

**ASSESSING TREATMENT ADHERENCE IN HYPERTENSION
CONTROL AMONG HYPERTENSIVE PATIENTS POST HEALTH
EDUCATION AT KENYATTA NATIONAL HOSPITAL**

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DECLARATION

I, Jared Kebaso Ongaga declare that this dissertation is my original work and has never been submitted for any academic award in any institution of higher learning.

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CERTIFICATE OF APPROVAL

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DEDICATION

I dedicate this work to my family: My lovely wife Floridah, our children Christiano, Allan, Unity and Gift who have been patient and supportive in the course of my studies.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACE	: Angiotensin Converting Enzyme
ACEi	: Angiotensin Converting Enzyme inhibitor
AF	: Atrial fibrillation
ARB	: Angiotensin receptor blocker
BMI	: Body mass index
BP	: Blood pressure
CVA	: Cerebrovascular accident
CCB	: Calcium channel blocker
CKD	: Chronic Kidney disease
CVD	: Cardiovascular disease
DASH	: Dietary approaches to stop hypertension
DBP	: Diastolic blood pressure
ESH	: European Society of hypertension
HMOD	: Hypertension mediated organ damage
KNH	: Kenyatta National Hospital
SBP	: Systolic blood pressure
WHO	: World Health Organization
WHO- ISH	: World Health Organization – International Society of Hypertension
WHR	: Waist hip ratio

OPERATIONAL DEFINITIONS

Anthropometric measurements: Weight (Kg), Height (Meters), BMI (Weight (Kg) / M²) and Waist to Hip ratio (WHR).

Biochemistry markers: Low density lipoproteins (LDL), High Density Lipoproteins (HDL) and total cholesterol

Health educated hypertensive patient: A patient diagnosed with hypertension and has had health education on the disease, treatment options and lifestyle modification either on one to one or as a group.

Health professional: A trained professional at least with Bachelor's degree (Doctors), Diploma in Kenya Registered Community Health Nursing for nurses or Diploma in Nutrition attending to patients at KNH Medical outpatient clinic.

Hypertension: Persistently elevated blood pressure in subjects aged 18 years and above where the systolic blood pressure (SBP) is equal or more than 140mmHg and/or diastolic blood pressure is equal or more than 90mmHg.

Physical activity: At least 150 minutes of moderate –intensity physical activity through the week as defined by WHO.

Treatment adherence: The extent to which a hypertensive patient's lifestyle and medication taking corresponds with agreed recommendations from a healthcare provider.

ABSTRACT

Background: There is a high burden of hypertension in Kenya with documented evidence showing that 24% of Kenyans have an elevated blood pressure and only 15% of those with HBP are aware of it. Low awareness on hypertension status and non-adherence to treatment have been further documented. Treatment adherence is an important indicator of good blood pressure control which is associated with reduction of the risk of cardiovascular diseases and related deaths. Studies on adherence to medication and associated factors are rare. This study was aimed at assessing adherence to hypertension treatment among health educated patients attending medical outpatient clinic and identify associated factors at Kenyatta National Hospital, Kenya.

Main objective: To assess treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital

Methodology: The study employed a descriptive cross-sectional study design. Whereby quantitative methods were used to obtain data on the pharmacological and non-pharmacological adherence. The Hill Bone High blood pressure compliance scale was used to assess the level of adherence. The study area was Kenyatta National Hospital medical outpatient clinics which manage primary hypertensive patients. The study population were primary hypertensive patients diagnosed at least six months or earlier. They also included those on treatment either by pharmacological methods or by lifestyle modification therapies. They must have had health education on hypertension either by nurses, doctors or nutritionists as a group or as an individual patient. Structured questionnaires were employed to collect data from patients concerning pharmacological and non-pharmacological treatment adherence. The questionnaire was interviewer administered. The Hill Bone high blood pressure scale was used to measure the overall adherence levels. The KNH-UoN Ethics & Research committee approved this study.

Results: Respondents (n=114) were mainly female (57.9%). They were mostly (31.3%) aged between 40-49 years and majority (73.1%) were from Nairobi county. Main study findings were: Young patients ($p=0.011$), higher education attainment ($p=0.03$) and formally employed ($p=0.031$) were likely to adhere to hypertension treatment. Respondents on high number of antihypertensive medications were likely ($p=0.000$) to falter in treatment adherence. Respondents with anthropometric parameters above the WHO recommendation were likely to be poorly adherent to hypertension treatment across gender ($p<0.05$).

Conclusion: Adherence to hypertension treatment improved among those patients receiving health education. Age, level of education, pill burden, BMI, Biomarkers, knowledge on hypertension and its treatment are significant predictors of adherence to treatment.

Recommendation: The findings underscore the need to allocate more resources and share health messages with hypertension patients on disease progress, risk factors and medication adherence.

CHAPTER ONE: INTRODUCTION

1.1 Study Background

This chapter entails, the study background, problem statement, justification of the study, research questions, research objectives and conceptual framework.

Hypertension is a worldwide health burden. It's a major contributor to heart disease burden, stroke, kidney failure, premature deaths and disabilities. It mostly affects individuals in developing countries where health systems weak, (WHO, 2017).

Hypertension can be defined as persistently raised blood pressure of 140/90 mmHg or above in patients over 18 yrs of age. Hypertension can be classified into two major types: primary hypertension and secondary hypertension. Primary hypertension is one in which its cause is not known and accounts for more than 95% of the cases. Secondary hypertension, is the one whose cause is known and it is responsible for approximately 5% in overall (MOH Kenya, 2018). This study will focus on primary hypertension which will be referred to as hypertension in this study.

In the development of various conditions such as CVAs, coronary heart disease, chronic kidney disease and heart failure hypertension is identified as a major risk factor. The estimates from WHO indicate, CVDs as a top cause of global mortality. In the year 2015 it is estimated that 17.7 million succumbed to CVDs, which represents approximately 30% global deaths (WHO, 2017).

The global prevalence of raised blood pressure between 2010 -2016 was 28.5% in developed countries and 31.5% in developing countries. Further, it's documented that, levels of awareness in developing countries were at 38%, treatment levels at 29% and levels of blood pressure control at 8% among those diagnosed with hypertension (Mills *et al.*, 2016). Among WHO regions, in the year 2017, raised blood pressure prevalence was highest recorded in

Africa which it was estimated to be approximately 46% in males and females combined (WHO, 2017).

In Kenya, 24% of the population has either elevated BP or are on treatment. It is further estimated that more than 56% of Kenyans have never been screened for HBP. The report further indicates that, only about 15% of the Kenyans with HBP were aware of their status, and only 8% of the HBP patients have been put treatment and only a minority (4%) of those on treatment have their blood pressure controlled (MoH-Kenya, 2015). Recently in 2019, a study done at KNH established that only 30.8% of the respondents knew that hypertension can be prevented, these were especially among those who were single and had higher educational attainment. They further found out that about half (53.6%) of the patients on antihypertensive therapy believed that they can stop medication once their blood pressure was well controlled (Kimani *et al.*, 2019). From the aforesaid this indicates that awareness on hypertension is still low and treatment adherence is a big challenge. One of the roles of health professionals in management of hypertension is to promote hypertension awareness and treatment adherence. How this role is accomplished by the health professionals is poorly understood, however the statistics above point to a gap on how it is done.

1.2 Problem Statement

The prevalence of raised blood pressure globally in 2015 was estimated to be 31%, where 28.5% was in developed countries and 31.5% in developing countries. Levels of hypertension awareness amongst developing countries was estimated to be at 38%. Treatment and blood pressure control levels of these countries are low at 29% and 8% respectively. Comparison made among WHO member countries showed that Africa had the highest prevalence of HBP at 46% both gender combined, (WHO, 2018).

In Kenya, a 2015 stepwise approach to surveillance survey (STEPS) was carried out and it indicated that 24% of Kenyans had elevated blood pressure and an equivalent number were receiving medications for high blood pressure. Amongst those with hypertension, only 15% of them were aware of their condition. It further indicated that approximately 8% of Kenyans with high blood pressures are receiving medication, out of whom only an estimated 4.6% have their hypertension controlled. It further indicated that, more than 56% of Kenyans have never screened for high blood pressure, (MoH-Kenya, 2015).

A study conducted at KNH on how adequately blood pressure is controlled among hypertensive patients, and levels of adherence to antihypertensive treatment and giving reasons why they did not adhere to therapy, it concluded that majority of patients had poor blood pressure control (74%) and majority (68.2%) were non-adherent to hypertensive therapy. In the study, among the reasons found out for non-adherence included: inadequate knowledge on the nature of their illness, non-adherence to pharmacologic therapy, obesity with lack of lifestyle modification and failure to achieve optimal dosing of drugs in patients with poor BP control, (Achieng L, Karari E & Joshi M, 2008). This KNH study showed high levels of non-adherence at 68.2%. Hence this study is being done as follow up to assess and see whether those who have been educated by nurses on hypertension will give a different picture on adherence to hypertension treatment and BP control.

KNH runs five outpatient medical clinics which are multi-disciplinary. Amongst the team players are nurses whose main role includes measurement of BP, patient education and clinic bookings. However there's lack of a standardized, readily available guideline to guide them in performance of these crucial roles which have direct implications in BP management, control and adherence to treatment. In addition, the extent to which the nurses implement the role of promoting treatment adherence is not known. This research aimed to assess treatment adherence in those clients educated by nurses/doctors/nutritionists in the management of

hypertension and recommend on ways adherence can be improved to achieve adequate BP control and better quality of life among hypertensive clients.

1.3 Research questions

- i. Is there an association between demographic characteristics and treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital?
- ii. What is the non-pharmacological treatment adherence level in hypertension control among hypertensive patients post health education at KNH?
- iii. What is the pharmacological adherence level to treatment in hypertension control among hypertensive patients post health education at KNH?

1.4 Study Objectives

1.4.1 Broad objective

To assess treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital

1.4.2 Specific objectives

- i. To assess the association between demographic characteristics and treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital.
- ii. To determine the non-pharmacological treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital.
- iii. To determine the pharmacological adherence to treatment in hypertension control among hypertensive patients post health education at KNH.

1.5 Study hypothesis

There is no relationship between health education and patients' adherence to hypertension treatment.

1.6 Justification and Significance of the study

The magnitude of the problem of hypertension in Kenya is still high (24% of adult Kenyans have an elevated blood pressure or are on medications for hypertension, only 15% of those with HBP are aware of it, only about 8% were on treatment for hypertension, out of which only 4.6% had their blood pressure controlled (MoH-Kenya, 2015). A study done at KNH shows 68.2% of the patients attending outpatient hypertension clinics were non-adherent to treatment. A study done at KNH and published 2019 indicated that only 30.8% of the respondents knew that hypertension is preventable and 53.6% were of the opinion that they will stop taking their drugs once the blood pressure was controlled, (Kimani *et al.*, 2019). This showed low levels of awareness about the disease. Many clinicians participate in educating patients on hypertension disease and approaches to treatment. Among the clinical personnel who play a crucial role in promoting hypertension prevention awareness and adherence to hypertension treatment are the nurses, doctors and nutritionists. They plan and participate in patient health education, blood pressure monitoring, treatment and communication to patients. Understanding how they play their role and adherence of patients they handle, will help in improving guidelines on hypertension health education hence improve awareness, adherence and compliance levels to treatment. This will translate to better blood pressure control and minimize hypertension related complications. This research will contribute to the existing knowledge base on how health education on hypertension relates to treatment adherence to both pharmacological and non-pharmacological approaches. Further this knowledge will help influence practice of health education on hypertension. The

study was carried out at KNH a national/regional teaching referral hospital hence the results can be generalized to improve practice in other counties.

1.7 Limitation/delimitation of the study:

Limitations included cases of incomplete data especially latest biomarkers (cholesterol, HDL and LDL) if patients will not have money on that day do them. This will be addressed by retrieving medical records for the sampled patients and take the latest biomarkers recorded within one month.

1.8 Conceptual Framework

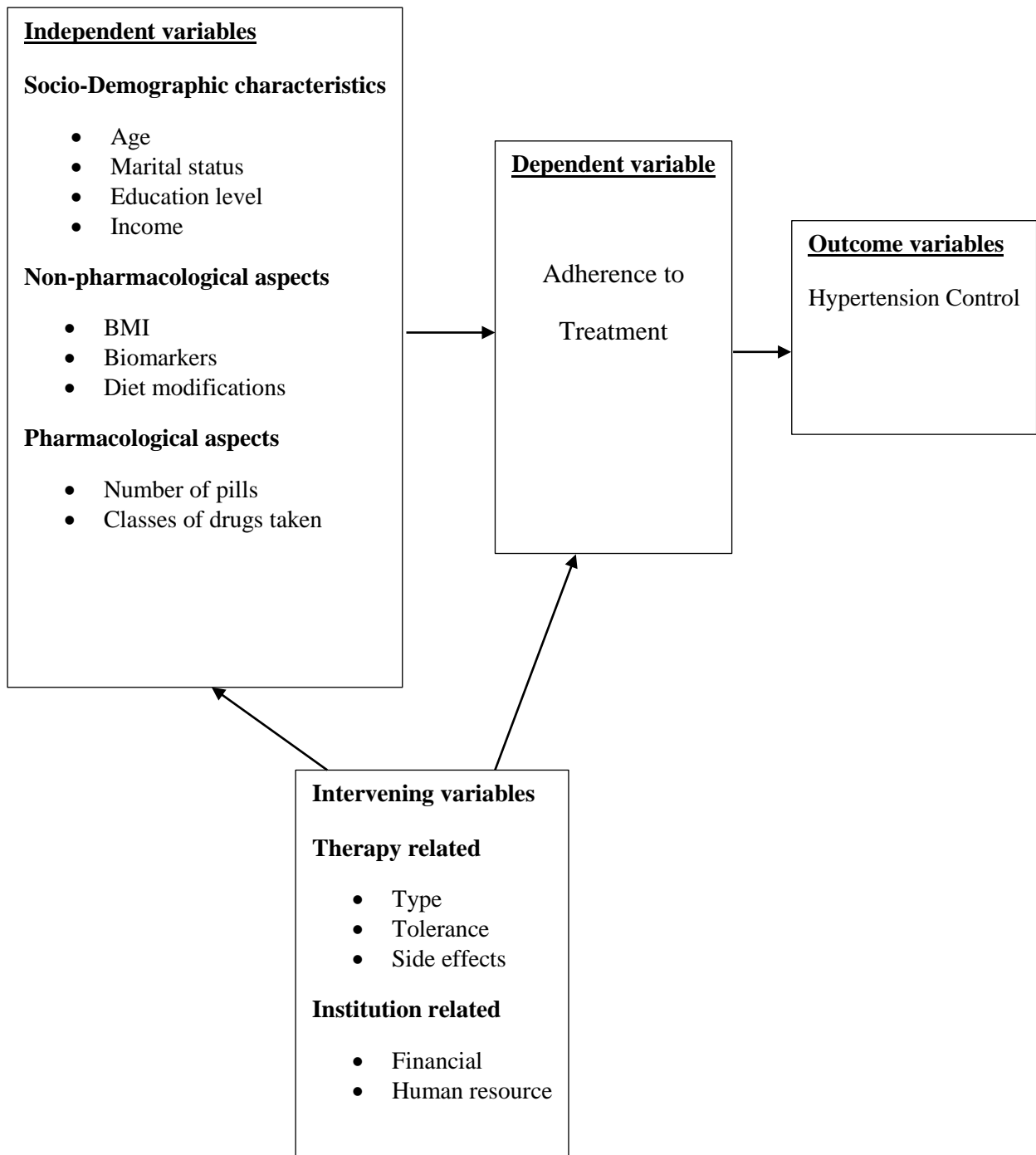


Figure 1.1: Conceptual framework depicting the relationship between variables under study

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Herein, literature review in regard to hypertension is documented. This includes; epidemiology of hypertension, types of hypertension, anthropometrics in hypertension, adherence measurements to hypertension treatment, role of the nurse in hypertension management and relationship between hypertension and cardiovascular diseases.

2.2 Epidemiology of Hypertension

The European society on hypertension (ESH) defines hypertension as persistently elevated blood pressure in people aged 18 years and above where the systolic and diastolic blood pressures are equal or more than 140mmHg and 90mmHg respectively, (ESC/ESH,2018). However the America Heart Association (AHA) in their 2017 revised guidelines they define hypertension as BP \geq 130mmHg and/or diastolic blood pressure of \geq 80 mmHg. This was arrived at based on evidence from a number randomized controlled trials that showed that starting hypertensive therapy on patients with this level of blood pressure is beneficial, (AHA, 2017). The Kenyan guidelines use the European society definition to guide management of hypertension in the country.

Global statistics indicate that; there are more than one billion people with high blood pressure and as people advance in age and get used to a sedentary lifestyle, then prevalence levels of hypertension globally will continually rise to over 1.5 billion by 2025. They further state that, HBP is one of the contributors to premature deaths, globally and this accounted for almost 10 million deaths in 2015, of which 3.5 million were due to stroke and 4.9 million were as a result of ischemic heart disease, (ESH/ESC, 2018).

In WHO regions, Africa has the highest prevalence of hypertension, in 2015 the prevalence was 46% for both sexes combined (WHO, 2018). On the other hand, in Kenya a survey

conducted by STEPS indicated that 24% of Kenyans were found to have either a raised blood pressure or were being treated for hypertension. In screening for hypertension, it established that only 56% have ever been screened for hypertension. Further the study established that of those with hypertension it is only 15% were aware that they had the disease, only 8% have been put on treatment and approximately 4.6% of those started on treatment have their blood pressure well controlled, (MoH-Kenya, 2018).

The ESH/ESC documents a relationship between hypertension and high risk of cardiovascular and renal diseases. Hypertension was also a major contributor to global premature deaths in 2015 and it accounted for approximately 10 million premature deaths and more than 200 million DALYS. They further document that SBP of > 140mmHg accounted for majority of the documented deaths and patient disability burdens of approximately 70% and the largest number systolic blood pressure – associated deaths per year are due to: 2.0 million and 1.5million Hemorrhagic stroke and ischemic stroke respectively. While ischemic heart disease accounted for about 4.9 million deaths, (ESC/ESH, 2018)

2.3 Types and etiology of Hypertension

Hypertension can be broadly grouped into two classes namely: primary or essential hypertension and secondary hypertension. In primary hypertension the cause is unknown whereas in secondary hypertension its underlying cause can be identified and treatment initiated. Hypertension can be further subdivided into classes namely; optimal hypertension, normal, high normal, grade one, two and three hypertension and isolated systolic hypertension. Other forms of hypertension are resistant hypertension, pseudo resistant hypertension and ‘white coat’ hypertension (ESH, 2018).

Primary hypertension, the cause is unknown and it accounts for 95% of the cases. Secondary hypertension, the cause can be identified and treated. Secondary hypertension is estimated to

account for around 5% of the cases. Various diseases associated with secondary hypertension are: renovascular disease, chronic parenchymal kidney disease, over secretion of aldosterone, pheochromocytoma, high levels of glucocorticoids, coarctation of the aorta, thyroid disorders, drugs (such as steroids, estrogen based drugs, non-steroidal anti-inflammatory drugs, sympathomimetic drugs), sleep apnea, psychoactive drugs such as cocaine, (MOH, 2018).

2.4 Hypertension risk factors

Various conditions predispose one to develop hypertension. These include those over 45 years of age (60 years for women), one's race (it's more among the black people), positive familial history, those overweight especially central obesity, physically inactive, use of tobacco, high amount of salt in diet, low intake of vitamin D, stress and chronic or heavy alcohol use (WHO, 2013, 2017).

The ESH guidelines explain that, hypertension is most of the time asymptomatic and that's why it is commonly referred to us a 'silent killer'. Due to its high prevalence, it's recommended that screening programs (blood pressure is taken in all adults) every 5 years, and more so among those individuals with a high normal BP bordering on hypertension. Further it is recommended that during screening if hypertension is suspected due to elevated blood pressure, then hypertension diagnosis should be confirmed by either repeating BP measurement in subsequent client clinic visits or by home based blood pressure monitoring, (ESH/ESC, 2018).

Kenya Cardiovascular guidelines of 2018 have indicated that the accurate diagnosis of HBP largely depend on accurate BP measurement. Hence physical Blood Pressure measurements in diagnosis, treatment/monitoring of hypertension cannot be overemphasized. Blood pressure can either be done in the clinic or outside the clinic. Since measurement/monitoring of BP is key in diagnosis of hypertension, Kenyan cardiovascular guidelines have given

outlines on how to take an accurate BP by both Nurses and Physicians. These are as shown in the appendix.

Demographic factors and hypertension

In a study conducted in 2014 to establish determinants to treatment adherence, it was established to be relatively on the higher side among those between 30-39 years and those above 60 years. Females were found to be more adherent (24.5%) than males (22.5%). Married couples were found to be more adherent (24.7%) than unmarried (21.1%), (Heydari *et al.*, 2014).

A study done in India among 473 HBP patients (226 males, 247 females) showed that adherence prevalence was 24.1% ($n = 114$) in the study population. Respondents with modified lifestyles among them, regular physical activity, those not-smoking and non-alcoholics were found to be more adherent to treatment compared to respondents with sedentary lifestyle, smokers and alcohol users ($P < 0.005$). Respondents who perceived high susceptibility, severity, benefit had better adherence compared with moderate and low susceptibility, severity, benefit, (Venkatachalam *et al.*, 2015).

2.5 Hypertension Management

Hypertension management constitutes both modifications of lifestyle and pharmacological therapy. Most hypertensive patients require drug pharmacotherapy, however modifications of lifestyle are crucial because they help in delaying need to commencement of pharmacotherapy or complement the blood pressure lowering effect of antihypertensive drugs. Lifestyle modifications include restricting dietary salt, moderation of alcohol intake or stopping altogether, eating healthy, exercising regularly, control of weight, and cessation of smoking are beneficial generally besides their impact on blood pressure control.

On commencement of treatment, the current recommendations are that for those with low to moderate-risk hypertension, even in the absence of HMOD, they should commence pharmacotherapy if their blood pressure is not contained after modification of lifestyle only (MoH-Kenya, 2018).

Those patients with a higher-risk in grade one hypertension and those with HMOD, or grade 2 hypertension patients, recommendation is that pharmacotherapy be initiated together with modifications in lifestyle, (ESH, 2018).

According to the Kenyan Cardiovascular guidelines of 2018, the treatment goal is to attain blood pressure which is below 140/90mmhg. It has been shown in studies that treatment of BP above this threshold (140/90mmhg) significantly reduce cardiovascular risk, conditions like stroke, heart failure, coronary syndromes, renal complications such as CKD and dying prematurely. These guidelines further indicated that, lifestyle change can not only delay the hypertension onset but also significantly, is attributed to the lowering of BP in hypertensive patients on treatment and even in particular cases avoid need for antihypertensive therapy.

In the ESH/ECS guidelines 2018, they recommend that the first aim of treating hypertension is to bring BP to lower than 140/90 mmHg. If patients tolerate the initiated treatment, then BP of 130/80 mmHg should be targeted or even lower in majority of the patients. They further recommend that in patients <65 years the systolic blood pressure should be lowered to a range of between 120–129 mmHg.

2.5.1 Blood Pressure measurement

Accurate measurement and recording of blood pressure is key to the diagnosis of hypertension, hence the American Heart Association as well as the Ministry of health Kenya have given guidelines on how to get an accurate blood pressure. A copy of the guidelines is as attached in the appendix.

It has been noted that clinic BP is most of the time not properly taken, especially due to paying less attention to the set conditions and guidelines which have been recommended for a measurement to be termed as valid measurement of BP. If blood pressure is improperly measured, it can result in wrong classification of patients, overestimating of a client's true blood pressure which often results in unnecessary treatment (ESH, 2018).

In children it's advisable generally to use cuffs corresponding with their ages for accurate determination of BP. Newborns and premature infants should use 4x8cm cuff, infants, 6x12cm and older children 9x18cm. Ambulatory blood pressure is taken by attaching a BP machine on the non-dominant hand of the patient and measurements taken for 24-25 hour basis so that an accurate blood pressure is obtained (MOH, 2018).

2.5.2 Anthropometrics and Lifestyle modification in high blood pressure

The MOH Kenya through a countrywide STEPwise survey in 2015 on various risk factors predisposing to non-communicable diseases, key summary findings were as follows. They found out that 27% of Kenyan population was overweight/obese (38.5% in women, 17.5% in males). On waist hip ratio (WHR), 28% of men were found to have a higher WHR and in women 36% had a higher WHR. The WHR is calculated by dividing circumference of the waist by circumference of the hip, the resulting index is used in identifying those subjects at increased risk to overweight/obesity associated diseases due to abdominal fat accumulation. In interpreting the index, women with a WHR of ≥ 0.85 and men with WHR of ≥ 0.9 are at higher risk of morbidities associated with obesity. On biochemical measurements, 1 in 10 respondents recorded cholesterol of $> 5\text{mmol/L}$, 50% of males and approximately 60% of females had levels of High Density Lipoproteins lower than recommended (normal for men is 1.03mmol/L and that of women is 1.29mmol/L).

Related to these anthropometric findings it was established that 13% of Kenyans consume various forms of tobacco and their related products. The prevalence in men was significantly higher than women at (23%) while that of women was at (4.3%). It further indicated that 19.3% of Kenyans use alcohols, among these 13% consume it daily. It also documents that, nearly quarter (23.2%) of Kenyans add salt to their meals. On fruits/vegetables, majority of Kenyans (94%) consume less than 5 servings of these ingredients per day. On physical activity, it was established that, 6.5% of Kenyans are not engaging in recommended physical fitness. It is recommended by WHO that an adult should engage in at least 150 minutes of moderate/intensity physical activities each week or at least 75 minutes vigorous physical activity weekly. It also found out that 97.7% of Kenyans have never measured their cholesterol levels. Other findings were only 1 in 5 Kenyans has been advised on the recommended fruit servings per day i.e. 5 fruit servings/vegetables daily) , only 8% of Kenyans had been advised on adverse effects of tobacco use, Only 10% had been advised on salt reduction and only 11.4% have been advised to reduction of fat intake (MoH-Kenya, 2015). These indicate a huge gap in health education by the concerned health care professionals especially nurses.

Some of the non-pharmacologic approaches to manage HBP like; stopping usage of tobacco or its various products, reduction of dietary salt , consuming the recommended servings of fruits and vegetables, engaging in the recommended regular physical activities and getting rid of unhealthy alcohol intake which research indicates lowers risk of developing hypertension and CVDs, (Kimani *et al.*, 2019) . Besides the above, drug treatment of conditions like diabetes, hypertension and reduction of high levels of lipids, contribute significantly in prevention of stroke and heart attack. To motivate people to make healthy choices, the health policies should create a conducive environment by ensuring choices are

available and affordable. This will help sustain healthy behavior for longer term health benefits. (WHO, 2017.)

2.6 Blood Pressure and Cardiovascular events

HBP is directly related to the incidence of a number of CVDs related disorders like stroke, MI, sudden death and end stage renal disease, (ESH guidelines, 2018).

Research is also linking hypertension and atrial fibrillation (AF), risk of developing decline in cognition and dementia. Further it is documented that systolic blood pressure appears to better predict CV events than diastolic blood pressure after 50 years of age. Amongst the younger populations (< 50 years), high DBP has been associated with increase in risk of cardiovascular events compared to the older patients. Further it is explained that, diastolic blood pressure declines from midlife due to arterial stiffening, and hence SBP plays a key role as a risk factor from midlife. After midlife, increased pulse pressure has additional adverse prognostic significance (ESH, 2018).

2.7 Adherence to hypertension treatment

The World Health Organization defines treatment adherence as extent to which a client's medication intake and behavior is in line and agrees with set goals and recommendations from a healthcare professional, (WHO, 2003).

The WHO report of 2015 indicated that the average adherence level among patients with long-term illness (chronic) was 50%. Adherence levels are of public health importance since non-adherence to medications lead to poor health outcomes and hence increase the overall cost of healthcare. To address the problem of non- adherence one has to understand its levels/magnitude. However researchers in this area find it a challenge due to lack of standardized tools for measuring adherence levels and hence the challenge of designing relevant interventions to the non-adherence. As it stands now, there is no perfect tool/measure

hence professionals must balance between reliability, practicality and cost effectiveness. Hence a tool with multi measurements approach is the best approach to measurement of adherence, (Fresco, 2015).

Non-adherence can be either primary or secondary. Primary refers to frequency in which a client fails to fill/renew prescriptions when drugs are started. Secondary refers to a situation where drugs are not taken as instructed/prescribed,(Karter *et al.*, 2010).

WHO, has attributed poor medication adherence to multiple factors. These are grouped into five categories: These are economic issues, treatment issues ,patient-associated issues, condition related, and health system issues, (WHO, 2003).

Once it is established that non-adherence is primary or secondary and the factors surrounding it, it becomes easier to design the interventions of individual patients. It is becoming evident that lack of adherence to medications, clinician delay (delay to initiate treatment when the BP is uncontrolled) are the commonest causes of unachieved blood pressure control. Non-adherence to antihypertensive has a correlation with increased risk of cardio-vascular events. Patients discontinuing treatment soon after initiation and lower than recommended dosages of daily treatment, are the most common symptoms of treatment adherence which is poor.

Data indicates that, after approximately six months, more than 1/3, and after approximately one year, about 1/2 of patients are likely to stop their initially prescribed treatment. Studies conclude that non-adherence to prescribed drugs have an effect to more than 50% of the patients who end up with hypertension which is resistant to treatment. Further the study found out that the poor adherence to treatment is strongly and related to the number of drugs prescribed. Hence there is need to detect non-adherence early enough to avoid unnecessary investigations and prescription of new drugs., (Fresco, 2015)

Guidelines have been developed to make treatment simple hence promote adherence which will improve BP control. This is majorly is achieved by prescribing a single combination pill. This has been necessitated by the fact that most drugs which have good outcomes in clinical trials, perform poorly in real live patients. This means that the BP levels anticipated in dosages given as per recommended guidelines may not achieve the BP targets anticipated. Hence need to address the issue of non-adherence and promote pill combinations in hypertension treatment. Available methods to detect no-adherence, are mostly indirect, unreliable, and provide limited information on dosing history.

2.8 Measurement of treatment adherence

The most accurate methods recommended for measuring adherence, is the detection of the levels of prescribed medications in urine. This is despite the fact that they too have their limitations. Another method which can be employed is the direct observation of treatment followed by BP measurement, hours later by home based blood pressure measurement. This can be used to determine if the blood pressure is really resistant despite consumption of the right drug, time and dosage. Use of questionnaires is another way of measuring adherence, however they tend to overestimate adherence to drugs. The advantage with this is that it is cheaper and easy to apply by many healthcare workers in day to day basis, (Fresco, 2015). This is the most commonly used in limited resource settings such as Kenya.

2.8.1 The Hill Bone High BP Compliance Scale (HBCS)

The scale is used in assessing patient behavior for 3 important behavioral areas of HBP measurement. These are whether sodium intake has reduced, keeping of hospital/clinic appointments and taking medications. These domains are broken down into 14 items. Each of the item has a 4 point Likert scale type. This summarized scale provides a simplified method for health workers to assess patients' self-assessed compliance levels and helps put in place

appropriate measures to intervene. A patient is defined to be fully adherent if the maximum score is 8. A score of ≥ 9 is considered non adherent to treatment (Fresco, 2015). A copy of this tool is attached in the appendix.

2.9 Barriers to treatment adherence

Barriers to treatment adherence may be linked to various factors. These include clinicians' attitude, beliefs of patients and their behavior, how complex and tolerable therapies are and the running of a healthcare system among many other factors. Therefore, when assessing non adherence, there should be blameless attitude, and encourages openness in order to identify various barriers to therapy and deal with them. Solutions arrived at should be individualized to the unique issues surrounding the patient. In conclusion, patients should be reminded of their responsibilities towards their own health.

2.10 Role of the Nurse in blood pressure management

Accurate measurement of blood pressure cannot be overemphasized as a starting point in the management of hypertension. This role is mostly conducted by trained nurses who then collaborate with other health care providers to initiate high blood pressure management. In level one and level two facilities which have inadequate capability to treat hypertension it is the accurate measurement of blood pressure that initiates emergency measures and appropriate referral, (Toit, 2013).

A study in the General practice British Journal reported that generally nurses record lower blood pressures compared to doctors. The doctors' systolic blood pressure measurements were on average higher by 7mmHg, while diastolic was on average higher by 3.4mmHg. They concluded that white coat hypertension was diagnosed more based on doctors' readings than nurses' readings, (Clark *et al.*, 2014).

In a survey done in twelve European countries involving 4,127 individuals, aged between 25-64 years, between 2009-2012, on challenges in standardization of blood pressure measurement, significant disparities were recorded when patients' blood pressure was taken without standardized guidelines. Patients whose blood pressure was measured with full bladder recorded an additional SBP of between 10-15 mmHg, and additional DBP of 10mmHg. Those who had smoked before BP measurement recorded an increased SBP of 10mmHg, and a DBP of 8mmHg. Those who did not rest at least 5 minutes before measuring of BP recorded an additional average SBP increment of between 10-20 mmHg and DBP of 14mmHg. Other factors which increased DBP/SBP were patients taken BP while legs were crossed, arm used for BP measurement was below heart level, talking while BP was being taken, too fitting cuff and measurement of BP in a cold room (Tolonen *et al.*, 2015)

Several interventions can be used to address adherence to treatment. First it is important to link prescribed drugs with patient habits, give adherence feedbacks to clients, encouraging the monitoring of self/individual blood pressure, packaging pills in special pill boxes for easy remembrance and interviewing with motivation. Collaboration among various healthcare providers/workers should be encouraged to increase drug adherence. Multiple approaches have a greater effect towards promoting adherence. Data suggests that ICT can be used to improve adherence to therapy. By way of transmitting home BP values and by frequent communication with clinicians, (ESH/ESC, 2018)

Prescription with administration of appropriate drug regimen is very important. This can be achieved through the management of anticipated drug-related adverse effects, using drugs which are long-acting and possibly need once daily dosing, complex schedules for dosing should be avoided and using single pill combination (SPCs) where possible. Fixed dose combinations are highly recommended since they minimize toxicities and side effects. Since

these combinations relatively lower costs, they also promote adherence to treatment (MOH Kenya, 2018).

A research done in Uganda showed that WHO guidelines on management of hypertension are not utilized hence an interventional study to improve nurses' attitudes, knowledge and skills in hypertension management was carried out which yielded positive results. (Katende, Groves and Becker, 2014). Among common questions the nurses face in their health education from clients is whether antihypertensive therapy be reduced or terminated at some point. ESH in their guidelines note that patients whose treatment results in effective BP control for a long period of time, there is a possibility to scale downwards the number/dosage of drugs. This however has to be accompanied by successful lifestyle modification. It is however cautioned that the reduction should be gradual and the patient is monitored closely to avoid rebound hypertension. Patients having a positive hypertension history modifying organ disease should not have their medication stopped ESH/ESC, 2018).

When educating hypertensive patients about non-pharmacological management of hypertension the AHA recommends that diet approaches to manage hypertension, rich in various veges, variety of fruits, whole grains and low fat dairy products. The guidelines also recommend reduction of sodium intake and potassium intake increase to reduce blood pressure. However it should be noted that some patients may be at risk by excess potassium intake especially those with renal disorders on treatment (American Heart Association, 2017).

2.11 Theoretical framework

The study will adopt Callista Roy's Adaptation theory. The adaptation model by Callista Roy is a commonly used theory in nursing which is aims at accelerating and improving individual's adaptation to health and disease including hypertension (Dilek, 2018).

Developed in the 70's, this model was fully published in 1999 by Roy and Andrew. Roy's model presents a human being as an adaptive system in constant interaction with both external/ internal environments (Alligood, 2014). She further explains that one of the major tasks of the human being as a system is adaptation and maintenance of its wellbeing in case of any changes in internal or external environment. Adaptation can result in highest level of health and wellbeing, to improved quality of life or result in dignified death, (Bartlet, 2010).

A study done in 7 health centers on outcomes of educational intervention provided using the adaptation model on management of hypertension, found out that after an education program, the experimental group mean score on adaptation index to medical treatment improved from 42.8 to 45.9. the average BP measurement also improved from 149.40 to 139.80, (Dilek, 2018)

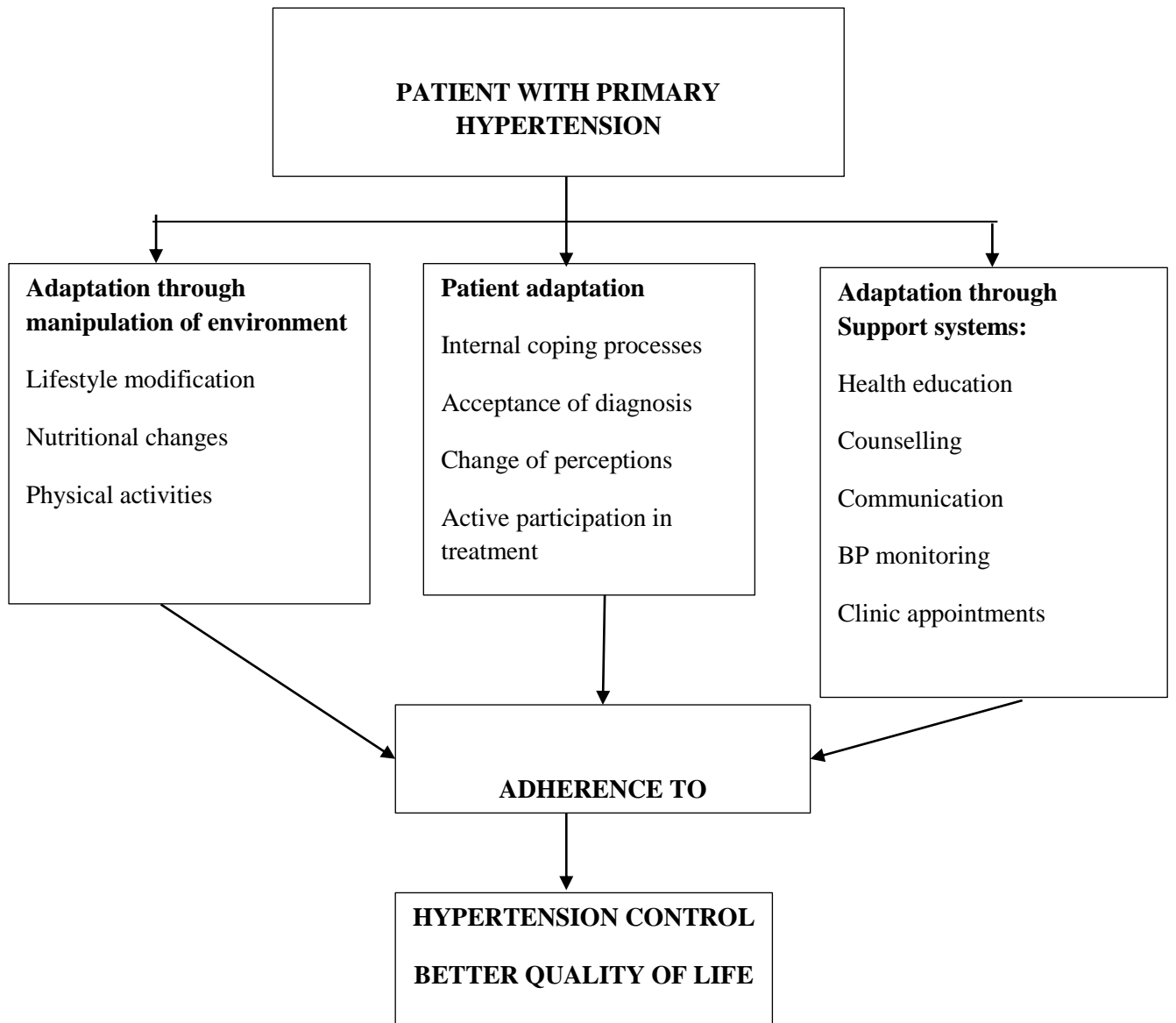


Figure 2.1: Theoretical framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter entails, the study design and location, target population, sampling techniques and sample size, research tools, data collection methods as well as methods of data analysis. This chapter also covers the ethical considerations for this research.

3.2 Study Design

A descriptive cross-sectional study design was employed. Choice of cross sectional design was informed by the fact that data was collected at specific point in time without follow-up. The respondents were interviewed once at the Medical outpatient clinics without follow-up interviews.

3.3 Study area

This study was conducted at KNH, largest Referral/Teaching hospital nationally and regionally. Situated along hospital road in Upper hill area approximately 3 kilometers from the Nairobi's CBD. Its bed capacity is 1800 though sometimes the numbers can go as high as 3000 due to bed sharing.

The study was carried out at the outpatient general medical clinics where hypertensive patients are seen at Kenyatta National Hospital. This is where patients are assessed and if their condition can be managed as an outpatient they are treated and booked for the next clinic, if not manageable as an outpatient they are admitted for further management in the medical wards. These clinics receive referrals from Nairobi, neighboring counties and across the country. KNH runs five medical outpatient clinics per week and there are 8 medical wards where hypertensive patients can be admitted. The hypertensive patients are seen in the general medical outpatient clinic. This implies that hypertensive patients don't have a specific clinic set aside for hypertensive cases. They are seen alongside other general medical

conditions except TB, asthma and HIV/AIDS which have separate specialized clinics set aside for them.

On average 50 hypertensive patients are seen per clinic day of which on average 16 are new hypertensive cases per clinic day. This was obtained from the KNH Health Information System in January 2019. In patient data obtained from the KNH health information system also indicated that there were 1,549 hypertensive in-patients between January –December 2018. Translating to an average of 129 patients per month in the wards. This study was conducted specifically at the outpatient medical clinics where the hypertensive patients were seen.

3.4 The Target Population

Target population was the primary hypertensive patients seen at the medical outpatient clinics at KNH. They should have been diagnosed and managed for at least six months before commencement of the study, started on treatment either by pharmacological therapy or lifestyle modification. They must have had health education on hypertension management by a health professional (nurse, doctor or nutritionist) either as an individual or as a group prior to the study. On average 50 hypertensive patients are seen per clinic day of which 16 are new hypertensive cases per clinic day.

3.5 Sample Size and Sampling Techniques

A sample is a small representative group which is obtained from the study population, (Mugenda and Mugenda, 1999). They further state that sampling is a process of selecting a number of subjects in such a manner that the selected cases represent the larger group. They further explain that it should be a good representation of the population characteristics on which the judgment is to be based.

Since the target population was less than 10,000, the Yamane formula was used to calculate the sample size (Yamane, 1967).

$$nf = n / \{1 + [(n)/N]\}$$

nf = the desired sample size when population is less than 10,000

n = the desired sample size when population is more than 10,000

N = the estimate of the population size

$$nf = 220 / \{1 + [(220)/420]\}$$

$$nf = 220 / 1.5$$

$$nf = 146.7 = 147$$

This sample was randomly distributed throughout the month of study in the outpatient medical clinic till the total of 147 is achieved.

3.5.1 Inclusion criteria

Patients who were diagnosed with primary hypertension as it was reflected in the patient's file. The patient should have been on follow-up for a period of not less than 6 months. The patient must have had health education sessions on hypertension management with a doctor, nurse or nutritionist either as an individual patient or as a group. The patient also must have been on management for hypertension by pharmacological therapy. Those patients subsequently willing to give a signed consent were involved in the study.

3.5.2 Exclusion Criteria

The study excluded; newly diagnosed (less than 6 months since diagnosis) hypertensive patients and those who were known to have secondary hypertension. Those patients on lifestyle modification only and yet to start pharmacological therapy were also excluded. This

is because the Hill-Bone tool for assessing treatment adherence assessed both pharmacological therapy and lifestyle modification.

3.5.3 Sampling Procedure:

Prior to the beginning of the medical clinics in the morning, files of patients booked for that day were retrieved from the medical records office. The files were perused and the patients who met the inclusion criteria were identified using their out-patient numbers. Then simple random sampling was employed in picking respondents by asking them to pick a piece of paper from a box which was marked yes/no. Those who picked yes and consented to participate were involved in the study. This was repeated each clinic day during the medical outpatient clinic days for one month.

3.6 Tools

A structured questionnaire was utilized to collect data from patients (see appendix VII)

3.7 Validity

To ensure validity the researcher consulted with experts in this area of cardiovascular specialty. These were: physicians working in the outpatient clinic, nurses with experience in running hypertension clinics, nurse trainers and researchers with a bias to cardiology nursing. This was to ensure both construct and content validity. This helped refine the data collection tool.

3.8 Reliability

The study instrument was pre-tested in Mbagathi County Referral Hospital outpatient clinic where 14 questionnaires (10%) of the total (n=142) were administered. The data was tested for reliability and a Cronbach's alpha of 0.7 was obtained. This helped to reaffirm that the data collection tool was reliable since it was within the range of 0-1 as recommended (Tavakol and Dennick, 2011)

3.9 Data Collection

A structured questionnaire was used in collecting data, as shown in the appendix VII. It was interviewer administered after consent. The structured questionnaire collected data on the patient demographic characteristics, pharmacological, non-pharmacological treatment adherence and the current overall adherence levels of patients using the modified Hill-Bone tool.

3.10 Ethical Considerations

KNH/UoN Ethics and Research Committee authorized this study prior to commencement (*Appendix XI*). Authorization and consent was sought from clinic in-charge and head department Medicine KNH (*Appendix XII*) prior to commencement of the study. Further the research proposal was registered with the KNH research registry and KNH research approval forms filled and signed (*Appendix X*). Respondents were taken through the informed consent form before they took part in the study (informed consent attached in the *Appendix III*). They were explained purpose of the study, it was also emphasized that the study had no physical or economic risks, were assured of utmost confidentiality and there wouldn't be denial of access to any services for choosing to abstain from the study. Respondents were also informed that participation was voluntary. Withdrawal at any point was also allowed. After taking them through the consent they were requested to sign a consent form prior to data collection.

3.11 Data management and Data Analysis

Quantitative data was obtained. Before data analysis, data was cleaned, checked for completeness to ensure reliable outcomes. It was planned that in case of incomplete data follow-up would be made and if not successful, the statistician would be consulted for advice the best way to avoid affecting accuracy of the results. Data (Quantitative) collected was analyzed using computer software SPSS version 24.0. Used to analyze, summarize and

organize data. The generated data was presented in frequencies, percentages and distributions. Relationship between variables was also analyzed.

3.12 Dissemination of study findings

The findings of the study was disseminated through the Medical Outpatient Nurses morning report meetings, feedback to department of Medicine KNH, National Nurses' Scientific conferences, UoN library and publication in referee journals.

CHAPTER FOUR: RESULTS AND FINDINGS

4.1 Introduction

The study was inspired by a desire to assess treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital. The study used a number of statistical tools to determine the relationship between pharmacological, non-pharmacological and socio demographic characteristics on treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital. The response rate was (n=114) 80%.

4.2 Socio- Demographic Characteristics

About a third of the respondents were aged between 40 -49 years (31.3%) while those less than 20 years (3.6%) were the least, (**Table 4.1**). There was a higher female representation (57.1%) than male (42.9%). The respondents were mostly married (62.3%) and they came from Nairobi County (73.1%). Those in formal employment were approximately 41.1% followed by those in business (29.9%). Respondents attained different levels of education: University (8.8%), diploma (22.8), secondary (24.6%) and primary (21.9%). Those who have never been to school were 9.6%. Majority (61.1%) were Protestants while the Muslims were the least (11.5%). On residence, majority (73.1%) were from Nairobi County while the rest were from other counties within Kenya.

Table 4.1: Demographic characteristics of respondents

Socio demographic factors	Frequency (n)	Percentage (%)	
Age	Less than 20 years	4	3.6
	20-29	14	12.5
	30-39	13	11.6
	40-49	35	31.3
	50-59	21	18.8
	Over 60 years	25	22.3
	Total	112	100.0
Gender	Male	48	42.1
	Female	66	57.9
	Total	114	100.0
Marital status	Married	71	62.3
	Single	24	21.1
	Separated	8	7.0
	Widowed	11	9.6
	Total	114	100.0
County residence	Nairobi	79	73.1
	Machakos	5	4.6
	Kajiado	7	6.5
	Kiambu	16	14.8
	Nakuru	1	.9
	Total	108	100.0
Occupation	Formal employment	44	41.1
	Farmer	5	4.7
	Businessman	32	29.9
	None	26	24.3
	Total	107	100.0
Level of education	Never been to school	11	9.6
	Primary level	25	21.9
	Secondary level	28	24.6
	Certificate	14	12.3
	Diploma	26	22.8
	University	10	8.8
	Total	114	100.0
Religion	Protestant	69	61.1
	Catholic	31	27.4
	Muslim	13	11.5
	Total	113	100.0
Employment status	Employed	44	38.9
	Unemployed	23	20.0
	Self-employed	43	38.1
	Total	113	100.0

4.3 Social demographic characteristics and blood pressure control

Overall there was a relationship between socio demographic characteristics and adherence to hypertension treatment among post health educated patients at KNH. This was statistically significant on respondents' age, level of education and employment status (**Table 4.2**).

Systolic blood pressure tended to be higher as the patient advanced in age. In education, respondents with higher educational attainment had better blood pressure control. In employment, respondents who had formal employment, had better blood pressure levels (**Figures 4.1, 4.2 and 4.3**) respectively. In payment for health services, majority of the respondents (67.7%) paid out of pocket, 21.1% by family members and 11.3% through insurances (**Figure 4.4**).

Further analysis with chi-square revealed that young patients ($p=0.011$), higher education attainment ($p=0.03$) and formally employed ($p=0.031$) were likely to adhere to hypertension treatment.

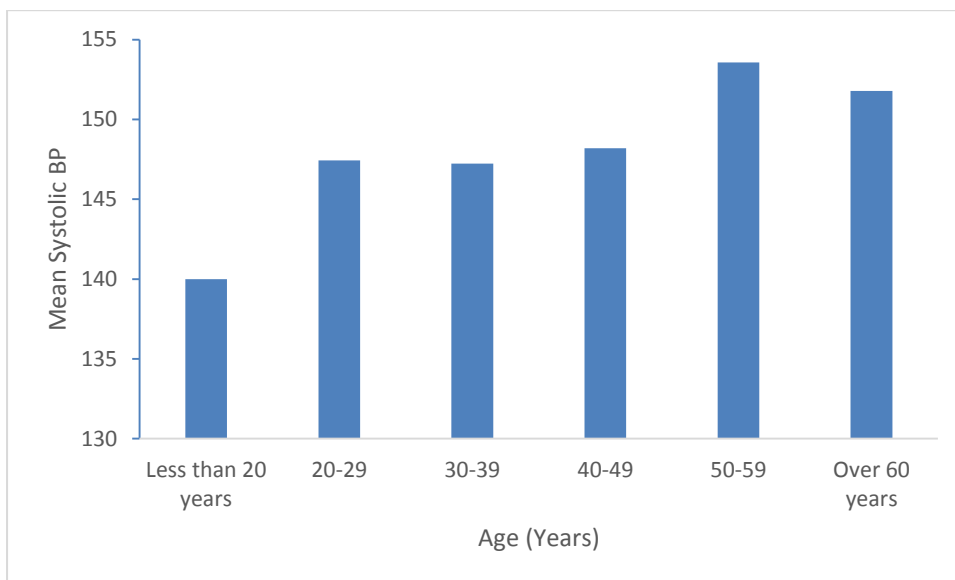


Figure 4.1: Relationship between age and systolic blood pressure

Table 4.2: Relationship between socio demographic characteristics and adherence

Socio demographic factors		Adherent	Non adherent	χ^2 (P-value)
Age	Less than 20 years	3(73.51%)	1(29.4%)	2.587 (0.011)
	20-39	18(66.79%)	9(37.3%)	
	40-49	28(807%)	7(22.4%)	
	50-59	16(76.25%)	5(26.6%)	
	Over 60 years	19(76.6%)	6(26.9%)	
	Total	84(7528%)	28(28%)	
Gender	Male	33(68.815%)	15(35.6%)	1.47 (0.145)
	Female	50(75.816%)	16(27.6%)	
	Total	82(71.932%)	32(32%)	
Marital status	Married	52(73.219%)	19(30.5%)	0.338 (0.736)
	Single	18(73.56%)	6(30.1%)	
	Separated	6(73.52%)	2(30.3%)	
	Widowed	10(90.91%)	1(10.4%)	
	Total	84(73.530%)	30(30.2%)	
County residence	Nairobi	60(75.919%)	19(26%)	0.05 (0.96)
	Machakos	5(1000%)	0(0%)	
	Kajiado	7(1000%)	0(0%)	
	Kiambu	11(68.85%)	5(33.8%)	
	Nakuru	1(73.50%)	0(29.4%)	
	Total	79(73.529%)	29(28.6%)	
Occupation	Formal employment	32(73.512%)	12(28.4%)	0.319 (0.75)
	Farmer	5(1000%)	0(0%)	
	Businessman	24(73.58%)	8(28.4%)	
	None	22(84.64%)	4(16.5%)	
	Total	79(73.528%)	28(28.4%)	
Level of education	Never been to school	8(73.53%)	3(30.4%)	2.205 (0.03)
	Primary level	19(76.6%)	6(27.4%)	
	Secondary level	22(78.66%)	6(24.4%)	
	Certificate	10(73.54%)	4(30.2%)	
	Diploma	20(76.96%)	6(26.3%)	
	University	7(73.53%)	3(30.1%)	
	Total	84(73.530%)	30(30.2%)	
Employment status	Employed	32(73.512%)	12(30%)	2.005 (0.031)
	Unemployed	15(65.28%)	8(39.2%)	
	Self-employed	35(81.48%)	8(21%)	
	Student	2(73.51%)	1(29.4%)	
	Total	83(73.530%)	30(29.9%)	

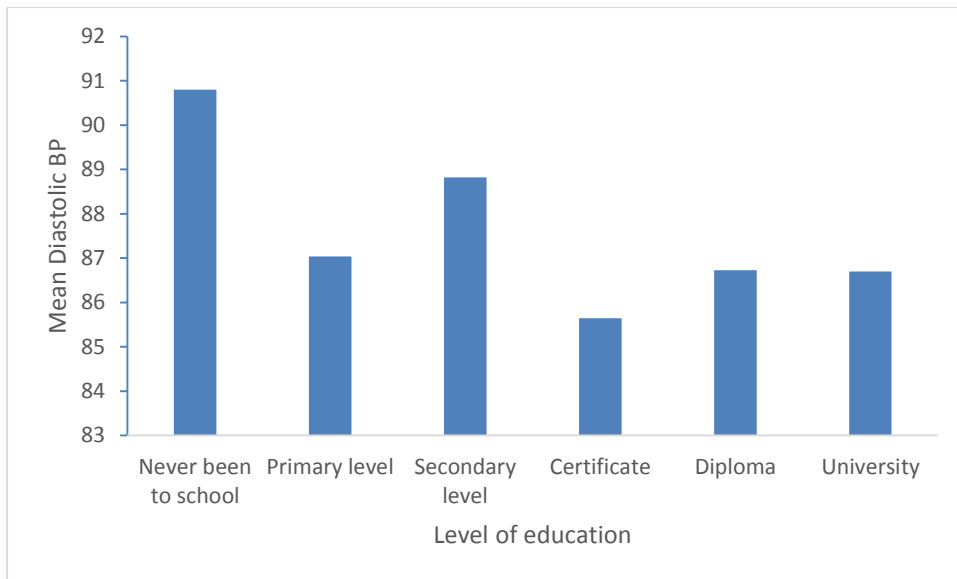


Figure 4.2: Relationship between education level and DBP

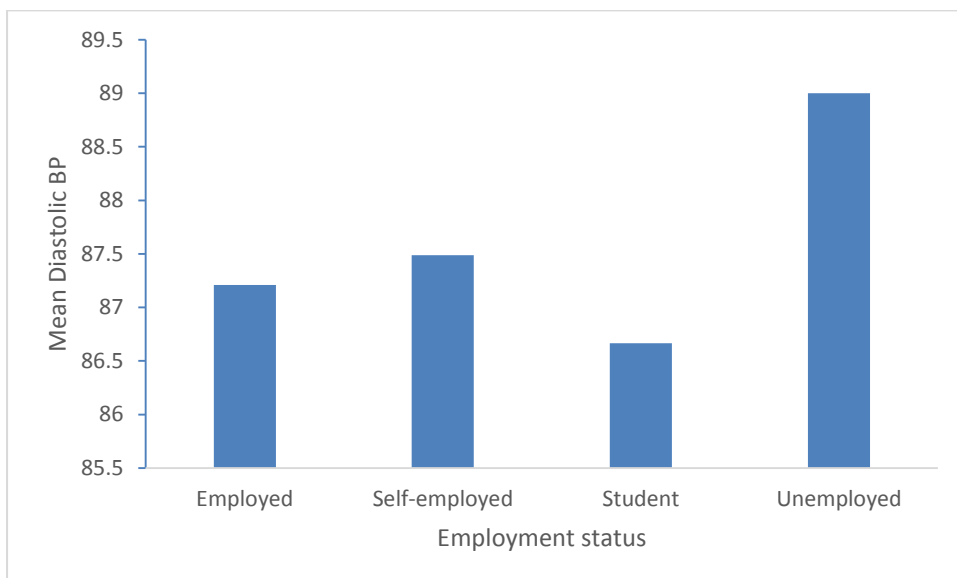


Figure 4.3: Relationship between employment status and blood pressure control

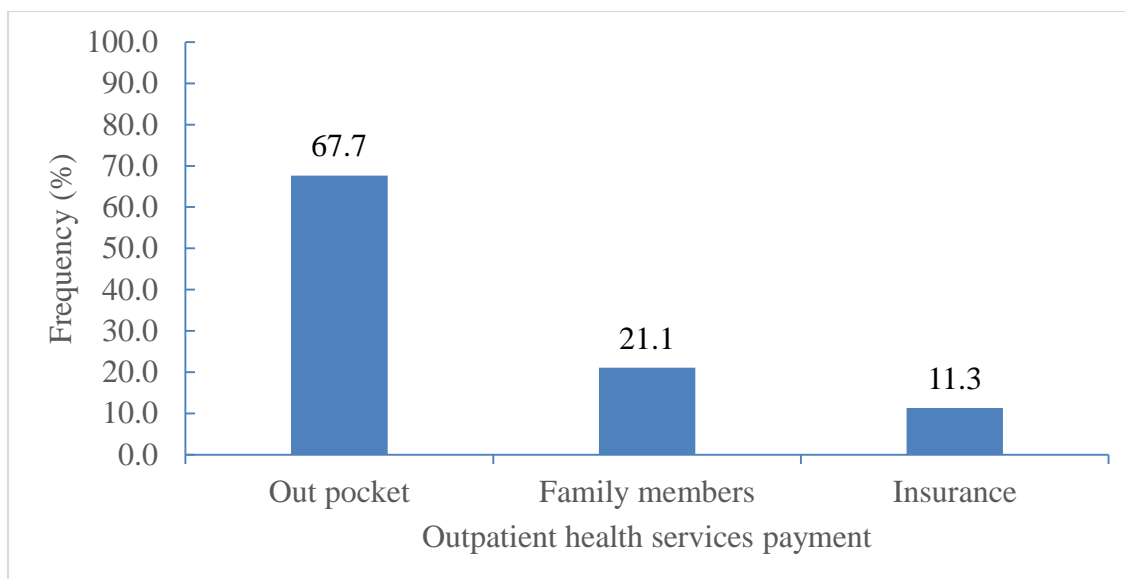


Figure 4.4: Payment means for clinic services

On NHIF cover, majority (93.0%) of the respondents have enrolled and of those with NHIF cover, 90.4% of them the cover is up to date. Further association by chi-square showed a significant relationship between NHIF card holding and adherence to treatment ($\chi^2=1.972$, $p=0.016$).

Table 4.3: Relationship between NHIF card holding and adherence to hypertension treatment

Pharmacological treatment aspects		Adherent	Non adherent	$\chi^2(P\text{-value})$
NHIF Card holders	Yes	59(71.2%)	24(28.8%)	1.972 (0.016)
	No	4(70.8%)	2(29.2%)	
	Total	63(70.8%)	26 (29.2)	

4.4: Non –pharmacological approaches and hypertension treatment adherence

This subsection aimed at establishing the extent to which hypertensive patients have complied with non-pharmacological approaches to treatment and hypertension control. Approaches included health education on diet, exercise, and lifestyle modification. The pre-

selected indicators here were anthropometric measurements, biomarkers and diet modification.

4.5.1: Sources of health education and blood pressure control among respondents

Respondents were asked to state the professional who provided health education when they attend medical clinic appointments (**Table 4.4**). Majority (55.8%) received hypertension health education from nurses, followed by doctors (32%) as well as nutritionists (11.6%). Further analysis showed that respondents educated by nurses ($p=0.02$) were more likely to adhere to hypertension treatment.

Table 4.4: Sources of hypertension related health education among the respondents

Professional	Percentage (%)	Mean diastolic BP (mmHg)	Time adequacy (%)	p-values
Nurses	55.8	87.3	50	0.02
Doctors	32.1	90.1	15	0.08
Nutritionists	11.6	89.5	35	0.10

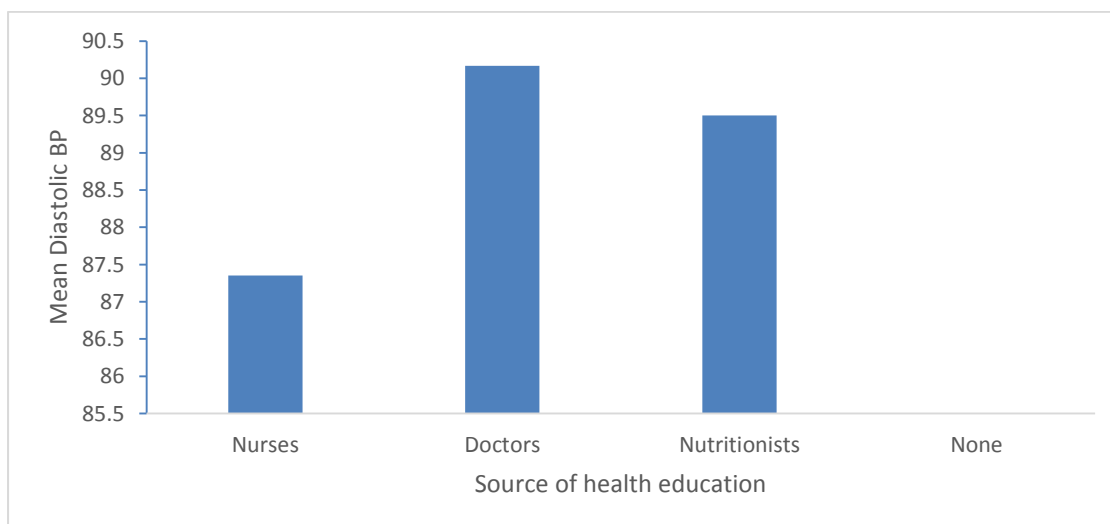


Figure 4.5: Sources of health education and blood pressure control

4.5.2: Hypertension related health messages shared by the health professionals

Regarding health messages, respondents were educated on, reduced salt intake (78%), exercise (69%), and (23%) on lifelong compliance to antihypertensive medications (**Table 4.5**). Further analysis showed that failure of emphasis on lifelong strict compliance to antihypertensive medication was likely to impact on compliance negatively.

Table 4.5: Hypertension related messages shared by the health professionals

Health message	Frequency(n)	Percentage (%)	p-values
Weight loss	75	66	0.07
Reduced salt intake	89	78	0.06
Exercise	79	69	0.08
Dietary modification	63	55	0.06
Lifetime compliance to antihypertensive treatment	25	23	0.02
Total	331	100.0	

4.6. Anthropometric measurements of patients with hypertension

The anthropometrics parameters included weight, height, BMI and WHR as markers for hypertension treatment adherence. Majority (70%) of the respondents were overweight, 2.7% were obese and 26.5% were normal (**Figure 4.6**). Further analysis by logistic regression showed that respondents with higher BMI were less likely adherent to treatment (**Table 4.6**).

Table 4.6: Association between BMI and adherence to hypertension treatment

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.458	.597		.766	.446
Systolic	.001	.002	.048	.417	.678
Diastolic	.002	.004	.066	.580	.564
Current BMI	.036	.024	.210	1.454	.015
Pulse rate	-.002	.005	-.040	-.357	.722
WHR	.427	.751	.081	.568	.571

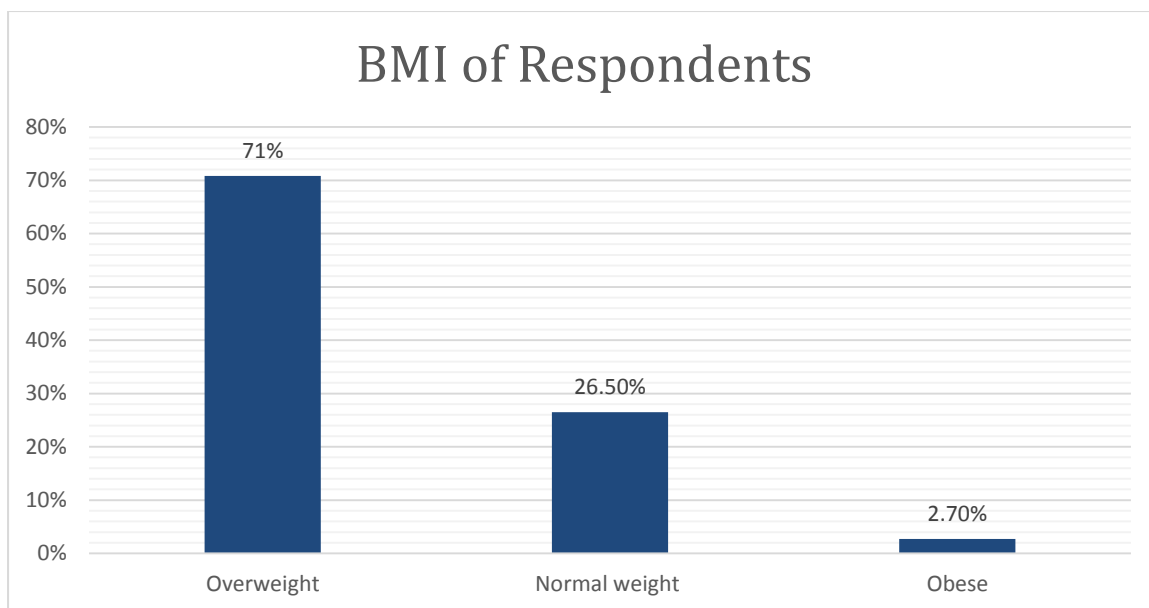


Figure 4.6: BMI of respondents

On waist hip ratio, the mean WHR for males and females was 0.86 and 0.80 respectively. The WHO recommendation for WHR ratios are < 0.85 for males and < 0.75 for females. Overall 35% of the males and 43% of the females had a higher WHR than recommended. Females ($p=0.01$) and males ($p=0.03$) with parameters above the WHO recommendation were less likely to be poorly adherent to hypertension treatment (Table 4.7).

Table 4.7: Average waist to hip ratio (WHR), among hypertensive patients

Gender		WHR	WHO RECC	p- value
Male	n	46		
	Mean	.8615	< 0.85	0.03
	Std. Deviation	.05777		
Female	n	64		
	Mean	.8023	<0.75	0.01
	Std. Deviation	.09277		

4.7: Biochemical measurements of patients with hypertension

Selected biomarkers done in the last 2 months of sampled patients were recorded from the patient files. Of the respondents, 55% of males had low HDL compared to similar

measurements in 62% females (**Table 4.8**). On total cholesterol, (50%) of men had total cholesterol above normal (> 5mmol) and (50%) of women had total cholesterol > 5mmol/L. further analysis via logistic regression showed that those with high LDL were less likely (p=0.09) to adhere to hypertension treatment (**Table 4.9**).

Table 4.8: Biochemical marker levels among respondents

Gender		Latest LDL	Percentage above normal	Latest HDL	p- value
Male	n	45		45	
	Mean	3.0593	55%	1.33	0.03
	Std. Deviation	1.15110		.411	
Female	n	61		61	
	Mean	3.2000	62%	1.43	0.01
	Std. Deviation	1.20049		.525	

Table 4.9: Association between latest HDL, LDL and adherence to hypertension treatment

Coefficients ^a						
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	Constant	.458	.597		.766	.446
	Current BMI	.036	.024	.210	1.454	.015
	WHR	.427	.751	.081	.568	.571
	Total Cholesterol	-.041	.037	-.141	-1.095	.277
	Latest LDL	.098	.037	.338	2.687	.009
	Latest HDL	-.076	.073	-.109	-1.045	.299
a. Dependent Variable: Adherence to treatment						

4.8: Pharmacological characteristics and adherence to treatment

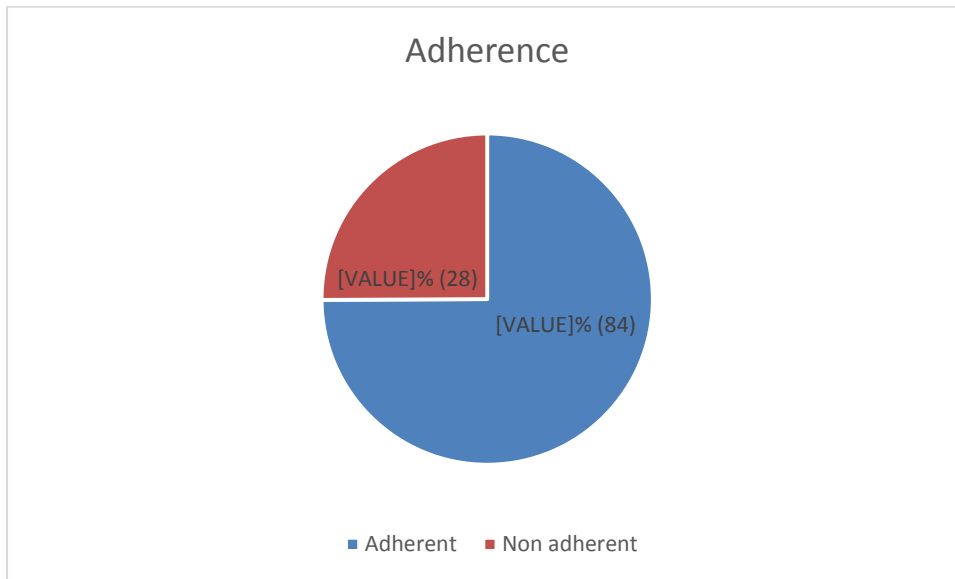


Figure: Summary of Hill Bone HBP scale

Majority of the respondents 84(74.9%) of respondents adhered to treatment while 28(25.1%) were non adherent using the Hill Bone HBP score. The individual item scores are attached in the Appendix IV.

Majority of the respondents (50.9%) were prescribed two tablets while 26.8% were on single tablet and 22.3% three or more tablets (**Table 4.10**). Most respondents (64.3%) indicated that more than two tablets were a burden compared to 35.7% who were of the contrary opinion. Most respondents (75%) use a combination of angiotensin receptor blockers (losartan), diuretics (hydrochlorothiazide) and β (beta blockers), calcium channel blockers and the least were Angiotensin Converting Enzyme inhibitors used by 3% respondents. When asked whether there were other drugs taken other than antihypertensive drugs, 53.5% of the patients indicated that they take other drugs besides antihypertensive medications. Most of them (50.9%) were on lipid lowering drugs (statins). Majority of the respondents experienced side effects (82.2%) while using drugs in hypertension treatment. The most common side effect reported was cough (21.6%) while reduced libido was recorded in 2.6% of the respondents.

Analysis by chi-square showed that owning an active NHIF card was likely to influence (p=0.016) adherence to hypertension treatment. However respondents on high number of antihypertensive medications were likely (p=0.000) to falter in treatment adherence (**Table 4.12**).

Table 4.10: Number of prescribed tablets taken by hypertensive patients

Prescribed antihypertensive tablets	Frequency (n)	Percentage (%)
One	30	26.8
Two	57	50.9
More than three	25	22.3
Total	112	100.0

Table 4.11: Classes of drugs taken by hypertensive patients

Current hypertension	Frequency (n)	Percentage (%)
ARBs/HCTZ + β blockers	86	75
Calcium C. blockers	17	15
ACEs inhibitors	3	3
Central acting agents	8	7
Total	114	100.0

Table 4.12: Relationship between pharmacological characteristics and treatment adherence

Pharmacological treatment aspects		Adherent	Non adherent	χ^2 (P-value)
NHIF Card holders	Yes	59(71.2%)	24(28.8%)	1.972 (0.016)
	No	4(70.8%)	2(29.2%)	
	Total	63(70.8%)	26 (29.2)	
Perception to drugs as a burden	Yes	51(70.5%)	21(29.5%)	0.013 (0.989)
	No	28(70.1%)	12(29.9%)	
	Total	79(70.5%)	33(29.5%)	
Side effects from antihypertensive drugs	Yes	68(77.2%)	20(22.7%)	0.76 (0.449)
	No	13(69.1%)	6(31.9%)	
	Total	81(75.7%)	26(24.3%)	
Number of antihypertensive drugs prescribed	Yes	55(76.9%)	16(23.1%)	4.083 (0.000)
	No	32(77.2%)	10(22.8%)	
	Total	87(77.0%)	26(23.0%)	

4.9 Hypothesis Test: Association between hypertension health education and adherence to hypertension treatment

Chi square analysis (**Table 4.13**) was done to test the hypothesis. Results showed that the association between being health educated on hypertension ($\chi^2=15.186$, p-value = 0.021), source of health education ($\chi^2=31.487$, p-value ≤ 0.001) and treatment adherence was statistical significance. Null hypothesis was thus rejected.

Table 4.13: Association between health education and adherence to treatment

Health education aspects		Adherent	Non adherent	χ^2 (P-value)
Being educated on hypertension	Weight loss	58(77.3%)	17(22.7%)	15.186 (0.021)
	Reduced salt intake	65(73%)	24(27%)	
	Exercise	60(75.9%)	19(24.1%)	
	Dietary modification	45(71.4%)	18(28.6%)	
	Lifetime compliance	18(72%)	7(28%)	
N	246(74.3%)	85(25.7%)		
Source of health education	Nurses	79(74.5%)	27(25.5%)	31.487 (≤ 0.001)
	Doctors	41(67.2%)	20(32.8%)	
	Nutritionists	15(68.2%)	7(31.8%)	
	N	136(71.6%)	54(28.4%)	
Adequacy of time allocated	Yes	22(68.8%)	10(31.3%)	0.789(0.178)
	No	48(71.6%)	19(28.4%)	
	N	70(70.7%)	29(29.3%)	

CHAPTER FIVE: DISCUSSION

5.1 Introduction

A cross sectional, hospital based study whose aim was to assess treatment adherence in hypertension control among health educated primary hypertensive patients attending medical outpatient clinic at KNH, Nairobi Kenya. The discussion is per objectives of the study and their respective findings. In summary, results indicated that advanced age, low education, unemployment, sedentary lifestyle and multiple pills were generally associated with poor adherence to hypertension treatment. In overall hypertension health educated patients were more adherent to treatment compared to the non-educated hypertensive population.

5.2 Demographic Factors and Hypertension Treatment Adherence

Overall there was a relationship between socio demographic characteristics and adherence to hypertension treatment among post health educated primary hypertension patients at KNH. This was statistically significant in respondents' age, level of education and employment status. Systolic blood pressure tended to be higher as the patient advanced in age. In education, respondents with higher educational attainment had better blood pressure control which was an indicator of adherence to treatment. On the other hand in employment, respondents who had formal employment had better blood pressure control.

Poor adherence among the aged can among others be attributed to age-related cognitive changes seen among older people. Furthermore, increase in average systolic blood pressure as one advances in age can be partly explained by the physiological changes that take place in the cardiovascular system including stiffness of arteries, calcification and other arteriosclerotic structural changes.

The findings are similar to a study carried out in a referral hospital in Ethiopia which showed that patients with hypertension who were more than 60 years old were less likely (67%) to

adhere to antihypertensive therapy compared to younger patients (Teshome *et al.*, 2017). Furthermore the findings are consistent with studies done among African Americans (Solomon *et al.*, 2015). However the adherence levels in this KNH study were higher than studies done in slum areas India (Venkatachalam *et al.*, 2015) and in Congo-Brazzaville (Lulebo *et al.*, 2015). In another study done at KNH findings indicated that advancement in age was associated with higher diastolic blood pressure (BP) ($p < 0.05$), HR and total cholesterol, (Kimani *et al.*, 2019). This finding is in agreement with findings in this study which showed poor adherence and blood pressure control among respondents advanced in age.

Differences in education levels has an implication on individual access to media (both print, written and internet based) as extra sources to hypertensive related health information. This might explain the possible reason for the difference in adherence levels seen between the more educated than the less educated population. A study on association between level of education and hypertension treatment adherence concluded that patient's knowledge on the disease significantly and independently determines good adherence (Jankowska-Polańska *et al.*, 2016). In another study on adherence and associated factors among primary hypertensive patients at a hospital in Ethiopia reported that hypertension knowledge and its management were positively and to a greater extent associated with adherence (Teshome *et al.*, 2017). Another study done at KNH concluded that younger patients and those educated on hypertension treatment were likely to be adherent to treatment than older patients (Achieng, Karari & Joshi, 2008). Finally a study done in Poland indicated that compliance levels and adherence to hypertension treatment are higher in patients with a higher educational attainment (Chudiak, Uchmanowicz & Mazur, 2018). It can hence be concluded that higher education attainment is associated with better treatment adherence among health educated hypertensive patients.

5.2 Socio-Economic Factors and Hypertension Treatment Adherence

With half of the respondents indicating that financial constraint is the major reason for not taking medications as prescribed, there is a danger of lack of consistence/persistence as recommended to avoid long-term cardiovascular risks. Non-adherence occurs when a hypertensive client does not: start a fresh prescription, implements as instructed, or persist with therapy (Vrijens *et al.*, 2017). Vrijens *et al* also indicated that hypertension is public health problem in LMI countries and affirm that affordability of drugs is an important issue in medication adherence.

Financing long term treatment has financial implications ranging from securing transport to clinics, purchase of drugs and purchase of recommended food especially fruits and vegetables. However persistence with therapy greatly minimizes long-term cardiovascular risks (Corrao *et al.*, 2011).

Studies have further shown that failure of patients to initiate fresh prescribed treatment is as high as 28% in an analysis computerized prescriptions (Vrijens *et al.*, 2017). A study done at KNH suggested that cost and availability of drugs seemed to play a big role in treatment adherence (Achieng, Karari, & Joshi , 2008).

5.3 Pharmacological Aspects and Hypertension Treatment Adherence

5.3.1 Number of pills and treatment adherence

There was generally an improvement in the overall adherence levels among health educated hypertensive patients which measured at 75% ($p=0.001$) compared to the WHO average of 50%. This can be attributed to the intervention of health education provided by Nurses, doctors and nutritionists.

The WHO report of 2015 indicated that the average adherence levels among patients with chronic illnesses was 50% in developed countries. Adherence levels are of public health

importance since non-adherence to medications lead to poor health outcomes and hence increase the overall cost of healthcare.

The prescribed number of pills taken by patients was significantly associated with treatment adherence. This study revealed that patients who took a single drug per day were more likely to adhere to therapy compared to patients who took multiple/many drugs in a day. The number of tablets prescribed and association with treatment adherence was statistically significant ($\chi^2=4.083$) and ($p=0.000$). This was further qualified by approximately three quarters of the adherent group viewing taking more than two tablets as a treatment burden. Majority of the respondents were on a combination of ARBs/HCTZ + Beta blockers. This is despite the fact that combined therapy is recommended by the Kenya Cardiovascular guidelines for effectiveness in achieving optimum blood pressure control. This can be mitigated by using fixed drug combinations to reduce the pill burden.

A study done at KNH also found out there was poor adherence with increased number of pills. Poor drug combinations and failing to get optimal doses may have resulted in blood pressure control in adherent patients, (Achieng, Karari & Joshi M, 2008).

Suboptimal therapy which is associated with therapeutic inertia, has also been attributed to poor blood pressure control which is the failure of clinicians to begin new medications or increase dosages when an abnormal BP is noted, (Sarfo *et al.*, 2018)

The effect of multiple pills on adherence might be due to the fact that when the number of drugs patients takes increase, they might lead to confusion about drugs and time. This decreases adherence to therapy. With increasing pill burden, cumulative side effects of the drugs, like GIT upset which was indicated as a common side effect by more than half of the respondents, may discourage proper use of the prescribed medications.

A study done in Ethiopia to assess medication adherence and associated factors concluded that taking less than two drugs per day was significantly associated with better medication adherence (Teshome *et al.*, 2017). This finding is in agreement with other studies done in Cameroon (Adidja *et al.*, 2018) and in a tertiary hospital in India (Venkatachalam *et al.*, 2015).

To address the issue of multiple pills, studies recommend one/single-pill fixed-dose combinations to make pill taking simple. Re-packing of drugs can also be utilized as a way to improve treatment adherence (Vrijens *et al.*, 2017). Other studies, (Mancia *et al.*, 2013) and (Gupta *et al.*, 2010; Sherrill *et al.*, 2011) agree that single-pill FDCs can reduce pill burden simplifying treatment regimens hence significantly improving adherence and BP control.

5.3.2 Drug side effects and hypertension treatment adherence

Majority of the respondents indicated that they had side effects from the antihypertensive they were taking with cough and abdominal upset and nausea being the commonest. However their influence on adherence was not statistically significant $\chi^2 (0.76) (p=0.449)$. This was contrary to studies done in Ghana which showed that side effects from antihypertensive have a negative effect on adherence to treatment (Sarfo *et al.*, 2018)

5.4 Non Pharmacological Aspects and Hypertension Treatment Adherence

5.4.1 BMI and hypertension Treatment adherence

The study established that majority of the respondents were overweight with (2.7%) being obese. In the statistical analysis of association between BMI as a predictor of adherence, had statistical significance, ($p=0.015, \alpha=0.05$) with those with high BMI being likely to poorly adhere to treatment. This compares fairly with a stepwise survey conducted in Kenya by ministry of health indicated that 27% of Kenyans were overweight or obese with the percentage being higher in females than males. Twelve percent of respondents from urban settlements were obese while 7 percent of rural dwellers are obese indicating a big risk of

NCDs and their complications, though urban dwellers seemed to be at increased risk. Further the study indicated that raised blood pressure was found in a quarter of the respondents. This is closely related to the national picture which indicates that eight percent of Kenyans have severe hypertension (defined as having SBP ≥ 160 mmHg and/or DBP ≥ 100 mmHg) and among this group seven percent are not currently taking medication, (MoH-Kenya, 2015).

This points to the need for emphasis on lifestyle modification as a non-pharmacological approach in hypertension control. This gap was reflected in a study done at KNH which showed that few respondents (30.8%) considered hypertension as a preventable disease mainly the single and highly educated ($p < 0.05$) (Kimani *et al.*, 2019).

It is documented that those who maintain a normal BMI leads to approximately 5-20 mmHg reduction in SBP. Further a study on blood pressure control done in KNH showed that obesity was found to contribute in poor BP control. Whereby about 75% of the study population was overweight found to be significantly associated with poor BP control. There was a conclusion that weight reduction lowers BP amongst obese patients. Their study recommended that among strategies of hypertension management in the clinics should be weight loss measures. (Achieng, Karari & Joshi, 2008).

Respondents with regular physical activity, non-smokers and non-alcoholics were more adherent to hypertension medication as compared with respondents with sedentary lifestyle, smoking and alcohol intake ($P < 0.005$). (Venkatachalam *et al.*, 2015)

5.4.2 Weight Hip Ratio (WHR) and treatment adherence

Failure in lifestyle modification may be attributed to poor BP control. In this study, assessment of patient's knowledge of lifestyle measures in treatment of hypertension and found that just about half of the patients knew about weight loss, exercise and dietary changes. About three quarters of the respondents were aware of the need of salt intake reduction.

Multiple studies have shown that lifestyle modification contributes to BP reduction (Dzudie *et al.*, 2017). Non consistency with the lifestyle measures may be attributed to failure of the knowledge to translate into better BP control. A study done at KNH showed that females had higher body mass index (BMI) and more males reported drinking alcohol and smoking, especially the highly educated. Higher BPs were observed in smokers and drinkers (Kimani *et al.*, 2019).

In a study on anthropometrics and the incidence of hypertension, health individuals with moderate mean BMI of 24.4 were followed-up for around 6 years, about 127 incident cases of hypertension were identified. Hence BMI was a significant predictor for presence of hypertension. Exercise decreases blood pressure (BP) in approximately 75% of individuals with hypertension, with systolic and diastolic BP reductions averaging approximately 11 and 8mm Hg, respectively,(Hagberg, Park and Brown, 2000).

5.5 Health Education and Hypertension Treatment Adherence

The study established that nurses were mostly the common (55.8%) source of health education followed by doctors (32.1%), and the rest by nutritionists. Further analysis of patients' source of knowledge and blood pressure control indicated that those counseled by nurses had better diastolic blood pressure control.

This was a critical finding despite most respondents stating that the time allocated for health education was inadequate. This can be attributed to the many competing tasks for nurses and the inadequate number of staff dedicated to these clinics.

A systematic review of ten clinical studies to assess the role of nurse in hypertension treatment adherence, similarly reported that there are benefits of nurses' intervention on treatment adherence amongst patients with hypertension. They engage communication with clients and home visits which are effective educational approaches. The study concluded that

nursing interventions are key in dealing with non-adherence to treatment amongst hypertension patients (Georgiopoulos *et al.*, 2018).

This study found out that less than one quarter of participants are aware that the antihypertensive medications are lifelong medications. This can be attributed to lack of emphasis by the various players who take part in health education among hypertensive patients. This can also be as result of lack of a standardized tool in KNH for undertaking hypertensive health education. This outcome agrees with a study done at KNH, where 53.6% believed they terminate antihypertensive medication once blood pressure is controlled (Kimani *et al.*, 2019). This is more than half the population and indicates a gap in health education among hypertensive patients.

Another study by the Pan-African Society of Cardiology (PASCAR) on roadmap to achieve 25% hypertension control in Africa by 2025 indicates that only 25.8% of the countries have developed or adopted guidelines for the management of hypertension. PASCAR further identifies Healthcare professional-related roadblocks. These include lack of appropriate evidence-based guidelines for healthcare professionals in individual countries, hypertension treatment guidelines poorly implemented because of a lack of continuing medical education, a shortage of healthcare professionals (physicians, nurses and trained health workers) at primary care level with very low physician/patient ratio and lack of quality and affordable anti-hypertension medications at primary healthcare facilities (Dzudie *et al.*, 2017).

A study on drug adherence and patients stopping along the way observed that drug adherence goes beyond pill consumption and is a reflection of a healthy behavior. Adherence is of particular concern in hypertension, with about half of the patients prescribed an antihypertensive drug stopping taking it within 1 year, in a longitudinal study of electronically compiled dosing histories of 4,783 patients (Vrijens *et al.*, 2008).

A number of patients mentioned cost of drugs as a hindrance to adherence. However, it was also noted that even patients who had the drugs provided for them, either by their children, employer or insurance, were not more adherent than those who bought their own medication. This has also been noted in other studies in which patients were non adherent despite having free medication. This is a pointer that there may be underlying lack of sufficient knowledge towards hypertension or its treatment that affect adherence. Patients' awareness of their adherence patterns can change their behavior. A 2014 study noted that key elements to changing patients' behavior include: education, motivation, and measurement (Vrijens et al., 2014).

WHO recommends that majority of cases of hypertension can be managed effectively at the primary health care level. Primary health-care physicians as well as trained non-physician health workers can play a very important role in detection and management of hypertension. WHO has developed guidelines and several tools to assist health workers in managing hypertension cost effectively in primary care hence reducing non-adherence,(WHO, 2013).

5.6 Hypertension Treatment Adherence Blood Pressure Control

Generally there is a close relationship between health education treatment adherence and blood pressure control. Western countries have reported high levels of adherence. In an Australian study, Nelson et al using the Morisky score to assess level of adherence found 55.2% of the hypertensive patients studied to be adherent. Siegel and others found adherence rates of 78.3% in the United States. In the western countries, assessment of adherence was done in groups of patients who had access to medication for free and this may account for some of the differences in level of adherence seen in our population. However they have guidelines on health education, and hypertension treatment. This is in contrast to low and middle income countries with only 25.8% of them have developed or adopted guidelines for

the management of hypertension. Other major roadblocks are either government and health-system related (Dzudie *et al.*, 2017).

5.7 Limitations of the study

1. Biomarkers (LDL, HDL and total cholesterol) largely depended on those documented in the files (secondary data) since it was expensive to undertake new ones at the point of the study.
2. Hill –Bone HBP scale heavily relies on patient recall which may not be accurate.
3. Means of verifying the level of adherence through drug serum levels could not be managed by the investigator because of time limitations and cost.

5.8 Conclusion

Using the Hill Bone scale- There was general improvement in the adherence levels among health educated patients with results indicating three quarter adherence.

It can also be concluded that, young age and high level of education associated with increase in level of adherence.

Another conclusion is that those aspects which impact negatively on treatment adherence are: financial constraints and pill burden as reported by half of the respondents.

Nurses play a big role in promoting treatment adherence at KNH, however the time set aside for health education was not adequate, there is less emphasis on lifelong therapy and dietary modification messages.

5.9 Recommendations

The study proved that health education plays a critical role in improving awareness, treatment adherence and control of hypertension.

To enhance the practice of health education and hence overall adherence to hypertension treatment adherence, the following are the specific recommendations:

- i. KNH should allocate more resources for health education of hypertensive patients (Teaching aids- dummy packages, Room, more Human resource- Nurses/Nutritionists)
- ii. Health professionals to emphasize more health messages on lifelong medication and diet during their health education sessions.
- iii. Recommend to Ministry of Health: Through the Kenya Medical Supplies Agency, there is need to subsidize and avail antihypertensive drugs to primary health care facilities. Furthermore antihypertensive drugs should be supplied in Fixed Dose Combinations to reduce the pill burden hence promote adherence to treatment.
- iv. Future research using combined methods from options given in brackets to assess adherence to hypertensive treatment: (DOTs, Morisky Medication Adherence Scale – MMAS-4, electronic monitoring and measurement of blood/urine drug levels being the most accurate

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APPENDICES

Appendix I: Budget

BUDGET

SER NO.	ITEM	UNITS	UNIT COST (KSH)	TOTAL (KSH)
1.	STATIONERY AND RELATED EXPENSES			
	i. Writing notebooks	10	200	2,000
	ii. Pens	30	20	600
	iii. Document folders	12	200	2,400
	iv. Printing services /photocopying services	800	20	16,000
2.	DATA COLLECTION			
	i. Research assistants (4)	5 days	1000	20,000
	ii. Health Information system access	1	1000	1,000
	iii. IREC fee	2	3000	6,000
3.	COMMUNICATION EXPENSES			
	i. Internet fee	1	5000	5,000
	ii. Anthropometry equipment	1	16,000	16,000
4.	CONSULTANCY FEE			
	i. Statistician	1	6,000	6,000
	ii. Analysis	1	10,000	10,000
5.	DISSEMINATION OF FINDINGS			
	i. Thesis printing, Binding	5	3000	15,000
	ii. Dissemination and publication of findings			
	GRAND TOTAL			100,000

Appendix II: Work Plan

Activity	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept
Concept paper development												
Proposal development												
KNH/UoN ERC Approval												
Data collection												
Data analysis and report writing												
Thesis defense/Dissemi nation of findings												

Appendix III: Informed Consent for Patients

Title of the study

Assessing treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital

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Introduction

I am a student at the School of Nursing Sciences, University of Nairobi pursuing a Master of Science Degree in Nursing (Medical – Surgical Nursing). I am conducting a study entitled: Assessing treatment adherence among nurse educated patients at Kenyatta National Hospital.

This study will be conducted at Kenyatta national hospital outpatient medical clinics for hypertension.

This study will be looking to assess treatment adherence among nurse educated hypertensive patients. To achieve this, the study will look at the, adherence levels of hypertensive patients on treatment, the same patients' anthropometric/ biochemistry parameters and the current lifestyle modifications among the patients in management of hypertension.

The purpose of this information is to give you details pertaining to the study that will enable you make an informed decision regarding participation. You are free to ask questions to clarify any of the aspects we will discuss in this information and the consent form. I will also ask you questions regarding the study before you sign the consent form to ascertain your understanding of the information provided.

Purpose of the study

This study will seek to assess adherence to treatment amongst patients diagnosed with primary hypertension. By assessing the adherence status, this will among others help the caregivers to know how to support them in enhancing adherence to hypertension treatment.

Risks

There will be no economic or physical risks to participating in the study. However, you will take some time off your schedule to respond to questions from the self-administered questionnaire. Some questions will require you to disclose some personal information that might trigger some negative feelings and possibly anxiety. If this happens, the researcher will refer you to the hospital counselor.

Benefits: There is no direct monetary benefit in participating in this study. However, the results of the study will be useful in facilitating the understanding of what can be done to enhance adherence to hypertension treatment. . The findings will be availed to the hospital, other relevant decision makers and stakeholders to aid in putting in place measures that will improve adherence to hypertension treatment.

Confidentiality: Confidentiality will be maintained and the information you provide will only be used for the intended purpose of the study. In addition, your name will not be required on any forms or used during publication of the final report thus ensuring your anonymity. All materials used during this study will be kept in a locked cupboard and only the personnel involved in this study will have access to them. Electronic files will be saved on password and fire-wall protected computers.

Voluntary participation: Participation in this study is voluntary. Refusal to take part will not attract any penalty. You retain the right to withdraw from the study at any time without any consequences. You are free not to answer any question during the interview.

Compensation: There is no compensation, monetary or otherwise, for participating in the study

Appendix IV: FOMU YA MAELEZO YA MSHIRIKI, HABARI NA RIDHAA

MADA YA UTAFITI: KUKADIRIA UZINGATIAJI WA MATIBABU MIONGONI MWA WAGONJWA WALIO NA ZIKIKISHO LA DAMU WALIOELIMISHWA KATIKA HOSPITALI KUU YA KENYATTA

Mtafiti Mkuu

Jared Kebaso Ongaga

Chuo kikuu cha Nairobi

Sanduku la posta 62938-00200, Nairobi

Simu ya rununu 0721516526, Barua pepe: jongaga79@gmail.com

Wasimamizi

Msimamizi wa kwanza

Dkt. Samuel Kimani

Rununu: Mobile 0722384917, barua pepe: tkimani@uonbi.ac.ke

Msimamizi wa pili

Dkt. Eunice Omondi

Rununu:0722728123, barua pepe: euomondi@hotmail.com

Kenyatta National Hospital/University of Nairobi Ethics and Research Committee

College of Health Sciences

P. O. Box 19676 00202 Nairobi

Telephone: (254-020) 2726300-9 Ext 44355

Email: uonknh_erc@uonbi.ac.ke

Utangulizi

Mimi ni mwanafunzi katika chuo kikuu cha Nairobi. Nasomea shahada ya uzamili katika uuguzi. Ninafanya utafiti kuhusu “Kukadiria uzingatiaji wa matibabu miongoni mwa wagonjwa walio na zikikisho la damu walioelimishwa na Wauguzi katika Hospitali Kuu Ya

Kenyatta. Utafiti huu unafanyika katika hospitali kuu ya Kenyatta miongoni mwa wagonjwa wenya msinikisho wa damu wanaohudhuria kliniki. Wauguzi pia wanaohudumia hawa wagonjwa watahuzishwa. Lengo kuu la utafiti huu ni kutafuta jinsi ya kuboresha huduma wanayoipata wagonjwa wenye sinikisho la damu.

Kusudi la habari hii ni kukupa maelezo kuhusu utafiti ambayo itakuwezesha kufanya uamuzi sahihi juu ya kushiriki. Wewe una uhuru kuuliza maswali ili kufafanua mambo yoyote tutakayojadili katika habari hii na fomu ya ridhaa. Mimi pia nitakuuliza maswali kuhusu utafiti kabla ya kutia sahihi fomu ya ridhaa ili kuhakikisha kuwa umeelewa habari iliyotolewa.

Kusudi la utafiti

Utafiti huu utakadiria jinsi wauguzi wanasaidia wagonjwa kufuata maagizo juu ya matibabu ya sinikisho la damu. Kutambua jinsi wanavyofanya hii kazi itasaidia kuboresha huduma wanaopata wagonjwa wenye sinikisho la damu.

Hatari

Hakutakuwa na hatari zozote za kiuchumi au kimwili kwa kushiriki katika utafiti huu. Hata hivyo, utachukua muda kidogo mbali na ratiba yako ili kujibu maswali kutoka kwa dodoso iliyosimamiwa. Maswali mengine yatakuhitaji kufichua taarifa za kibinafsi ambazo zinaweza kusababisha hisia zenye hasi na uwezekano wa wasiwasi. Ikiwa hii itatokea, mtafiti atakupeleka kwa mshauri wa hospitali

Faida:

Hakuna faida ya moja kwa moja ya fedha katika kushiriki katika utafiti huu. Hata hivyo, matokeo ya utafiti huu yatakuwa na manufaa katika kuwezesha kuelewa jinsi unaweza shirikiana na wauguzi katika matibabu ya sinikisho la damu.

Usiri:

Usiri utadhibitiwa na maelezo ambayo utatoa yatatumiwa tu kwa madhumuni yaliyotarajiwa ya utafiti huu. Kwa kuongeza, jina lako halitakuwa kwa fomu yoyote au kutumika wakati wa kuchapishwa kwa ripoti ya mwisho hivyo kuhakikisha kutojulikana kwako. Vifaa vyote vilivyotumiwa wakati wa utafiti huu vitawekwa kwenye kikombeli kilichofungwa na wafanyakazi tu wanaohusika katika utafiti huu ndio watakaovifikia. Faili za elektroniki zitahifadhiwa kwenye kompyuta yenye watafiti tu wanaweza kufungua.

Kushiriki wa hiari:

Kushiriki katika utafiti huu ni kwa hiari. Kukataa kushiriki katika sehemu yoyote haitavutia adhabu yoyote. Unahifadhi haki ya kujiondoa kwenye utafiti wakati wowote bila madhara yoyote kwako. Wewe una uhuru kukosa kujibu swali lolote wakati wa mahojiano.

Fidia: Hakuna fidia, fedha au vinginevyo, kwa kushiriki katika utafiti huu

Appendix V: Consent Form

If you consent to participate in the study:

“Assessing treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital ” then fill and sign below.

I give consent to the investigator to interview me and use the information obtained from me in his study. The nature of the study has been explained to me by the investigator.

Signature Date

I confirm that I have explained the nature and effect of the study.

Signature Date

Appendix VI: FOMU YA SHAHA

Ikiwa Unakubali Kushiriki katika utafiti tafadhali soma kisha weka sahihi/kidole hapa chini:

Mimi nakubali kushiriki katika utafiti huu. Nimetambulishwa kuhusu hali ya utafiti unaofanywa na hatari zimeelezwa kwangu. Pia ninaelewa kuwa ushiriki wangu katika utafiti huo ni wa hiari na uamuzi wa kushiriki au kutohusika hautaadhiri matibabu yangu katika kituo hiki kwa namna yoyote. Naweza pia kuchagua kuacha ushiriki wangu katika utafiti wakati wowote bila maelezo yoyote au madhara. Pia nimehakikishiwa kuwa maelezo yangu ya kibinafsi na taarifa nitakayotoa itahifadhiwa kwa siri. Ninathibitisha kwamba wasiwasi wangu wote juu ya ushiriki wangu katika utafiti umeshughulikiwa vya kutosha na mchunguzi. Mchunguzi ameniuliza maswali ili kuhakikisha ufahamu wangu wa taarifa iliyotolewa.

Sahihi ya Mshiriki (au alama ya kidole) _____ **Tarehe** _____

Ninathibitisha kwamba nimeelezea wazi kwa mshiriki hali ya utafiti na maudhui ya fomu hii ya ridhaa kwa undani na mshiriki ameamua kushiriki kwa hiari bila shinikizo lolote au shinikizo la kutosha.

Sahihi ya msaidizi _____ **Tarehe** _____

Kwa Ufafanuzi wowote, tafadhali wasiliana na;

Mtafiti: Jared Kebaso Ongaga

Namba ya Simu: 0721516526

Barua pepe: jongaga79@gmail.com AU,

Msimamizi: Dr Samuel Kimani (BScN, MSc, PhD)

Namba ya simu: 0722384917

Appendix VII: QUESTIONNAIRE FOR PATIENTS

Study title: Assessing treatment adherence in hypertension control among hypertensive patients post health education at Kenyatta National Hospital

Date..... Study number

SECTION I: SOCIO- DEMOGRAPHIC CHARACTERISTICS

1. What is your age?
 - a. Less than 20 years []
 - b. 20-39 years []
 - c. 40-49 years []
 - d. Over 60 years []

2. What is your gender?
 - a. Male []
 - b. Female []

3. What is your marital status?
 - a. Married []
 - b. Single []
 - c. Divorced []
 - d. Separated []
 - e. Widowed []
 - f. Others (specify)

4. Usual residence (county)
5. Occupation
 - a. Formal employment []
 - b. Farmer []
 - c. Businessman []
 - d. None []
 - e. Others (specify)

6. What is your Level of education?
 - a. Never been to school []

- b. Primary level []
- c. Secondary level []
- d. Certificate []
- e. Diploma []
- f. University level []

7. What's your religion?

- a. Protestant []
- b. Catholic []
- c. Muslim []
- d. Hindu []
- e. Others (specify) []

8. What's your current employment status?

- a. Employed []
- b. Unemployed []
- c. Self-employed []
- d. Student []
- e. Others (specify) []

9. What's your net monthly income? (Specify) Ksh

10. How do you pay for outpatient health services?

- a. Out of pocket []
- b. Insurance []
- c. Family members []
- d. Others (specify)

11. Do you have an NHIF card?

- a. Yes []

b. No []

8. Is it active?

a. Yes []

b. No []

12. How much do you approximately spend on hypertension treatment per month?

State here. Ksh.....

13. Is it within your means? Yes [] No []

14 How much do you approximately spend on transport to the clinic to KNH per month?

State here

SECTION II PHARMACOLOGICAL TREATMENT ASPECTS

15. How many prescribed antihypertensive tablets do you take?

a. One []

b. Two []

c. Three []

d. Four []

e. Don't know []

16. If more than one in the question above, do you see the number of tablets as a burden?

a. Yes []

b. No []

17. Apart from antihypertensive drugs, are there any other drugs you take regularly?

a. Yes []

b. No []

If yes specify

18. Are you experiencing any side effects from antihypertensive drugs?

a. Yes []

b. No

If yes state which ones

19. Do you take your drugs as prescribed?

a. Yes []

b. No []

If no why.....

SECTION III PHARMACOLOGICAL TREATMENT ASPECTS

20. When were you diagnosed with hypertension?

- a. Less than 2 years ago []
- b. 2-5 years ago []
- c. 5-10 years ago []
- d. 10-20 years ago []
- e. Over 20 years ago []

21. What's your latest blood pressure?

State here

22. Do you suffer from any other condition apart from hypertension?

- a. Respiratory []
- b. Kidney []
- c. Diabetes []
- d. Cancer []

Others (specify).....

23. What's your current weight in Kg?

24. What's your height in meters?

25. Current BMI? (Weight/Height in M²)

26. . Have you ever been educated about any of the following?

- a. Weight loss []
- b. Reduced salt intake []
- c. Exercise []

- d. Dietary modification []
- e. Lifetime compliance to antihypertensive treatment
[]
- 24. Who usually gives you the health education above?
 - a. Nurses []
 - b. Doctors []
 - c. Nutritionists []
 - d. None []
- 25. Do you feel the time allocated for the health education is adequate?
 - a. Yes []
 - b. No []
- 26. Other parameters
 - a. Pulse rate
 - a. Waist circumference.....
 - b. Hip circumference.....
 - c. WHR.....
 - d. Total Cholesterol
 - e. Latest LDL
 - f. Latest HDL.....
- 27. Current hypertension medication(s)
- 28. Have you been advised by a health professional against smoking in the last 12 months?
 - a. Yes []
 - b. No []
- 29. Are you exposed to indoor cigarette smoking at home or at work?
 - a. Yes []
 - b. No []

30. Are engaged in any form of physical activity in your day to day life?

Which among the following?

- a. Walking []
- b. Gym []
- c. Jogging []
- d. Manual working conditions []
- e. Others (specify).....
- f. None []

31. How would you describe the amount of salt you take?

- a. No salt []
- b. Low amount of salt []
- c. Moderate amount []
- e. A lot of salt []

32. Do you take alcohol?

- a. Yes []
- b. No []

33. If yes how often do you take alcohol?

- a. Daily []
- b. Occasionally []
- c. Not at all []

SECTION IV: COMPLIANCE WITH CHANGES IN LIFESTYLE

34.	How often do you undertake the following?	Daily	Occasionally	Not at all
a	Smoke			
b	Take alcohol			
c	Add salt to diet			
d	Engage in physical activities			
e	Have adequate sleep			
f	Eat fruits and vegetables			
g	Take fast foods			

35	Question	None of the time	Some of the time	Most of the time	All the time	N/A	Don't know
		1	2	3	4	8	9
A	How often do you forget to take your hypertensive medication?						
B	How often do you decide not to take your hypertensive medicine?						
C	How often do you take salty food?						
D	How often do you shake salt, fonder or aromat on your food before you eat?						
E	How often do you eat fast food(Pizza, chips, KFC etc)						
F	How often do you get a date for next appointment before you leave the clinic?						
G	How often do you miss scheduled appointments?						

H	How often do you leave the dispensary without obtaining your prescribed pills(due to long line, closure of clinic, forgetting etc)						
I	How often do you run out of HBP drugs?						
J	How often do you skip your HBP medicine 1-3 days before you go to the clinic?						
K	How often do you miss taking your HBP drugs when you feel better?						
L	How often do you miss taking your HBP drugs when you feel sick?						
M	How often do you take someone else's HBP drugs?						
N	How often do you miss taking your HBP drugs when you care less?						
	Total score						

Appendix VIII : LETTER TO KENYATTA NATIONAL HOSPITAL CEO

Jared Kebaso Ongaga
University of Nairobi
School of Nursing Sciences
February 2019

To

The Chief Executive Officer
Kenya National Hospital
Nairobi.

Dear Sir / Madam

RE: PERMISSION TO UNDERTAKE A RESEARCH STUDY

I am a second year post graduate Nursing student, pursuing Master of Science in Nursing (Medical-Surgical Nursing). I am writing to request for permission to carry out research on **“Assessing treatment adherence in hypertension control among hypertensive patients post health education at Kenya National Hospital”**.

The study will be carried out at the general medical outpatient clinic where hypertensive patients are seen and medical wards admitting primary hypertensive patients at KNH.

Your kind permission to allow me carry out this research in KNH will be highly appreciated. The research findings will help in improving management of hypertensive patients by nurses at the clinics and wards. A copy of the final document will be submitted to the departments under study.

Please find the attached approval letter from KNH/UON ERC

Thanks for your continued support

Yours sincerely,

Jared Kebaso Ongaga

(H56/7110/2017)

Appendix IX: Hill-Bone Hypertension Treatment Adherence Scale

Question	Score					
	None of the time	Some of the time	Most of the time	All the time	N/A	Don't know
	1	2	3	4	8	9
How often do you forget to take your hypertensive medication?						
How often do you decide not to take your hypertensive medicine?						
How often do you take salty food?						
How often do you shake salt, fonder or aromat on your food before you eat?						
How often do you eat fast food(KFC, Pizza, chips)						
How often do you get next appointment before you leave the clinic?						
How often do you miss scheduled appointments?						
How often do you leave the dispensary before without obtaining your prescribed pills(due to long line, closure of clinic, forgetting etc)						
How often do you run out of HBP pills?						
How often do you skip your HBP medicine 1-3 days before you go to the clinic?						
How often do you miss						

taking your HBP pills when you feel better?						
How often do you miss taking your HBP pills when you feel sick?						
How often do you take someone else's HBP pills?						
How often do you miss taking your HBP pills when you care less?						

Appendix X: KNH Research Registration Approval Form



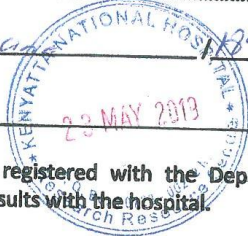
KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
Research & Programs: Ext. 44705
Fax: 2725272
Email: knhresearch@gmail.com

KNH/R&P/FORM/01

Study Registration Certificate

1. Name of the Principal Investigator/Researcher
..... JARED KEBASO ONGAGA
2. Email address: jongaga79@gmail.com Tel No. 0721516526
3. Contact person (if different from PI).....
4. Email address: Tel No.
5. Study Title
..... EVALUATING TREATMENT ADHERENCE IN HYPERTENSION CONTROL AMONG HYPERTENSIVE PATIENTS POST HEALTH EDUCATION AT KENYATTA NATIONAL HOSPITAL
6. Department where the study will be conducted MEDICINE
(Please attach copy of Abstract)
7. Endorsed by Research Coordinator of the KNH Department where the study will be conducted.
Name: Signature Date
8. Endorsed by KNH Head of Department where study will be conducted.
Name: Dr. K. U... Signature KF Date 23/5/19
9. KNH UoN Ethics Research Committee approved study number P105/02/2019
(Please attach copy of ERC approval)
10. I JARED KEBASO ONGAGA commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Research and Programs.
Signature: [Signature] Date 21/05/2019
11. Study Registration number (Dept/Number/Year) Medicine/105/2019
(To be completed by Research and Programs Department)
12. Research and Program Stamp



All studies conducted at Kenyatta National Hospital must be registered with the Department of Research and Programs and investigators must commit to share results with the hospital.

Appendix XI: Research Approval by KNH-UoN Ethics and Research Committee



UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355



KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: <http://www.erc.uonbi.ac.ke>
Facebook: <https://www.facebook.com/uonknh.erc>
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC



KENYATTA NATIONAL HOSPITAL
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Telegrams: MEDSUP, Nairobi

Ref: KNH-ERC/A/186

20th May, 2019

Jared Kebaso Ongaga
Reg. No.H56/ 7110/2017
School of Nursing Sciences
College of Health Sciences
University of Nairobi

Dear Jared

**RESEARCH PROPOSAL: EVALUATING TREATMENT ADHERENCE IN HYPERTENSION CONTROL
AMONG HYPERTENSIVE PATIENTS POST HEALTH EDUCATION AT KENYATTA NATIONAL HOSPITAL (P105/02/2019)**

This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 20th May 2019 – 19th May 2020.

This approval is subject to compliance with the following requirements:

- Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
- All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
- Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
- Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
- Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
- Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
- Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

Protect to discover

Appendix XII: Research Approval by Head of Department Medicine KNH



KENYATTA NATIONAL HOSPITAL
P. O. Box 20723, 00202 Nairobi

Tel: 2726300/2726450/2726550
Fax: 2725272
Email: knhadmin@knh.or.ke

Ref: KNH/HOD-MED/42B/VOL.II/

Date: 22nd May 2019

Jared Kebaso Ongaga
School of Nursing Sciences
College of Health Sciences
University of Nairobi

RE: APPROVAL TO CONDUCT A STUDY AT THE KNH MEDICINE DEPARTMENT

Following approval of your study by the KNH/UoN ERC and completion of the KNH study registration form, permission is hereby granted for you to collect data from the KNH Medicine Department to enable you complete your study on *"Evaluation treatment adherence in hypertension control among hypertensive patients post health education"* at *Kenyatta National Hospital*.

Kindly liaise with the Senior Assistant Chief Nurse, Medicine Department for facilitation. By a copy of this letter, the SACN, Medicine Department is informed and requested to facilitate.

Dr. K. Ndege

Dr. KINOTI NDEGE
Ag. HOD - MEDICINE

Copy to: SACN, Medicine Department
KNH

Vision: A world class patient-centered specialized care hospital



ISO 9001: 2015 CERTIFIED

Appendix XII: Anti-plagiarism Report

ORIGINALITY REPORT			
7%	5%	3%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS
PRIMARY SOURCES			
1	aphrc.org Internet Source		1%
2	Bryan Williams, Giuseppe Mancia, Wilko Spiering, Enrico Agabiti Rosei et al. "2018 ESC/ESH Guidelines for the management of arterial hypertension", European Heart Journal, 2018 Publication		1%
3	Submitted to Kenyatta University Student Paper		1%
4	41.89.99.18 Internet Source		1%
5	Submitted to Strathmore University Student Paper		<1%
6	Bryan Williams, Giuseppe Mancia, Wilko Spiering, Enrico Agabiti Rosei et al. "2018 Practice guidelines for the management of		<1%

Appendix XIII: Hill Bone HBP scores

Assessment of treatment	Frequency (n) [n, (%)]						N
	None of the time (1)	Some of the time (2)	Most of the time (3)	All the time (4)	N/A (8)	Don't know (9)	
No. of times Hypertensive medication is forgotten	8(7.08%)	47(41.59%)	28(24.78%)	0(0%)	22(19.47%)	8(7.08%)	113
Decision to take hypertensive medicine	12(10.53%)	51(44.74%)	19(16.67%)	0(0%)	23(20.18%)	9(7.89%)	114
Salty foods	10(8.77%)	46(40.35%)	21(18.42%)	0(0%)	25(21.93%)	12(10.53%)	114
How long do you shake salt, fonder or aromat on your foods before you eat	17(15.04%)	49(43.36%)	16(14.16%)	1(0.88%)	22(19.47%)	8(7.08%)	113
How often do you eat fast foods	42(36.84%)	30(26.32%)	9(7.89%)	1(0.88%)	23(20.18%)	9(7.89%)	114
Appointment before you leave the clinic	3(2.63%)	16(14.04%)	55(48.25%)	3(2.63%)	12(10.53%)	25(21.93%)	114
Missed scheduled appointments	6(5.22%)	59(51.3%)	24(20.87%)	0(0%)	6(5.22%)	20(17.39%)	114
Do you leave the dispensary without obtaining your prescribed pills	6(5.31%)	56(49.56%)	19(16.81%)	0(0%)	9(7.96%)	23(20.35%)	113
How often do you run out of HBP drugs	10(8.7%)	54(46.96%)	23(20%)	0(0%)	7(6.09%)	21(18.26%)	114
How often do you skip your HBP medicine 1-3 days	11(9.57%)	65(56.52%)	13(11.3%)	0(0%)	6(5.22%)	20(17.39%)	114

How often do you miss taking HBP drugs when you feel better	14(12.39%)	52(46.02%)	12(10.62%)	0(0%)	24(21.24%)	11(9.73%)	113
How often do you miss taking HBP drugs when you feel sick"	27(23.48%)	46(40%)	14(12.17%)	0(0%)	21(18.26%)	7(6.09%)	114
How often do you take someone else's HBP drugs	70(61.95%)	11(9.73%)	2(1.77%)	0(0%)	22(19.47%)	8(7.08%)	113
How often do you miss taking your HBP drugs when you care less	70(60.87%)	9(7.83%)	4(3.48%)	0(0%)	23(20%)	9(7.83%)	114