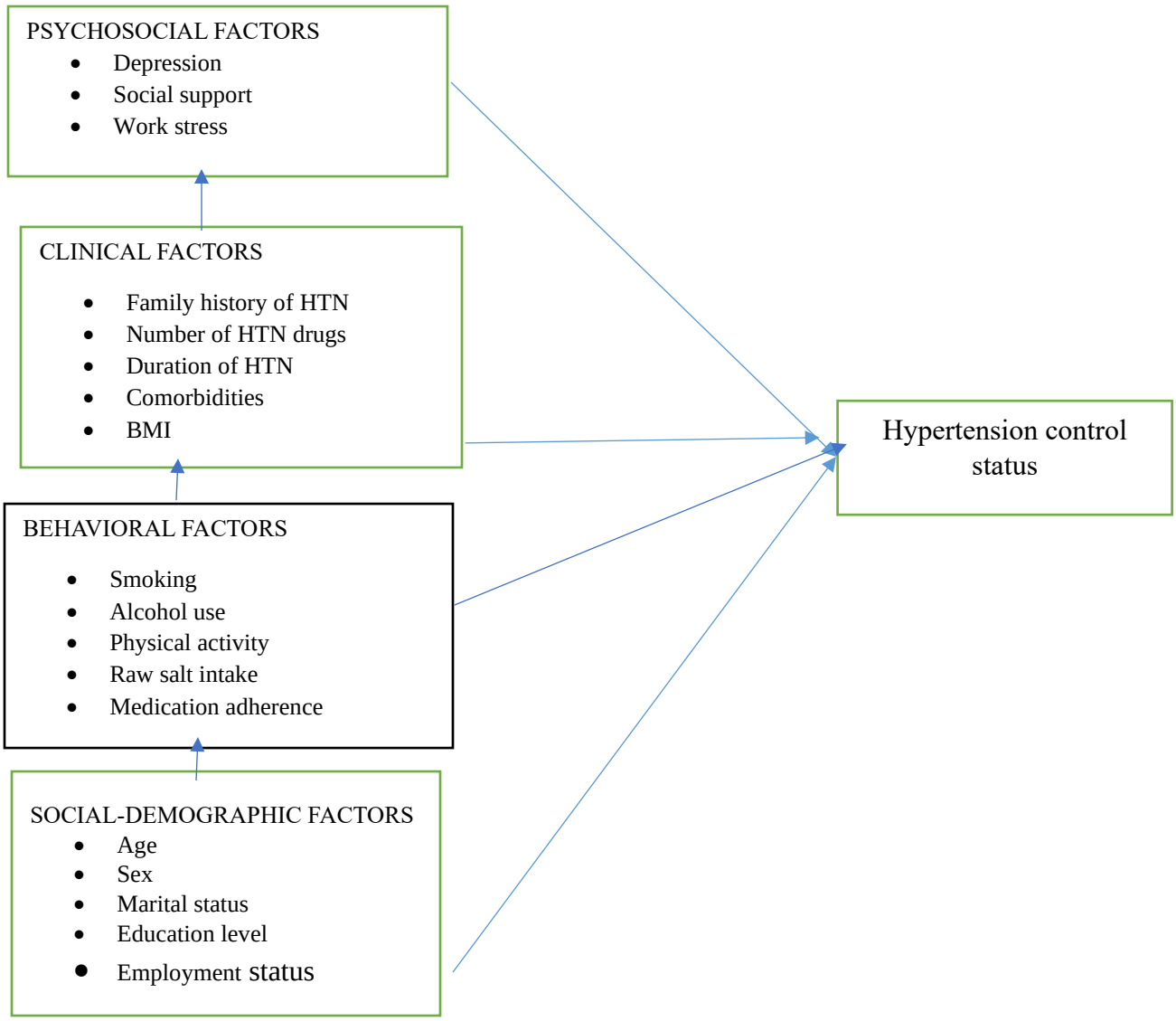


Figure 1: Conceptual framework of factors associated with hypertension control status (Source: Author's construction)

1.4 Rationale of the Study

This research helped to identify gaps in factors associated with hypertension control, a major public health concern contributing to significant number of complications. The findings from this study will be useful in development of targeted interventions and healthcare policies that are contextually relevant through addressing the root causes of poor hypertension control in Tanzania. The data will guide on the improvement of public health initiatives and effective strategies to achieve hypertension control. Results from this study can be used as a reference point by researchers and contribute to the ongoing advancement in understanding management and control of hypertension. Understanding factors associated with hypertension control will help in promoting healthy behaviors, preventing and reducing morbidities, disabilities and mortalities resulting from uncontrolled hypertension hence achieving the third Sustainable Development Goal (SDG 3) which aims to ensure healthy lives and promote well-being by 2030.

1.5 Research questions

1.5.1 Main Research Question

What is the prevalence and factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam?

1.5.2 Specific Research Questions

(i) What is the prevalence of uncontrolled hypertension among hypertensive patients attending clinic at Amana Regional Referral Hospital in Dar es Salaam?

(ii) What are the clinical factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam?

(iii) What are the behavioral factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam?

(iv) What are the psychosocial factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam?

1.6 Research Objectives

1.6.1 Broad Objective

To determine the prevalence and factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam.

1.6.2 Specific Research Objectives

(i) To determine the prevalence of uncontrolled hypertension among hypertensive patients attending clinic at Amana Regional Referral Hospital in Dar es Salaam.

(ii) To identify clinical factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam

(iii) To determine behavioral factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam.

(iv) To identify psychosocial factors associated with hypertension control status among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Hypertension control status.

Numerous research studies have explored the prevalence of controlled hypertension in various setting, providing insights into the magnitude of this problem. Both on a global and local level, the prevalence of controlled hypertension is still low whereby worldwide, only 21% of hypertensive patients have controlled hypertension (5). Around one billion individuals have uncontrolled hypertension globally (19). A study done in United Kingdom reported that 38.1% of hypertensive adults on treatment had controlled hypertension (15). Hypertension control is still a challenge in Sub-Saharan Africa where by there is a high pooled prevalence of 97% of uncontrolled hypertension (20) . Another study conducted in 12 middle and low income countries in sub-Saharan Africa indicates the prevalence of controlled hypertension to be 22.6% and 77.4% for uncontrolled hypertension (6) .

Analysis conducted in Low and Middle income countries reported that only 10% of individuals with hypertension on medication have controlled their blood pressure(21).A study done in West Africa reported the rate of hypertension to be less than 10% in Benin and Ghana with exception of Nigeria which had control rate of 30% (22).In East Africa the magnitude of uncontrolled hypertension is high as in many other countries, study conducted in Rwanda reported that the prevalence of uncontrolled hypertension was 62.2% (23).

The situation is not different from Tanzania where by a proportion 29.9% of hypertensive patients on medications have controlled hypertension (4).Another study done in mafia island in Tanzania reported a low prevalence of controlled hypertension among adults taking anti-hypertensive which is 20.6% (7).The extent hypertension control among hypertensive patients is not well known since many studies in Tanzania focuses on the magnitude of hypertension. This study will provide the magnitude of controlled hypertension among hypertensive patients on anti-hypertensive medications along with its associated factors.

2.2 Psychosocial factors and hypertension control.

Literature shows that psychosocial factors have important role in development of hypertension. Psychosocial factors leading to emotional stress can bring about a physiological response which when activated repeatedly can result into failing to control BP levels (24) . Adults with chronic illnesses such as hypertension have high levels of depression and anxiety which may have an effect on their quality of life. Meta-analyses studies report that emotional states such as depressive and anxiety symptoms are among the independent risk factors of hypertension in the society(25,26).

Study done in China reported that depression is a significant predictor of uncontrolled hypertension (27).This is in contrast with findings from study done in United Kingdom which shows that depression is significantly associated with controlled hypertension (15).

Having good social relationships among individuals act as sources of emotional and informational support. The positive aspects of social ties enhance health leading to reduction of negative effects of stressful experiences on health by enabling people to cope with stress. All these affects the control of hypertension (25,26). A study done in United States shows that social integration and emotional support safeguard the effects of low socio-economic status on hypertension (28).However, many studies done have focused on association between psychosocial factors and hypertension. This study aims to identify the association between psychosocial factors and hypertension control among hypertensive patients on treatment.

2.3 Clinical factors and hypertension control.

Clinical related characteristics of hypertensive patients play important role on blood pressure control. Research has consistently identified clinical factors as contributors to uncontrolled hypertension. Clinical factors such as Body Mass Index (BMI), number of anti-hypertensive medications, comorbidities such as diabetes and chronic kidney disease have shown significant association with uncontrolled hypertension.

A study done in Palestine reported that individuals using one anti-hypertensive drug were found to have decreased risk of controlled hypertension and that only 31% of the patients using one drug to lower their blood pressure attained the targeted blood pressure and 69% of the patients using one anti-hypertensive drug had uncontrolled hypertension(13).However studies done in Ethiopia found no significant association between number of antihypertensive drugs used and hypertension control (1,8,11).

Literature shows that higher BMI have negative effect in hypertension control. Study done in Ethiopia have reported that overweight as significant predictor of uncontrolled hypertension whereby overweight patients whereby among 25.6% patients who had overweight 20% had uncontrolled hypertension (8).Another study in Ethiopia reported that the chance of having poor hypertension control is two times more in patients with higher BMI than those with normal BMI (11). Similar results were reported by a study done in Palestine showing high BMI was significantly associated with uncontrolled hypertension.70.9% of obese patients and 61.7% of patients with overweight had uncontrolled hypertension (13).In contrast studies done in Ethiopia(1) and Iran (5) found no significant association between BMI and uncontrolled hypertension.

Hypertensive patients who have other chronic illness have poor blood pressure control. Studies show that comorbidities like diabetes and chronic kidney disease is significantly associated with uncontrolled hypertension. Studies done in Asia shows that comorbidity is a significant predictor of uncontrolled hypertension. A study done in Palestine reported that 69.2% of diabetic patient had uncontrolled hypertension. This is in line with study conducted in Iran which showed that 73.7% of patients with diabetes and 56.0% of patients with CKD had uncontrolled hypertension (5).

Studies in Ethiopia shows that individuals with comorbidities like Diabetes and chronic kidney disease have been reported to have poor blood pressure control hence more likely to have uncontrolled hypertension. Findings of study in Eastern Ethiopia reported that more than half (64.3%) of patients with comorbidities had uncontrolled hypertension(1). Another study in

Ethiopia reported that out of 50.3% with comorbidities 31.6% had uncontrolled hypertension. The findings are the same as of the study done in Iran(5) and in Palestine where 69.2% of diabetic patients had uncontrolled hypertension(13).

In contrast a study done in United Kingdom reported that comorbidities among hypertensive patients were strongly associated with controlled hypertension(15).However other studies reports that comorbidities is not a significant predictor of uncontrolled hypertension (11,19). Further research is needed to identify the clinical factors associated with hypertension control.

2.4 Behavioral factors and hypertension control

Behaviors play a pivotal role in hypertension control. Literature underscores the association between behaviors like smoking, excessive alcohol intake, high salt intake, physical activity, medication adherence and hypertension control emphasizing the importance of behavioral modification in treatment strategies (1,11,13,19).

Physical activities make the heart to pump more blood with minimal exertion. Physical activity lowers high blood pressure by boosting renal function, lowering body weight and systemic vascular resistance. Studies reports that physical activity have a positive effect in controlling blood pressure among hypertensive patients (29).A study in Ethiopia reported that physically inactive patient had increased risk of uncontrolled hypertension compared to those who were physically active whereby more than half of hypertensive patients who were physically inactive (55.9%) had uncontrolled hypertension (1). Similar results were reported in other studies conducted in Ethiopia that being physically inactive is an independent predictor of uncontrolled hypertension (11,19).

Studies reveal that alcohol is a predictor of hypertension, hence alcohol intake against the recommended quantity among hypertensive patients burdensome hypertension control(8). Study done in Ethiopia among adult hypertensive patients reported that non abstinence to alcohol intake was significant associated with uncontrolled hypertension, out of 32.8% who did not adhere to alcohol abstinence22.5% had uncontrolled hypertension (8). Similar finding was reported in study done at a screening campaign in rural Rwanda(23).

Smoking is another factor that have been identified as significant predictor of uncontrolled hypertension. Study done in Palestine showed that 75.4% of hypertensive patients who smoke had uncontrolled hypertension which is high compared to 56.9% among non-smokers (13). Similar findings were reported in Rwanda (23).

High salt intake has been reported to be associated with uncontrolled hypertension. Researches done to identify factors associated with uncontrolled hypertension have reported that high salt intake is an independent predictor of uncontrolled hypertension, a study done in Ethiopia found that hypertensive patients who added table salt on their food were at higher risk of having uncontrolled hypertension (11).Similar results were reported by a study done in Northern Ethiopia which reported that 53.3% of patients who did not adhere to low salt diet had uncontrolled hypertension (19).More research is needed to determine relationship between behaviors and controlled hypertension.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Study design

A hospital-based analytical cross-sectional study design was used. This design provided a snapshot of a population at a specific moment. It allowed to measure the relationships between the study variables.

3. 2 Study area

The study was conducted at Amana Regional Referral Hospital in Dar es Salaam region. According to the 2022 population and housing census, Dar es Salaam is a highly populated region and has a total of about 5.4 million people. It has five administrative district councils which are Ubungo, Kigamboni, Temeke, Kinondoni and Ilala municipal councils. Amana Regional Referral hospital was chosen as a study area because it is located in Ilala Municipal council which has the highest population (1,649,912) compared to the other municipal councils in Dar es Salaam region. The hospital serves a diverse population, the diversity provides comprehensive insights into hypertension control status and its associated factors. Also, the hospital serves a dense urban population and previous studies have shown high prevalence of hypertension in urban areas like Dar es Salaam, making Amana Regional Referral Hospital a relevant site for research. According to the data office the hospital attends approximately 3,000 patients with non-communicable diseases per month and hypertension clinic attends approximately 60- 80 patients per day.

3. 3 Study population

The study included adults 18 years and above, diagnosed with hypertension and on anti-hypertensive drugs attending clinic at Amana Regional Referral Hospital from 17 May 2024 to 18 June 2024.

3.3.1 Inclusion criteria

All adults 18 years and above on anti-hypertensive treatment for at least one month and attending HTN clinic for follow up visits during the study period.

3.3.2 Exclusion criteria

Pregnant women with hypertension as well as hypertensive patients admitted in the wards during the time of this survey were not recruited into the study. Pregnant women were excluded because they have pregnancy induced hypertension which requires different management strategies than those used for chronic hypertension in non-pregnant individuals.

3.4 Sample size and sampling procedure

3.4.1 Sample size determination

The sample size was determined by using a single proportion formula by Fisher(8)

$$n = z^2p(100-p)/e^2$$

Whereby,

Z = the standard normal deviation for 95% confidence level, 1.96.

p = 37.2% the magnitude of uncontrolled hypertension among hypertensive patients documented in a study by Galson SW et al (30) .

e = 5%, the margin error to be tolerated

n is the sample size required in the study

Hence, $n=1.96^2x37.2 \times (100-37.2)/5^2$

Therefore: n=359 participants

Adjusting for 10% non-response

N= n+ (n *non respondent rate)

N=359 + (359* 0.1)

N=395

The minimum sample size after adjusting for non-respondent rate was 395 participants.

3.4.2 Sampling procedure and technique

Systematic random sampling technique was used to select study participants. Participants were identified and recruited at the hypertension clinic and interview was done at the exit point. The clinic attends 700 patients in one month with two doctor's room and on average 350 hypertensive patients are attended in one doctor's room within one month. The sample size for the study was 395 participants, since there were two rooms the sample size was divided by two to get the sample size needed from each doctor's room. Therefore 197 participants were recruited from the first doctor's room and 198 participants were recruited from the second doctor's room. To get sampling interval from each doctor's room 350 was divided by 197 participants of the first doctor's room (400/197=1.8~2) and for the second doctor's room 350 was divided by 198 participants (400/198=1.8~2). The sampling interval (k) for both rooms was two. The first participant was selected randomly among the first two patients and from there patients were enrolled after every one patient coming out of each doctor's room. Each research assistant was recruiting participants from one doctor's room. An average of 30 participants were recruited per day.

3.5 Study variables and their measurements

The dependent variable in this study was hypertension control status which was categorized into controlled hypertension and uncontrolled hypertension. Blood pressure (BP) was measured using a digital BP machine. The recorded BP measured by a nurse before patient entered the doctor's room was used for analysis. Controlled hypertension was defined as systolic BP of <140mmHg and diastolic BP of <90mmHg (15,16). Uncontrolled hypertension was defined as systolic BP of ≥140mmHg and or diastolic BP of ≥90mmHg (8).

The independent variables were grouped into four groups. Socio-demographic variables (age, sex, marital status, level of education, employment status); psychosocial variables (depression, and social support); clinical variables (duration of HTN, family history of hypertension, number of HTN drugs, comorbidities and Body Mass Index); and behavioral variables (physical activity, salt intake, alcohol consumption and smoking).

Anthropometric measurements, specifically height and weight were measured. The height was measured to the nearest 0.1cm using a portable stadiometer. Participants were asked to stand up-right without shoes while putting their heels together, their back against the wall and eyes on forward direction. Weight was measured to the nearest 0.1kg using digital weighing scale positioned on a flat ground while ensuring wearing of light clothes and no shoes. Body Mass Index (BMI) was calculated by taking weight in kg divided by height in meters squared(kg/m^2). BMI was categorized as follows: Underweight (BMI <18.5kg/m^2) Normal (BMI 18.5-24.9 kg/m^2), Overweight (BMI 25-29.9kg/m^2) and Obese (BMI 30$kg/m^2$and above) (8,11). The portable stadiometer and weighing scale were calibrated by biomedical engineer and documented on 30 April 2024.

Duration of hypertension was measured from the time when a participant was diagnosed with hypertension and started on medications.

Study participants were also asked of any family history of hypertension, number of drugs they take to lower their BP which were grouped into 3 groups: - one drug, two drugs and three drugs or more.

Co-morbidities: Participants were asked apart from having hypertension whether they have diabetes, kidney diseases or have had a stroke to assess comorbidities.

Smoking: Smoking was assessed by asking whether the patients smoked or took a puff in the last seven days. Patients will be regarded as smokers if they had smoked or taken one puff in the last seven days (1,8).

Alcohol intake: Participants who reported not to have taken any alcohol in the past seven days or they don't drink alcohol at all were classified as abstainers. Respondents who reported otherwise were classified as non-abstainers (8)

Physical activity: This was assessed by 2 items: - 1. “For the last seven days how, many days did you do at least 30 minutes total physical activity?” and 2. “For the last seven days how many days did you do a specific exercise activity (such as biking or swimming) other than what you do around the house or as part of your work?”. For each day if participant had activity or exercise the score was one and if not, the score was zero for both items, responses from two items were summed (range 0–14). Participants who scored ≥8 were classified as adherent to physical activity(1,8).

Raw salt intake: Use of raw salt was established by asking patient if they usually use raw table salt on food.

Depression was measured using Patient Health Questionnaire- (PHQ-9) to screen whether the study participants were depressed or not. The scores are from 0 (not at all) to 3 (nearly every day), having 9 questions leading to a score ranging from 0 to 27. Categories included minimal depression (1-4), mild depression (5-9), moderate depression (10-14), mild severe depression (15-19) and 20-27 severe depression. In this study participants with score of 10 and above were considered to have depression.

Social support was measured using Oslo Social Support Scale (OSSS-3) which has three items. The first item that asks for number of close confidants is rated on a 4-point Likert-type scale ranging from 1- 4. The second and the third items asking about sense of concern from other people and relationship with neighbors are rated on a 5-point Likert-type scale ranging from 1-5. The sum score ranges from 3-14. Score 12-14 implies strong social support, 9-11 moderate social support and 3-8 poor social support.

3.6 Data collection tools and methods

3.6.1 Data collection tools

Data was collected using a semi-structured interview form. The form aimed to gather quantitative data on factors associated with hypertension control status among hypertensive patients attending clinic at Amana Regional Referral Hospital. The questions were developed following research objectives, from literature review and validated scales including the Patient Health Questionnaire-9 and Oslo Social Support Scale-3 and then modified for the study's context. The interview form consisted of 16 items divided into four sections which were socio-demographic information, clinical characteristics, behavioral and psychosocial characteristics of participants. The semi-structured interview form was written in English and translated to Swahili so as to facilitate the process of data collection.

3.6.2 Recruitment and training of research assistants

This study involved the principal researcher and two research assistants. The research assistants were trained for three days and the training involved familiarizing them with the research, including the topic, objectives, and the interview form. The training involved interactive discussions of the necessary skills required for research.

3.6.3 Pretesting of data collection tool

The research assistants were involved in the pretesting of the tools. The semi-structured interview form was pretested at Kibaha District hospital two weeks before data collection. The purpose of pretesting was to ascertain the tool's capability to collect the required information and its suitability to the targeted population. The information was used to rectify the final interview form

3.6.4 Data Collection method

The participants were approached at the hypertension clinic and recruitment was done while patients were walking out of the doctor's room. Participants were kindly asked for a consent to participate in the study. The objectives of the study were explained to the participants and a written consent was obtain prior to the interview. Interviews were conducted in special rooms, privacy and confidentiality were highly maintained. Interviews were done during the three days of the week, Tuesday, Wednesday and Friday during the clinic hours. Each interview took about five to seven minutes. Weight was measured by a nurse before the patient has entered doctor's room and height was measured by the research assistant before the interview. The principal investigator and two trained research assistants collected the data. To ensure good data quality during data collection, the research assistants were trained, continuous follow up and supervision was made by the principal investigator throughout the data collection period. Collected data was reviewed and checked daily for completeness and consistency at the spot during data collection time.

3.7 Reliability and Validity test

The Cronbach's alpha coefficient for the interview form was 0.80 indicating a good reliability of the tool.

Validity was ensured by conducting thorough literature review and experts were consulted to confirm that the semi-structured interview form covered all relevant aspects of the study. A panel of two experts reviewed the questions and provided feedback which was incorporated into the final version of the semi-structured interview form.

3.8 Data analysis

Data was entered, processed and analyzed using Stata version 17. Data was cleaned, variables were created and categorized. Descriptive statistics were summarized in frequency and proportions for categorical variables, continuous variables were summarized using median and Interquartile range. Since the outcome was common with prevalence of 47.1%, the Modified Poisson regression model with robust estimator was used to determine association between

explanatory variables and hypertension control status. In the bi-variable Modified Poisson regression model variables with a p-value of less than 0.2 were selected for multivariable regression to control for potential confounders. The Prevalence ratio (PR) with 95% confidence interval (CI) was used to identify factors associated with hypertension control. A p-value less than 0.05 was regarded as statistically significant.

3.9 Ethical issues

Ethical clearance of the study was obtained from the MUHAS Institutional Review Board (IRB). Permission to conduct the study was given by the Medical Officer In charge of Amana Regional Referral Hospital. Participants were given a brief description of the study and a written consent form was provided to the participant before participating in the study. They were given assurance on confidentiality issues regarding the information they shared in the interview form. Names of the study participants were not used to identify them. Participation was voluntary and no incentives were given to the study respondents.

3.10 Dissemination

This dissertation will be made available online at the MUHAS library in electronic form. Hard copies will be given to the MUHAS School of Public Health and Social Sciences. Another copy will be given to Amana Regional Referral Hospital, also a manuscript will be developed for publication in a peer reviewed journal for wider dissemination of the findings.

CHAPTER FOUR

4.0 RESULTS

This chapter presents the findings of this study based on the analysis of the collected data. The response rate was 100%. Descriptive statistics are provided first to summarize the main characteristics of the sample, followed by inferential statistics to determine the relationships between the variables. Key findings are highlighted and relevant Tables and Figures are included to support the presentation of data.

4.1 Sociodemographic characteristics of the respondents

A total of 395 respondents were enrolled in this study. The median age was 60 years [IQR, 52-69], 56.2% of the respondents were aged between 50-64 years and above (n=222), more than half of the respondents were females (n=221, 55.9%) and more than three-quarters reported to be married (n=304, 76.9%). One-third of participants had primary education (n=138, 34.9%) (Table 1).

Table 1: Sociodemographic characteristics of the respondents

Variable	Frequency (n)	Percentage (%)
Age [median, IQR]	60 (52-69)	
20-34 years	20	5.1
35-49 years	58	14.7
50-64 years	222	56.2
65 years and above	95	24.0
Sex		
Female	221	55.9
Male	174	44.1
Marital status		
Single	4	1.0
Married	304	76.9
Divorce	9	2.3
Widowed	78	19.8
Education level		
No formal education	94	23.8
Primary level	138	34.9
Secondary level	97	24.6
College and above	66	16.7
Employment status		
No employment	145	36.7
Employed	60	15.2
Self-employed	153	38.7
Retired	37	9.4

4.2 Status of Hypertension control among surveyed respondents

Almost half of the surveyed respondents had uncontrolled hypertension (n=186, 47.1%, 95% CI: 42.2%-52.0%) (Figure 2).

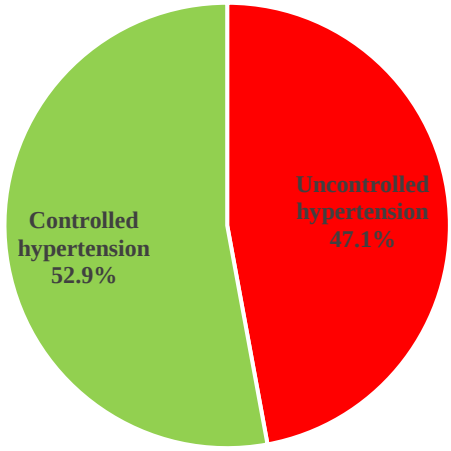


Figure 2: Hypertension Control Status of the respondents

4.3 Clinical Characteristics of the respondents

Regarding clinical characteristics, 46.3% (n=183) reported to have history of hypertension in the family, 60.5 % (n=239) had hypertension for one to three years. 48.1% (n=190) reported to use two antihypertensive drugs while 36.5% (n=144) had chronic illnesses other than hypertension, and only 39.8% (n=157) had normal body mass index (Table 2)

Table 2: Clinical Characteristics of the respondents

Variable	Frequency (n)	Percentage (%)
Family history of hypertension		
No	212	53.7
Yes	183	46.3
Duration of hypertension [Median month, IQR]	24 (8-63)	
1-3 years	239	60.5
4-6 years	62	15.7
7-9 years	33	8.4
More than 10 years	61	15.4
Number of antihypertensive drugs		
One	120	30.4
Two	190	48.1
Three or more	85	21.5
Comorbidity		
No	251	63.5
Yes	144	36.5
Types of co-morbidities		
Diabetes mellitus	24	16.7
Stroke	29	20.1
Kidney diseases	43	29.9
Other	48	33.3
Body Mass Index (BMI)		
Underweight	11	2.8
Normal	157	39.7
Overweight	144	36.5
Obesity	83	21.0
Blood pressure		
Systolic [Median, IQR]	136 (130-152)	
Diastolic [Median, IQR]	80 (74-89)	

4.4 Behavioral characteristics of the respondents

More than half of the respondents did not engage themselves in physical activity (n=208, 52.7%), 13.4% (n=53,) reported to smoke, and 36 of them (9.1%) reported to consume alcohol in the past seven days prior to the survey. About half of the participants (n=198, 50.1%) affirmed to never add table salt to a meal (Table 3).

Table 3: Behavioral characteristics of the respondents

Variable	Frequency (n)	Percentage (%)
Physical activity		
No	208	52.7
Yes	187	47.3
Smoking		
No	342	86.6
Yes	53	13.4
Alcohol intake		
No	359	90.9
Yes	36	9.1
Raw table salt		
Never	198	50.1
Rarely	150	38.0
Occasionally	39	9.9
Often	8	2.0

4.5 Psychosocial characteristics of the respondents

Among the respondents 31.9% (n=126) had strong social support, more than half had moderate social support (n=233, 56.5%) and 11.6% (n=46) had poor social support. In addition (n=16, 4.1%) had depression (Table 4).

Table 4: Psychosocial Characteristics of the Respondents

Variable	Frequency	Percentage (%)
Social support		
Poor	46	11.6
Moderate	223	56.5
Strong	126	31.9
Depression		
No	379	95.9
Yes	16	4.1

4.6 Bivariate analysis of factors associated with uncontrolled hypertension.

A significant association was established between age and uncontrolled hypertension, i.e. hypertensive patients with 65 years and above had 0.42 times risk (95% CI 0.26-0.69; p=0.001) of having uncontrolled hypertension as compared to their counterparts. Males had 1.27 times risk (95% CI: 1.03-1.56; p=0.024) of having uncontrolled hypertension as compared to females. Individuals with secondary education had 2.12 times risk (95% CI 1.55- 2.92; p=<0.001) of having uncontrolled hypertension as well as individuals with college education and above had 1.47 times risk (95% CI 1.00- 2.15; p=0.045) of having uncontrolled hypertension as compared to their counterparts. Individuals who are self-employed had 1.32 times risks (95% CI 1.04-1.67; p=0.020) of having uncontrolled hypertension and those who are employed had 1.43 times risk (95% CI 1.08-1.90; p=0.014) of having uncontrolled hypertension as compared to those who are not employed. Participants who use three or more antihypertensive drugs had 1.68 times risk (95% CI 1.28-2.18; p=<0.001) as compared to those who use two or one antihypertensive drug. Individuals with co-morbidities had 1.82 times risk of having uncontrolled hypertension

as compared to individuals with no co-morbidities (95% CI: 1.49-2.23; p= <0.001). Participants with overweight had 1.50 times risk (95% CI 1.17-1.93; p=0.001) of having uncontrolled hypertension as well as those with obesity had 1.47 times risk (95% CI 1.10-1.95; p=0.008) of having uncontrolled hypertension as compared to their counterparts. Participants who were physically inactive had 1.36 times risk (95% CI 1.09-1.69; p =0.006) of having uncontrolled hypertension as compared to their counterparts. Participants with depression had 1.93 times risks (95% CI: 1.55-2.39: p= <0.001) of having uncontrolled hypertension compared to individuals without depression (Table 5).

Table 5: Bivariate analysis of factors associated with uncontrolled hypertension.

Variable	Hypertension status		PR, 95% CI	p-value
	Controlled	Uncontrolled		
Sociodemographic characteristics				
Age				
20-34 years	8(40.0)	12(60.0)	1	
35-49 years	23(39.7)	35(60.3)	1.01, 0.66-1.52	0.978
50-64 years	107(48.2)	115(51.8)	0.86, 0.59-1.26	0.449
65 years and above	71(74.7)	24(25.3)	0.42, 0.26-0.69	**0.001**
Sex				
Female	128(57.9)	93(42.1)	1	
Male	81(46.6)	93(53.4)	1.27, 1.03-1.56	**0.024**
Marital status				
Single	54(59.3)	37(40.7)	1	
Married	155(51.0)	149(49.0)	1.20, 0.92-1.58	0.181
Education level				
No formal education	63(67.0)	31(33.0)	1	
Primary level	83(60.1)	55(39.9)	1.21,0.85-1.72	0.294
Secondary level	29(29.9)	68(70.1)	2.12, 1.55-2.92	**<0.001**
College and above	34(51.5)	32(48.5)	1.47, 1.00-2.15	**0.047**
Employment status				
Not employed	110(60.4)	72(39.5)	1	
Self-employed	73(47.7)	80(52.3)	1.32, 1.04-1.67	**0.020**
Employed	26(43.3)	34(56.7)	1.43, 1.08-1.90	**0.014**
Clinical characteristics				
Number of antihypertensive drugs				
One	72(60.0)	48(40.0)	1	
Two	109(57.4)	81(42.6)	1.06, 0.81-1.40	0.649

Variable	Hypertension status		PR, 95% CI	p-value
	Controlled	Uncontrolled		
Three or more	28(32.9)	57(67.1)	1.68, 1.28-2.18	**<0.001**
Co-morbidity				
No	160(63.8)	91(36.2)	1	
Yes	49(34.0)	95(66.0)	1.82, 1.49-2.23	**<0.001**
Body Mass Index (BMI)				
Normal	99(63.1)	58(36.9)	1	
Underweight	8(72.7)	3(27.3)	0.74, 0.27-1.98	0.547
Overweight	64(44.4)	80(55.6)	1.50, 1.17-1.93	**0.001**
Obesity	38(45.8)	45(54.2)	1.47, 1.10-1.95	**0.008**
Behavioural characteristics				
Physical activity				
Yes	113(60.4)	74(39.6)	1	
No	96(46.2)	112(53.9)	1.36, 1.09-1.69	**0.006**
Smoking				
No	182(53.2)	160(46.8)	1	
Yes	27(50.9)	26(49.1)	1.04, 0.78-1.41	0.754
Alcohol intake				
No	194(54.0)	165(46.0)	1	
Yes	15(41.7)	21(58.3)	1.27, 0.94-1.71	0.117
Raw table salt				
No	114(57.6)	84(42.4)	1	
Yes	95(48.2)	102(51.8)	1.22, 0.99-1.51	0.064
Psychosocial characteristics				
Social Support				
Poor	28(60.9)	18(39.1)	1	
Moderate	118(52.9)	105(47.1)	1.20, 0.82-1.77	0.348
Strong	63(50.0)	63(50.0)	1.28, 0.85-1.91	0.231
Depression				
No	207(54.6)	172(45.4)	1	
Yes	2(12.5)	14(87.5)	1.93, 1.55-2.39	**<0.001**

4.7 Multivariable analysis of the factors associated with Uncontrolled hypertension.

During multivariable analysis on the factors associated with uncontrolled hypertension, the findings indicated that participants with 50-64 years had 0.61 times risk (95% CI 0.40-0.92; p=0.020) of having uncontrolled hypertension as well as those with 65 years and above had 0.33 times risk (95% CI 0.19-0.57; p=<0.001) as compared to their counterparts. Males had 1.27 times risk (95% CI 1.01-1.60; p= 0.039) of having uncontrolled hypertension as compared to females. Participants with college education and above had 1.34 times risk (95% CI 1.02-1.75; p=0.030) of having uncontrolled hypertension as compared to those without college education. Individuals with comorbidities had a 1.32 times risk of having uncontrolled hypertension as compared to those without comorbidities (95% CI: 1.06-1.66; p=0.015). Likewise, participants with depression had a 1.63 times risk (95% CI: 1.17-2.28; p=0.009) of having uncontrolled hypertension as compared to their counterparts. (Table 6).

Table 6: Multivariable analysis of factors associated with Uncontrolled hypertension

Variable	APR, 95% CI	p-value
Sociodemographic characteristics		
Age		
20-34 years	1	
35-49 years	0.69, 0.44-1.07	0.094
50-64 years	0.61, 0.40-0.92	**0.020**
65 years and above	0.33, 0.19-0.57	**<0.001**
Sex		
Female	1	
Male	1.27, 1.01-1.60	**0.039**
Marital status		
Single	1	
Married	0.76, 0.58-1.01	0.059
Education level		
No formal education	1	
Primary level	0.93, 0.64-1.34	0.688
Secondary level	0.93, 0.67-1.29	0.667
College and above	1.34, 1.02-1.75	**0.030**
Employment status		
Not employed	1	
Self-employed	1.01, 0.81-1.26	0.903
Employed	1.02, 0.74-1.40	0.899

Variable	APR, 95% CI	p-value
Clinical characteristics		
Number of antihypertensive drugs		
One	1	
Two	0.97, 0.73-1.29	0.831
Three or more	1.38, 0.99-1.89	0.050
Co-morbidity		
No	1	
Yes	1.32, 1.06-1.66	**0.015**
Body Mass Index (BMI)		
Normal	1	
Underweight	0.58, 0.19-1.78	0.336
Overweight	1.29, 0.99-1.68	0.052
Obesity	1.26, 0.93-1.69	0.128
Behavioural characteristics		
Physical activity		
Yes	1	
No	1.15, 0.92-1.45	0.219
Alcohol intake		
No	1	
Yes	0.96, 0.72-1.28	0.794
Raw table salt		
No	1	
Yes	1.17, 0.92-1.49	0.189
Psychosocial characteristics		
Depression		
No	1	
Yes	1.63, 1.17-2.28	**0.004**

CHAPTER FIVE

5.0 DISCUSSION

In this study the overall magnitude of uncontrolled hypertension was found to be 47.1% (95% CI, 42.2%-52.0%). The study findings are consistent with the previous studies conducted in Brazil (46.4%) (31), Kenya (48%) (9),Eastern Ethiopia (48%) (1), (48.6%) in Northern Ethiopia (19), Jimma University Hospital (52.7%) (32), Ayder comprehensive specialized hospital in Ethiopia (52.5%) (8) and South India (47%)(33).

However, it was higher than studies done in Chile (36.9%)(34), Thailand (24.6) (35), Israel (35.9%) (36) and Sudan (34%)(37). The discrepancy could be due to sociocultural and behavioral variations within the studied population, as well as differences in the healthcare services available in the settings where the study was conducted.

Moreover, the magnitude of uncontrolled hypertension in this study was lower than several studies conducted in Palestina (62%) (13), Morocco (73%) (38) Southeast Ethiopia (82.5%)(39), Zimbabwe (67.2%) (40), Iran 61.7% (5), Rwanda (62.2%) (23), Dodoma Tanzania (58.3%)(41), Dar es Salaam (92%) (42), Northern Tanzania (95.3%) (43) and Mafia (79.4%) (7). The inconsistency observed could be attributable to difference in operational definition of uncontrolled hypertension. But also, differences in adherence to smoking and alcohol abstinence among the study participants may be reasons for the observed inconsistency.

In this study almost half of the hypertensive patients had uncontrolled hypertension. This inadequate control of hypertension presents a significant challenge for the health system. Failure to control BP has a significant impact not only on the morbidity and mortality of patients but also in terms of health care costs.

The study found age, male sex, college education and above, co-morbidities and depression significantly associated with hypertension control status among hypertensive patients.

This study showed that hypertensive patients with older age had decreased risk of having uncontrolled hypertension. This is in line with the study done in Thailand (35) which reported that older patients had lower risk of having uncontrolled hypertension. However this finding is in contrast to studies done in Uganda (44) and Ethiopia (1,19,32) which reported that older hypertensive patients had more odds of having uncontrolled hypertension compared to younger ones. Complications of hypertension such as end organ damage usually do not occur in early period of hypertension hence young hypertensive patients may not be aware of the complications (35) so they may think they are safe from hypertension complications control and not adhering to hypertension control strategies as a result they may have poor BP control.

Moreover, people at young age may not follow up schedules with doctors because they are busy working and working hours are the same as the clinic hours (35). Also due to younger people being busy working they may have poor adherence to medication, hence more likely to have uncontrolled hypertension than older patients. There is a need to raise awareness of hypertension control especially to younger hypertensive patients so as to achieve BP control to this group.

This study reported males have 1.27 times risk of having uncontrolled hypertension as compared to females. This is consistent with studies done in Ethiopia (1) and Morocco (38). This may be due to biological factor (45). Moreover, studies have revealed that females have lower levels of pro-renin and renin compared to males, resulting the blood pressure to be higher than females(45).

This study also found that hypertensive patients with college education and above had 1.34 times risk of having uncontrolled hypertension compared to those without college education. The result is similar to the findings of study done in Sudan (37). In contrast, a study done in Palestine reported that lower educational level was associated with increased risk to uncontrolled hypertension (13). The possible explanation for this association is that other factors may have contributed to this association such as the nature of the work they do which may

involve a lot of sitting time. These individuals may have stressful working environment which make them more likely to have uncontrolled hypertension. In addition to that these participants may be living a sedentary lifestyle hence more likely have poor blood pressure control

In this study hypertensive patients with co-morbidities had 1.32 times more risk of having uncontrolled hypertension compared to hypertensive patients who did not have any co-morbidity. The study findings corroborate with previous studies conducted in Ethiopia (1) and Thailand (35). Similarly, a study done in Dodoma, Tanzania showed that hypertensive patients with chronic kidney disease have poor hypertension control (41) while a related study in Palestine reported that hypertensive patients with diabetes had higher odds of having uncontrolled hypertension compared to those without diabetes (13). In contrast to this study, findings from a study in the United Kingdom found that hypertensive patients with comorbidities were more likely to have good blood pressure control (15) which may be explained by frequent healthcare services utilization which has been associated with controlled hypertension.

Patients with both diabetes mellitus and hypertension have higher risk of having cardiovascular events compared to hypertensive patients without diabetes (13). This may be due to the fact that many chronic illnesses cause endothelial dysfunction and insulin resistance resulting into increased blood pressure (1,35). Moreover, controlling BP among hypertensive patients with chronic illness may be challenging because many chronic illnesses are secondary causes of hypertension (8). In addition, studies reported that the presence of co-morbidities adds complexity to the management of hypertension, making it more challenging to achieve optimal BP control (20,46). Complications among diabetic patients such as neuropathy, resistance to treatment, and a high pulse rate, cause difficulties in lowering their blood pressure compared to non-diabetic patients (47).

Co-morbidities require multiple medications and more complex treatment regimens. Managing multiple conditions can be challenging and may result in lower adherence to prescribed medications and lifestyle modifications, hence leading to poor blood pressure control. The study findings highlight the importance of comprehensive care and tailored treatment approaches for hypertensive patients, especially those with additional co-existing medical problems.

Even though this study didn't show significant association between higher BMI (overweight and obesity) and uncontrolled hypertension several studies have revealed significant association between obesity/overweight and uncontrolled hypertension. Studies done in Ethiopia (8,11,32) and Zimbabwe (40) found overweight and obesity as significant predictor of uncontrolled hypertension. Sympathetic nervous system activation and renin- angiotensin system are considered to have significant functions in the pathogenesis of obesity related hypertension (8).

The study found that hypertensive patients with depression had 1.63 times risk of having uncontrolled hypertension compared to those without depression. The study findings align with related studies conducted in Mexico and China (27,48). In contrary to this, study by Aron in the United States of America found that depression was negatively associated with uncontrolled hypertension (49), this may be due to higher utilization of healthcare services demonstrated by the depressive patients. Depressive symptoms are common in adults, often co-morbid with chronic illnesses such as hypertension and may have negative effects on health and quality of life of individuals. Studies found that depressive symptoms increase risk of hypertension (24). Both hypertensive and depressive patients have increased sympathetic tone and secretion of adrenocorticotrophic hormone and cortisol (48) hence pathophysiologically they affect one another. Existence of both conditions increases chances of poor hypertension control.

Poor Blood pressure control among depressive patients may be caused by their loss of interest in adhering to therapeutic regimen (48). Another possible reason might be the psychological and physiological effects of depression, such as increased stress, inactivity, and poor sleep quality, could negatively impact the body's ability to regulate blood pressure effectively.

The study findings suggest that healthcare providers who manage patients with hypertension should also routinely assess them for the presence of mental health conditions such as depression. When such mental health conditions are identified, the providers should ensure appropriate treatment and management of both the physical and mental health aspects.

Prevalence of uncontrolled hypertension in smokers was 49.1%. However, there was no significant association between uncontrolled hypertension and smoking possibly due to few numbers of participants who reported to be smoking. This observation is consistent with study done in Ethiopia by Solomon et al (2023) (11). In contrary to this, studies done in Rwanda (23), Ethiopia (32) and Palestine (13) reported that smoking was significantly associated with uncontrolled hypertension.

This study could not find significant association between alcohol intake and uncontrolled hypertension. Similar findings were reported by studies done in Ethiopia (1,11) . However several studies done at Jimma University (32), Zimbabwe (40) and Ethiopia (8) found alcohol intake as a significant predictor of uncontrolled hypertension.

5.1 Limitations of the study

Firstly, behavioral practices of the respondents were not observed and responses were based on self-reports therefore there might be recall and social desirability biases. This scenario was mitigated by ensuring the respondents that the responses were anonymous and confidentiality was observed. Secondly, the study did not assess medication adherence and type of antihypertensive used by the participants.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The prevalence of uncontrolled hypertension among hypertensive patients attending Amana Regional Referral Hospital in Dar es Salaam was relatively high (47.1%). Significant factors associated with hypertension control status included age 50-64 years (APR 0.61,95% CI 0.40-0.92; p=0.02), 65 years and above (APR 0.33, 95% CI 0.19-0.57; p= <0.001), male sex (APR 1.27,95% CI 1.01-1.60; p=0.039), college education and above (APR 1.34, 95% CI 1.02-1.75; p=0.03), co-morbidities (APR 1.32, 95% CI, 1.06-1.66; p=0.015) and depression (APR 1.63, 95% CI:1.17-2.28; p=0.004).

6.2 Recommendations

Based on the findings of this study, the following are the proposed recommendations:

1. Hypertensive patients should be encouraged by healthcare providers to practice lifestyle modifications such as reducing salt intake, do regular physical activities, limit alcohol intake and quit smoking.
2. Healthcare providers should develop comprehensive care plans that address comorbidities and hypertension control simultaneously. This may involve coordinated care teams to ensure all aspects of patient's health are managed effectively.
3. The Ministry of Health should institute strategies to raise awareness and education on hypertension control such as public campaigns, provision of educational materials to patients, and school and workplace initiatives.
4. Further researches should be conducted to assess the impact of healthcare provider practices such as communication styles and continuity of care on hypertension control.

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APPENDICES

Appendix I: Interview Form (English Version)

IDENTIFICATION INFROMATION

SERIAL NUMBER: ……

DATE: …….

BLOOD PRESSURE MEASUREMENT (BP)……

ANTHROPOMETIC MEASUREMENTS

WEIGHT (in kilogram): …….

HEIGHT (in metres): ……

BMI (kg/m^2): …….

PART I : SOCIO-DEMOGRAPHIC INFORMATION

1. What is your age (in complete years)? ……

2. Sex …….

   A. male

   B. female

3. What is your marital status?
   A. single
   B. married
   C. divorced
   D. widowed
   E. Co-habiting

4. What is your education level?

   A. no formal education

   B. primary education

   C. secondary education

   D. college and above

5. What is your employment status?

   A. Employed

   B. Self employed

   C. No employment

   D. Retired

PART II: CLINICAL CHARACTERISTICS

1. Is there any history of hypertension in your family?

   A. Yes

   B. No

2. When did you know that you have hypertension and started taking medication?

   …… (in months)

3. How many drugs are you taking to lower your blood pressure?

   A. One

   B. Two

   C. Three or more

4. Are you having any other chronic illness apart from hypertension?

   A.Yes

   B. No

   If YES what illness do you have?

   A. Diabetes mellitus

   B. Stroke

   C. Kidney diseases

   D. Other

5. Body mass index
    A. Below 18.5 kg/m²
    B. 18.5-24.9 kg/m²
    C. 25-29.9 kg/m²
    D. 30 kg/m² and above

PART III: BEHAVIOURAL CHARACTERISTICS

1. A. For the last seven days, how many days did you do at least 30 minutes physical activity?...

B. For the last seven days how many days did you do specific exercise activity?.....

2. Have you smoked or even took a puff during the past seven days

A. Yes

B. No

3. Did you drink alcohol in the past seven days?

A. Yes

B. No

4. Do you usually add table salt to your meal?

A. Never

B. Rarely

C. Occasionally

D. Often

E. Always

PART IV: PSYCHOSOCIAL CHARACTERISTICS

1. QUESTIONS TO ASSESS SOCIAL SUPPORT (adapted from Oslo Social Support Scale-3)

   i. How many people are close to you and you can count on them when having great personal problems?
      a) None
      b) 1-2
      c) 3-5
      d) 5+

   ii. How much interest and concern do people show in what you do?
      a) None
      b) Little
      c) Uncertain
      d) Some
      e) A lot

   iii. How easy is it to get help from neighbors if you should need it?
      a) Very difficult
      b) Difficult
      c) Possible
      d) Easy
      e) Very easy

2. QUESTIONS TO ASSESS DEPRESSION (adapted from PHQ-9)

	During the last two weeks how frequently have you experienced the following?	Not at all	Several days	More than 7 days	Nearly everyday
1.	Little interest or pleasure in doing things	0	1	2	3
2.	Feeling down, depressed or hopeless	0	1	2	3
3	Difficulty falling asleep or sleeping too much	0	1	2	3
4	Feeling tired or having little energy	0	1	2	3
5	Poor appetite or overeating	0	1	2	3
6	Feeling bad about yourself or that you are a failure or have let down yourself or family	0	1	2	3
7	Troubles concentrating in things like reading or watching TV	0	1	2	3
8	Moving or speaking slowly and being noticed by people or being fidgety or restless	0	1	2	3
9	Thoughts that you would be better off dead, or of hurting yourself in some way	0	1	2	3
	TOTAL SCORE (add the marked numbers)				

Appendix II: Interview Form (Swahili Version)

TAARIFA ZA UTAMBUZI

NAMBA: ……

TAREHE: …….

VIPIMO VYA SHINIKIZO LA DAMU……

VIPIMO YA KIANTHROPOMETIKI

UZITO (katika kilogram): …….

UREFU (katika mita): ……

UZITO/UREFU (kg/mita za mraba): …….

SEHEMU YA I: TAARIFA ZA KIJAMII

1. Una miaka mingapi? ……

2. Jinsia …….

    A. Mwanaume

    B. Mwanamke

3. Hali ya ndoa

    A. Hujaoa au Haujaolewa

    B. Umeoa au umeolewa

    C. Mtalakiwa

    D. Mjane

    E. Unaishi bila ndoa

4. Kiwango cha elimu ni kipi?

    A. Hauna elimu rasmi

    B. Elimu ya msingi

    C. Elimu ya sekondari

    D. Chuo na kuendelea

5. Hali yako ya ajira ni ipi?

    A.Umeajiriwa
    B. Umejiajiri
    C. Hauna ajira
    D. Umestaafu

SEHEMU YA PILI: TABIA ZINAZOHUSIANA NA AFYA

1. Je, kuna historia yoyote ya shinikizo la damu katika familia yako?

    A. Ndiyo

    B. Hapana

2. Ulijua lini kuwa una shinikizo la damu na kuanza kutumia dawa?

…….(katika miezi)

3. Je, unatumia dawa ngapi kupunguza shinikizo la damu?

    A. Moja

    B. Mbili

    C. Tatu au zaidi

4. Je, una ugonjwa mwingine wowote sugu mbali na shinikizo la damu?

    A. Ndiyo

    B. Hapana

Kama NDIYO ni upi kati ya haya?

    A. Ugonjwa wa kisukari

    B. Kiharusi

    C.Magonjwa ya figo

    D. Mengine

5. Uwiano wa uzito na urefu wa mwili

    A. Chini ya 18.5 kg/mita mraba

    B.18.5-24.9 kg/mita mraba

    C. 25-29.9 kg/mita mraba

    D. 30 kg/mita mraba na Zaidi

SEHEMU YA TATU: TAARIFA ZA TABIA AU MTINDO WA MAISHA

1.A. Kwa siku saba zilizopita ni siku ngapi ulifanya mazoezi ya viungo kwa angalau dakika 30?

B. Kwa siku saba zilizopita ni siku ngapi ulifanya shughuli maalum ya mazoezi?

2. Je, umevuta sigara au hata kuvuta pafu katika siku saba zilizopita?

A. Ndiyo

B. Hapana

3. Je, ulikunywa pombe katika siku saba zilizopita?

A. Ndiyo

B. Hapana

4. Je, una kawaida ya kuongeza chumvi mbichi ya mezani kwenye chakula?

A. Hapana

B. Nadra

C. Mara kwa mara

D. Mara nyingi

E. Kila mara

Sehemu ya nne: Tabia za kisaikolojia na usaidizi wa jamii

1. MASWALI YA KUTATHMINI USAIDIZI WA KIJAMII (imechukuliwa kutoka kwa Kiwango cha 3 cha Usaidizi wa Kijamii wa Oslo)

1. Ni watu wangapi walio karibu nawe na unaweza kuwategemea unapokuwa na matatizo makubwa ya kibinafsi?

i. Hakuna
ii. 1-2
iii. 3-5
iv. 5+

2. Je, watu wanaonyesha kupendezwa na kujali kiasi gani katika kile unachofanya?

i. Hakuna
ii. Kidogo
iii. Sina uhakika
iv. Baadhi
v. Mengi

3. Je, ni rahisi kiasi gani kupata usaidizi kutoka kwa majirani ikiwa utauhitaji?

i. Ngumu sana
ii. Ngumu
iii. Inawezekana
iv. Rahisi
v. Rahisi sana

2.MASWALI YA KUTATHMINI SONONA (imechukuliwa kutoka PHQ-9)

	Katika wiki mbili zilizopita ni mara ngapi umesumbuliwa na yafuatayo?	Sio kabisa	Siku kadhaa	Zaidi ya siku 7	Karibu kila siku
1.	Kutokuwa na raha au hamu katika kufanya mambo	0	1	2	3
2.	Kuhisi huzuni au kutokuwa na tumaini	0	1	2	3
3	Ugumu wa kusinzia au kulala kupita kiasi	0	1	2	3
4	Kuhisi uchovu au kuwa na nguvu kidogo	0	1	2	3
5	Kukosa hamu ya kula au kula kupita kiasi	0	1	2	3
6	Kujisikia vibaya juu yako mwenyewe au kwamba umeshindwa au umejiangusha mwenyewe au familia	0	1	2	3
7	Matatizo ya kuzingatia katika mambo kama vile kusoma au kutazama TV	0	1	2	3
8	Kufanya mambo au kuongea polepole na kuonekana na watu au kuwa na wasiwasi au kutotulia	0	1	2	3
9	Mawazo ya kwamba ungekuwa afadhali ufe, au kujiumiza kwa njia Fulani	0	1	2	3
	Jumla (ongeza nambari zilizowekwa alama)				

Appendix III: Informed Consent Form (English Version)

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES

DEPARTMENT OF DEVELOPMENT STUDIES

CONSENT TO PARTICIPATE IN THE STUDY ON FACTORS ASSOCIATED WITH HYPERTENSION CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING CLINIC AT AMANA REGIONAL REFERRAL HOSPITAL

Consent to participate in this study

Dear Participant, my name is Tunu Zablon Mdonya, a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing Master of Public Health program. I am the principal investigator in this study that aims to identify factors associated with hypertension status among hypertensive patients at Amana Regional Referral Hospital.

Purpose of the study the aim of the study is to identify factors associated with hypertension control among hypertensive patients on a follow up clinic at Amana Regional Referral Hospital in Dar es Salaam. The information collected will help us to know the current situation of hypertension control at Amana Regional Referral Hospital. You are humbly asked to participate in this study because we believe that the information you share will very useful to this study.

Methods of the study A number of questions will be asked to you and your responses will be recorded. Your blood pressure, height and weight will be measured as well. The session will take about 10 minutes.

Procedure of the study You are free to decide whether to participate, not to participate or withdrawal at any time. Feel free to ask any question about the study. I will be happy to share the findings once the research is complete. However, your name will not be mentioned and your identity will be confidential.

Risks, benefits and confidentiality There will be no direct benefits for your participation in this study but the information you share will help the hospital to improve the treatment to hypertensive patients**.**

Contacts information in case of any question about this study please contact the principal investigator Tunu Zablon Mdonya through phone number +255716143612 or email tunumdonya@gmail.com

If you have any questions about your rights as participant you may contact MUHAS Institutional Research Board Chairperson Dr Nahya Salim Masoud +255713250074

Statement of consent the aim and nature of the study have been elaborated to me, and I understand that my participation is voluntary and there will be no consequences if I decide not to participate. I am free to quit at any time. I have right to know the findings of the study. I voluntarily consent to be a participant in this study.

Name of participant…… Signature…… Date……

Name of investigator……. Signature…… Date…….

Appendix IV: Informed Consent Form (Swahili Version)

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI MUHIMBILI

SHULE YA AFYA YA UMMA NA SAYANSI ZA JAMII

IDARA YA ELIMU YA MASOMO YA MAENDELEO

RIDHAA YA UTAFITI WA KUTATHIMINI MAMBO YANAYOHUSIANA NA UDHIBITI WA SHINIKIZO LA JUU LA DAMU MIONGONI MWA WAGONJWA WA SHINIKIZO LA JUU LA DAMU KATIKA HOSPITALI YA RUFAA YA MKOA YA AMANA

Ridhaa ya kushiriki katika utafiti

Mpendwa Mshiriki,

Naitwa Tunu Zablon Mdonya, mwanafunzi wa Chuo Kikuu cha Afya na Sayansi Shirikishi Muhimbili (MUHAS) anayesomea shahada ya uzamili ya afya ya Umma. Mimi ndiye mchunguzi mkuu katika utafiti huu unaolenga kutambua mambo yanayohusiana na udhibiti wa shinikizo la juu la damu miongoni mwa wagonjwa wa shinikizo la juu la damu katika Hospitali ya Rufaa ya Mkoa ya Amana.

Madhumuni ya utafiti Madhumuni ya utafiti huo ni kutambua mambo yanayohusiana na udhibiti wa shinikizo la juu la damu miongoni mwa wagonjwa wa shinikizo la juu la damu

kwenye kliniki ya ufuatiliaji katika Hospitali ya Rufaa ya Mkoa wa Amana jijini Dar es Salaam. Taarifa zilizokusanywa zitatusaidia kujua hali ya sasa ya udhibiti wa shinikizo la juu la damu na mambo yanayohusiana na udhibiti huo katika Hospitali ya Rufaa ya Mkoa ya Amana. Unaombwa kwa unyenyekevu kushiriki katika utafiti huu kwa sababu tunaamini kuwa maelezo unayoshiriki yatakuwa na manufaa sana kwa utafiti huu.

Mbinu za utafiti Maswali kadhaa yataulizwa na majibu yako yatarekodiwa. Utapimwa Shinikizo la damu, urefu na uzito. Mahojiano yatachukua dakika 10.

Utaratibu wa utafiti Uko huru kuamua kama utashiriki, kutoshiriki au kujiondoa wakati wowote. Jisikie huru kuuliza swali lolote kuhusu utafiti. Nitafurahi kushiriki matokeo baada ya utafiti kukamilika. Hata hivyo, jina lako halitatajwa na utambulisho wako utakuwa siri.

Hatari, faida na usiri Hakutakuwa na manufaa ya moja kwa moja kwa ushiriki wako katika utafiti huu lakini maelezo utakayoshiriki yatasaidia hospitali kuboresha matibabu kwa wagonjwa wa shinikizo la damu.

Maelezo ya anwani Iwapo kuna swali lolote kuhusu utafiti huu tafadhali wasiliana na mpelelezi mkuu Tunu Zablon Mdonya kupitia nambari ya simu +255716143612 au barua pepe tunumdonya@gmail.com

Ikiwa una maswali yoyote kuhusu haki zako kama mshiriki unaweza kuwasiliana na Mwenyekiti wa Bodi ya Utafiti wa Taasisi ya MUHAS Dk Nahya Salim Masoud +255713250074

Taarifa ya kibali Lengo na asili ya utafiti imefafanuliwa kwangu, na ninaelewa kuwa ushiriki wangu ni wa hiari na hakutakuwa na matokeo yoyote nikiamua kutoshiriki. Niko huru kuacha wakati wowote. Nina haki ya kujua matokeo ya utafiti. Ninakubali kwa hiari kuwa mshiriki katika utafiti huu.

Jina la mshiriki…… Saini……Tarehe …….

Jina la mtafiti ……. Sahihi…… Tarehe…….

Appendix V: Ethical Clearance

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/2235 Date: 08/05/2024

MUHAS-REC-05-2024-2235
TUNU ZABLON MDONYA
SHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: FACTORS ASSOCIATED WITH HYPERTENSION CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING CLINIC AT AMANA REGIONAL REFERRAL HOSPITAL

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: 08/05/2024
EXPIRATION DATE OF APPROVAL: 08/05/2025

STUDY DESCRIPTION:
Purpose:
The purpose of this prospective observational cross sectional study is to identify factors associated with hypertension control among hypertensive patients attending clinic at Amana Regional Referral Hospital, Dar es Salaam Tanzania.

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-%2015650.pdf and in the MUHAS archives.

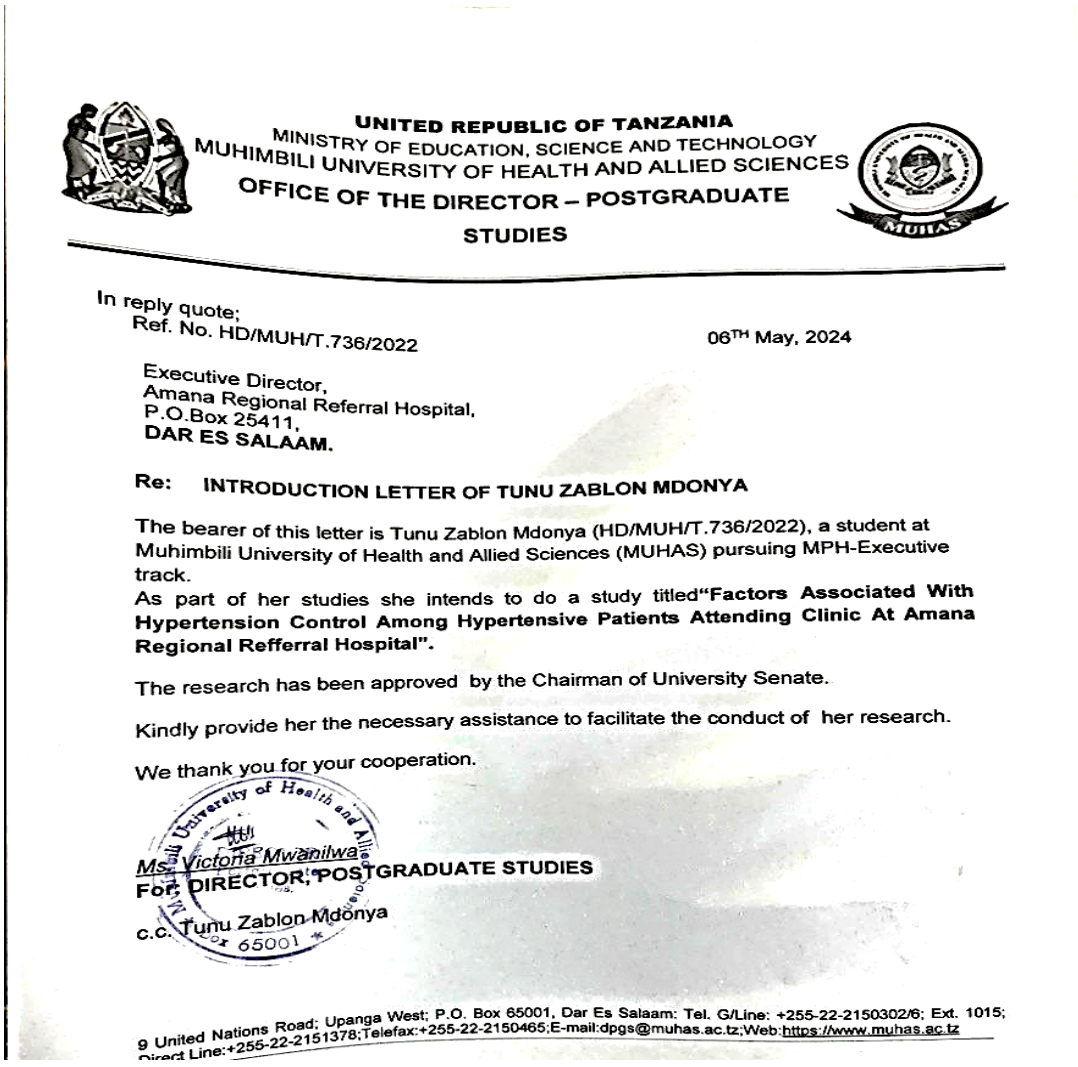
The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.



Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Appendix VI: Introductory Letter



UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.736/2022

06TH May, 2024

Executive Director,
Amana Regional Referral Hospital,
P.O.Box 25411,
DAR ES SALAAM.

Re: INTRODUCTION LETTER OF TUNU ZABLON MDONYA

The bearer of this letter is Tunu Zablon Mdonya (HD/MUH/T.736/2022), a student at Muhimbili University of Health and Allied Sciences (MUHAS) pursuing MPH-Executive track.
As part of her studies she intends to do a study titled**"Factors Associated With Hypertension Control Among Hypertensive Patients Attending Clinic At Amana Regional Refferral Hospital".**

The research has been approved by the Chairman of University Senate.

Kindly provide her the necessary assistance to facilitate the conduct of her research.

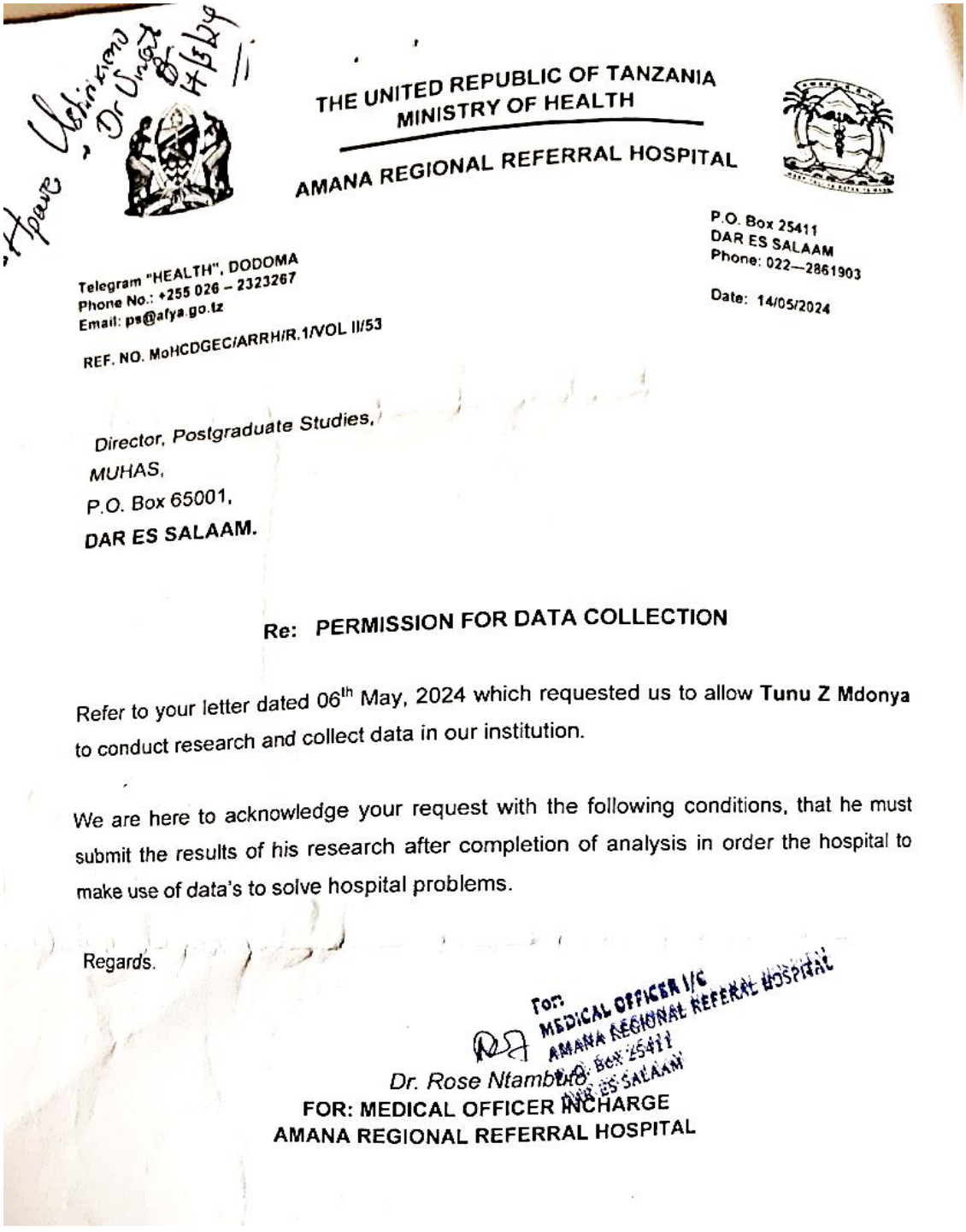
We thank you for your cooperation.

Ms. Victoria Mwanilwa
For: DIRECTOR, POSTGRADUATE STUDIES

c.c. Tunu Zablon Mdonya

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

Appendix VII: Permission Letter



THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF HEALTH

AMANA REGIONAL REFERRAL HOSPITAL

Telegram "HEALTH", DODOMA
Phone No.: +255 026 – 2323267
Email: ps@afya.go.tz

P.O. Box 25411
DAR ES SALAAM
Phone: 022—2861903

REF. NO. MoHCDGEC/ARRH/R.1/VOL II/53

Date: 14/05/2024

Director, Postgraduate Studies,
MUHAS,
P.O. Box 65001,
DAR ES SALAAM.

Re: PERMISSION FOR DATA COLLECTION

Refer to your letter dated 06th May, 2024 which requested us to allow **Tunu Z Mdonya** to conduct research and collect data in our institution.

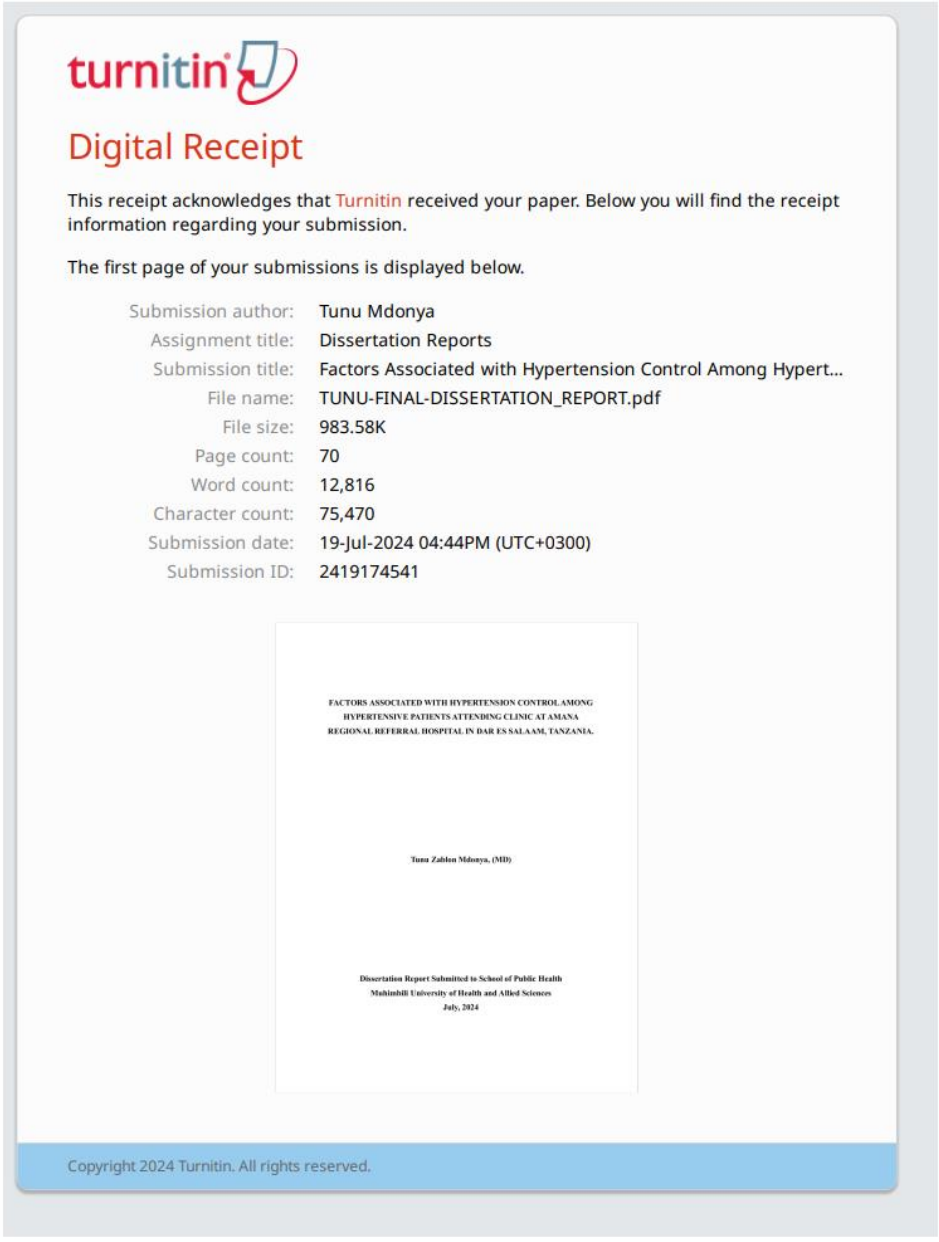
We are here to acknowledge your request with the following conditions, that he must submit the results of his research after completion of analysis in order the hospital to make use of data's to solve hospital problems.

Regards.

For:
MEDICAL OFFICER I/C
AMANA REGIONAL REFERRAL HOSPITAL
P.O. Box 25411
DAR ES SALAAM

Dr. Rose Ntambula
FOR: MEDICAL OFFICER INCHARGE
AMANA REGIONAL REFERRAL HOSPITAL

Appendix VIII: Tunitin receipt



turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

Submission author:	Tunu Mdonya
Assignment title:	Dissertation Reports
Submission title:	Factors Associated with Hypertension Control Among Hypert...
File name:	TUNU-FINAL-DISSERTATION_REPORT.pdf
File size:	983.58K
Page count:	70
Word count:	12,816
Character count:	75,470
Submission date:	19-Jul-2024 04:44PM (UTC+0300)
Submission ID:	2419174541

FACTORS ASSOCIATED WITH HYPERTENSION CONTROL AMONG HYPERTENSIVE PATIENTS ATTENDING CLINIC AT AMANA REGIONAL REFERRAL HOSPITAL IN DAR ES SALAAM, TANZANIA.

Tunu Zablon Mdonya, (MD)

Dissertation Report Submitted to School of Public Health
Muhimbili University of Health and Allied Sciences
July, 2024

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Appendix IX: Plagiarism report



Factors Associated with Hypertension Control Among Hypertensive Patients Attending Clinic at Amana Regional Referral Hospital in Dar Es Salaam, Tanzania

ORIGINALITY REPORT

29%	21%	19%	15%
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