

**FACTORS AFFECTING ADHERENCE TO ANTI-HYPERTENSIVE  
MEDICATION REGIMEN AMONG HEMODIALYSIS PATIENTS  
ATTENDING PANDYA MEMORIAL HOSPITAL, MOMBASA,  
KENYA**

**BY**

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**(PG/MPH/088/2011)**

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Award of the Degree in Master of Health Promotion and International  
Health of Maseno University**

**SCHOOL OF PUBLIC HEALTH AND COMMUNITY DEVELOPMENT**

**MASENO UNIVERSITY**

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## **DECLARATION**

I declare that this research thesis is my own original work and has never been presented for an academic award in any university or institution of higher learning.

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Finally I thank the almighty God, who has brought me this far. To him I give all the glory and honor. Great is thy faithfulness.

## **DEDICATION**

To my parents Dr. Eliakim Otenyo and Mary Otenyo, my brothers James and Mark for their endless love and support and to my loving and caring husband Reuben.

## ABSTRACT

Patients with chronic kidney disease undergoing hemodialysis are usually co-morbid with hypertension that contributes to increased cardiovascular morbidity and mortality if not controlled. A number of factors are targeted as influencing agents to uncontrolled hypertension but adherence to treatment is counted as a major factor contributing to poor control of hypertension. In Kenya studies done among chronic kidney disease patients have found high uncontrolled rate of blood pressure in this population, a study done at Kenyatta national hospital found 84.4% uncontrolled blood pressure and another done in Nephrology clinics in Nairobi found uncontrolled rate of 64.7% and adherence rate of 31.8% to antihypertensive medication. There are no studies done neither in other parts of the country nor in private hospitals to compare with these studies. Therefore the current study investigated factors influencing adherence to antihypertensive medication regimen among hemodialysis patients attending Pandya Hospital in Mombasa. Specifically the study assessed patient's adherence to treatment; described the socio-demographic factors affecting patients adherence to antihypertensive medications; established the patient's knowledge about antihypertensive medications; and determined the patient's perception of antihypertensive medications. A cross-sectional study was conducted at the renal unit of Pandya Memorial Hospital amongst a sample size of 144 hypertensive patients aged 18 years and above, respondents were identified using simple random sampling. Data was collected using semi structured questionnaires. Data analysis using Chi square test was applied to establish significant relationships between the dependent variable (adherence) and independent variables (socio-demographic factors, knowledge, perception), logistic regression was used to predict independent variables that influence adherence, and results with  $p$  values  $\leq 0.05$  were considered statistically significant. Adherence was determined using Morisky's Medication Adherence Scale (MMAS-8). Overall, 83(57.6%) of the patients were found to be fully adherent to their antihypertensive medication. Factors that influenced adherence to antihypertensive medication were; age  $p = 0.23$  (OR=1.02, CI=0.98-1.07), female gender had better adherence than males  $p = 0.98$  (OR= 2.58, CI=1.09-6.16), patients with health insurance  $p = 0.92$  (OR=0.35, CI=0.15-0.84), knowledge of side effects of medication  $p = 0.58$  (OR=2.02, CI=0.44-9.27), perception of severity  $p = 0.69$  (OR=3.61, CI=1.02-12.78), perception of benefit  $p = 0.30$  (OR=3.22, CI=1.06-9.79), and perception of barriers  $p = 0.75$  (OR=0.23, CI= 0.08-0.64). The study showed male patients, older patients and patients with no health insurance were associated with adherence to antihypertensive medication to avert morbidities and mortalities healthcare workers should formulate interventions tailored towards scaling up adherence in those subgroups of hypertensive patients. Interventions to increase patient's knowledge on the medications and patient's perception on antihypertensive are critical aspects to ensure an improved adherence level thus controlling blood pressure levels and consequently reduce morbidities and mortalities associated with hypertension in patients with chronic kidney disease undergoing hemodialysis.

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## LIST OF ABBREVIATIONS/ACRONYMS

<b>ACE-I:</b>	Angiotensin Converting Enzyme Inhibitors
<b>APHRC:</b>	African Population and Health Research Center
<b>ARB:</b>	Angiotensin Receptor Blockers
<b>CCBs:</b>	Calcium Channel Blockers
<b>CKD:</b>	Chronic Kidney Disease
	Detection, Evaluation and Treatment of High Blood Pressure
<b>ESKD:</b>	End Stage Kidney Disease
<b>HBM:</b>	Health Belief Model
<b>HWGAC:</b>	Hypertension Working Group of American Society
<b>JNC7:</b>	Seventh Report of the Joint National Commission on Prevention,
<b>KDOQI:</b>	Kidney Disease Outcomes Quality Initiative
<b>MKAQ:</b>	Medication Knowledge Adherence Questionnaire
<b>MMAS:</b>	Morisky's Medication Adherence Scale
<b>MMHg:</b>	Millimetre of mercury
<b>SPSS:</b>	Statistical Package for Social Science
<b>USRDS:</b>	United States Renal Data System
<b>WHO:</b>	World Health Organization

## DEFINITION OF TERMS

- Adherence:** The extent to which a person's behavior- taking medication, following a diet, and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider.
- Blood Pressure:** The pressure of blood in the vessels, especially the arteries, as it circulates through the body.
- Chronic renal failure:** Progressive loss in renal function over a period of months or years.
- Compliance:** The state or fact of according with or meeting prescriber's advice.
- Health Belief Model:** This is a psychological model that describes a person's health behavior as an expression of health beliefs. The model was designed to predict a person's health behavior, including the use of health services, and to justify intervention to alter maladaptive health behavior.
- Hemodialysis:** Process of purifying the blood of a person whose kidneys are not working normally.
- Hypertension:** Repeatedly elevated blood pressure exceeding systolic of 140mmHg and diastolic of 90 mmHg.
- Knowledge:** Familiarity, awareness or understanding.
- Perception:** The state of being or process of becoming aware of something.
- Peritoneal dialysis:** Type of dialysis whereby the peritoneal membrane is used as a filter remove extra fluid from the body.
- Regimen:** A systematic plan for a medical therapy intended to restore health

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## CHAPTER ONE: INTRODUCTION

### 1.1 Background of the Study

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7) define hypertension as systolic blood pressure  $>140$  mm Hg, diastolic blood pressure  $>90$ mmHg, or the need for antihypertensive therapy (Chobanian *et al.*, 2003). High blood pressure is associated with increased cardiovascular risk, with higher blood pressure readings linked with greater chances of ischemic heart disease, stroke and kidney disease. Indeed, among individuals between 40-70 years of age, for every 20 mmHg systolic or 10 mmHg diastolic blood pressure increases, mortality doubles, mainly due to ischemic heart disease and stroke (Lewington *et al.*, 2002).

Hypertension illness is estimated to account for at least 5% of adult mortality in Sub-Saharan Africa (Cooper *et al.*, 1998). In a study in Old Town Mombasa, Kenya the prevalence of hypertension was 32% and hypertension accounted for 42% risk factor for developing chronic non communicable diseases in Mombasa (Jenson *et al.*, 2011; Tawa *et al.*, 2011).

Chronic Kidney Disease is a growing health concern associated with a high risk of adverse outcomes. Its prevalence is increasing at a rate of 8% per year Worldwide (Ruilope, 2008). Its prevalence is at least three to four times in Sub-Saharan Africa than in more developed countries (Naicker, 2003).

The etiology of chronic kidney disease differs by region, age, gender and race. In Europe, Japan and USA, diabetic nephropathy is the leading cause of chronic kidney disease, while in developing world chronic glomerulonephritis and systemic hypertension are the leading causes (Ruilope, 2008). The prevalence of hypertension in chronic kidney disease (CKD) in the USA is 23.3% of individuals without chronic kidney disease and up to 84.1% of stage 4-5 chronic kidney disease patients (USRDS, 2010). Kenyan data on the same is derived from a study by Rajula *et al.* (2009) who found a prevalence of hypertension at 76% overall among chronic kidney disease patients, with only 16.6% having controlled hypertension. Nadeem *et al.* (2013) looking at the prevalence of cardiovascular risk factors among chronic kidney disease patients, found that 72.3% were hypertensive, out of whom only 19% achieved optimal blood pressure control.

According to USRDS, 2010 approximately 23million people (11%) of the United States adult population have chronic kidney disease and of those approximately 555,000 are undergoing hemodialysis. Due to predicted increase in prevalence of diabetes and hypertension, these numbers are only expected to rise in future. In Sub Saharan Africa the estimated prevalence of hypertension in hemodialysis patients is 60-90% and is a major contributor to hypertension morbidity and mortality (Agarwal *et al.*, 2003). Despite advances in blood pressure management in the general population, hypertension remains a challenge to control in the hemodialysis population. In a study of 2,535 clinically stable adult hemodialysis patients, 86% were found to be hypertensive. Within this hypertensive group, only 30% had their blood pressure under adequate control, 58% were inadequately treated, and 12% were not treated at all (Agarwal *et al.* 2003). Rocco *et al.* (2001) found

similar results in a sample of 1,238 maintenance hemodialysis patients, where less than 30% had blood pressure that were considered normotensive by the Joint National Committee (JNC) VI standards.

Target blood pressure for patients with chronic kidney disease is generally accepted to be <130/80 mmHg. Renin Angiotensin Aldosterone System (RAAS) Inhibitors are considered first line pharmacologic treatment of hypertension in hemodialysis patients this is because it prevents left ventricular hypertrophy. The second line is beta-blockers. However most of the hemodialysis patients will require a combination of antihypertensive agents (Inrig, 2010). Despite the existence of proven effective measures to reduce cardiovascular morbidity and mortality due to raised blood pressure levels, control of this disease is still low. This fact has been attributed to low adherence to antihypertensive treatment (Curtin *et al.*, 1999). The estimates of non adherence to antihypertensive medication in hemodialysis patients ranged between 12.5% and 95.7% (mean 38.2%). When assessed using different measures of adherence like patient self-report and objective measures, the mean prevalence rates were 24.3% and 38.5%, respectively (Ghimire *et al.*, 2015)

The World Health Organization Adherence meeting in June 2001 defined adherence as the extent to which the patient follows medical instructions. Muntner *et al.* (2010) describe an overall medication adherence rate of only 69%, among chronic kidney disease patients undergoing hemodialysis, drawing attention to the important issue of medication adherence in patients undergoing hemodialysis, a population particularly

vulnerable to the adverse consequences of poor medication adherence and blood pressure control. Clinicians often assess medication adherence prior to making adjustments to the dosages of the prescribed antihypertensive.

Patient reported adherence is very often the initial means used to assess medication adherence in routine clinical practice. However, this means of assessing medication adherence has been shown to be unreliable because it's subjective and confounded by patients incomplete reporting and at times intentional false reporting (Stephenson *et al.*, 1993).

More objective, reliable and accurate means of assessing medication adherence such as use of tracer compounds, serum drug levels assays, and electronic monitoring methods are increasingly being used (Burner, 2001). Conversely, these methods are not readily available in resource limited environment and if available is quite expensive making them impractical (Taslim and Oluwafemi, 2016). Therefore patient reported adherence remains the only available and practical means of assessing medication adherence; moreover they are simple, easy and viable to use (Krousel-wood, 2007).

The Morisky's Medication Adherence Scale (MMAS-8) is one of the most commonly used self reporting methods (Xi *et al.*, 2014). Because it provides information on behaviors associated with low adherence that maybe intentional or unintentional. Identification of these behaviors can facilitate tailoring of interventions to specific patient issues and strongly related to adherence (Aronson, 2007). Thus this study assessed the

proportion of adherence to antihypertensive medication regimen among chronic kidney disease patients undergoing hemodialysis at Pandya Memorial Hospital using the Morisky's Medication Adherence Scale (MMAS-8).

Factors associated with adherence in Hemodialysis patients, mainly based on expert opinion, are similar to those for other chronic conditions and can be subdivided into demographic, clinical and psychosocial predictors such as knowledge, patient beliefs and perceptions (Rosner, 2006).

Demographic factors were found to be significantly associated with hypertensive medication adherence in hemodialysis patients in previous studies for example older age has been reported as the predictor of higher hypertensive medication adherence in the chronic kidney disease population, although other studies found low adherence prevalent in older population as well (Kutner, 2001). Other factors significantly associated with measures of adherence were: ethnicity, being a smoker, living single, being divorced or widowed, female gender, low education, and unemployment (Ghimire *et al.*, 2015). No similar study has been conducted in investigating the role of socio-demographic factors in relation to patients' adherence to antihypertensive treatments among hemodialysis patients attending Pandya memorial Hospital, Mombasa.

Limited knowledge and understanding of medications remains a factor that influence adherence to hypertensive medication among hemodialysis patients (Sathvik *et al.*, 2007).

A basic knowledge of a patient's medication such as the name, indication, dosage, frequency and side effects are considered vital information (Hope *et al.*, 2004). An understanding of medications taken is usually approximated based on the extent of the patient's ability to recall all of these basic information. Nonetheless, approximately two-thirds of the information provided by a health care provider to a patient has been shown to be forgotten immediately (Morrow *et al.*, 2005).

Complexity of drug regimens and lack of communication are often contributors towards the lack of understanding towards treatment. This is especially true in elderly patients that are unable to follow complicated instructions (Sathvik *et al.*, 2007). This is a particular concern as better knowledge of medications may improve the patient's adherence. Therefore, this study was performed to investigate the extent of medication knowledge influence on adherence among Kidney disease patients attending Pandya Memorial Hospital to their hypertension medication regimen.

According to (Zhang *et al.*, 2014; Weisbord *et al.*, 2014) patients' perceptions may be more important than objective clinical assessments in determining medication adherence. Perceptions of illness develop from exposure to a variety of social and cultural information (Petrie and Weinman, 2012). The Health Belief Model (HBM) postulates that health-related actions and compliance depend on the perceptions of the individual in four areas: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers to the consequences of the illness or condition. Having cues to act as well as the confidence (self-efficacy) to act allow the individuals to exert control over their lives (Simons-Morton *et al.*, 2012). Thus, guided by the constructs of the Health Belief Model,

this study was conducted to explore perceptions of patients undergoing hemodialysis at Pandya Memorial Hospital, as they relate to medication adhering behaviors when living with hypertension.

## **1.2 Statement of the Problem**

Patients with chronic kidney disease undergoing hemodialysis are usually co-morbid with hypertension that is difficult to control and contributes to increased cardiovascular morbidity and mortality (Inrig, 2010). Controlling blood pressure to target is seen as one of the most important ways of retarding the progress of chronic kidney disease (Klag *et al.*, 1996). Pharmacologic therapy is required to control blood pressure in hemodialysis patients. However, due to co-morbidities that requires different medications and hemodialysis patients being required to take a combination of antihypertensive agents to achieve adequate blood pressure control. Complexity of the medication regimen has led to poor control of blood pressure in hemodialysis patients due to non adherence to antihypertensive medication (Kauric-Klein, 2013).

Medication adherence has been found to be as low as 3-7% among patients with chronic kidney disease on hemodialysis to their prescribed regime of antihypertensive medications over a six-week period (Curtin *et al.*, 1999). Poor adherence to medication regimens have accounted for worsening of disease states, death, and increased health care costs (Rodgers and Ruffin, 1998). It is therefore imperative to ensure adequate blood pressure control in chronic kidney disease patients on hemodialysis. This entails patients adhering to their antihypertensive medication which will guarantee better health outcomes.

In Kenya, studies revealed a prevalence of hypertension ranging between 61.5% and 76% among patients with varying degrees of chronic kidney failure (Maritim, 2007; Nadeem, 2003 and Rajula, 2009). Although many studies done in Mombasa has focused on the prevalence, extent of blood pressure control and adherence to antihypertensive medication regimen among the general population. No researcher has explored the adherence and factors influencing adherence to antihypertensive medication among chronic kidney disease patients in Mombasa.

### **1.3 Justification of the Study**

Blood pressure control in chronic renal disease patients has been found to be a challenge. Wagude (2012) and Kubo *et al.* (2015) studies among kidney disease patients attending Nephrology Clinics in Nairobi found 84.4% and 64.7% uncontrolled hypertension among the patients. Similarly a study done in Kenyatta National Hospital among renal patients by Okech (2012) found 78.8% uncontrolled hypertension. Within the context of hypertension management, a number of factors are targeted as influencing agents but adherence to treatment is still counted as one of the major contributing factors to poor management and control of hypertension (Saleem *et al.*, 2011). In a study by Achieng *et al.* (2009) among out patients hypertensive patients attending Kenyatta National Hospital, found a 31.8% adherence to antihypertensive medication and the results was significantly associated with poor blood pressure control.

While Kubo *et al.* (2015) found an adherence of 28% among kidney disease patients to their antihypertensive medication. The reasons underlying inadequate control of hypertension in this population are poorly understood.

Agarwal *et al.* (2003) study done in Kenyatta National Hospital did not find uncontrolled hypertension in the chronic hemodialysis dialysis population to be related to under recognition of hypertension or the lack of use of antihypertensive medication. Possible reasons for uncontrolled hypertension in this population include non adherence to blood pressure medication regimens (Rahman *et al.*, 1999).

Factors affecting adherence to antihypertensive medication among chronic kidney disease have rarely been studied in Kenya with only few studies confined to Kenyatta National Hospital, a National Referral Hospital and Nephrology clinics in Nairobi. Therefore there was need for adherence and factors affecting adherence to antihypertensive medication among chronic renal disease patient's studies in other parts of the country and in private hospitals since patients needs are dynamic and are continuously influenced by the patient's cultural, economic, demographic, social and environmental factors (Kols and Serman, 1998). Some of which may be modifiable, leading eventually to improved patient outcomes.

## **1.4 Objectives of the Study**

### **1.4.1 General Objective**

To assess factors affecting adherence to antihypertensive medication regimen among hemodialysis patients attending Pandya Memorial Hospital, Mombasa, Kenya

### **1.4.2 Specific Objective**

Specifically, the study intended to achieve the following objectives:

- i. To determine the proportion of hemodialysis patients attending Pandya Memorial Hospital Mombasa, who are adherent to their antihypertensive medication regimen.
- ii. To describe socio-demographic characteristics of hemodialysis patients attending Pandya Memorial Hospital, Mombasa and compare them with adherence to antihypertensive medication regimen.
- iii. To assess knowledge of antihypertensive medication regimen and its effects on adherence to antihypertensive medication among hemodialysis patients attending Pandya Memorial Hospital, Mombasa.
- iv. To establish patient's perception of adherence to antihypertensive medication among hemodialysis patients attending Pandya Memorial Hospital, Mombasa.

## **1.5 Research Questions**

The study was guided by the following research questions:

- i. What is the proportion of adherence to antihypertensive medication regimen among hemodialysis patients attending Pandya Memorial Hospital in Mombasa?
- ii. What socio-demographic factors are associated with adherence to antihypertensive medication regimen among hemodialysis patients attending Pandya Memorial Hospital, Mombasa?
- iii. What is the knowledge of hemodialysis patients attending Pandya Memorial Hospital in Mombasa on antihypertensive medication regimen?
- iv. What is the effect of perceptions on adherence to antihypertensive medication regimen among hemodialysis patients attending Pandya Memorial Hospital in Mombasa?

## **1.6 Null Hypothesis**

- i. Socio-demographic factors of hemodialysis patients are not associated with adherence to antihypertensive medication regimen.
- ii. Knowledge of hemodialysis patients is not associated with adherence to antihypertensive medication
- iii. Perception of hemodialysis patients is not associated with adherence to antihypertensive medication

### **1.7 Significance of the Study**

Poor adherence to antihypertensive medication among hemodialysis severely compromises the effectiveness of treatment making this a critical issue in the health of the hemodialysis patient's population both from the perspective of quality of life and of health economics. Identification of factors that influence antihypertensive medication adherence may provide a significant positive return on investment through primary prevention of risk factors and secondary prevention of adverse health outcomes.

Findings from this study may also assist health care professionals to manage hypertension appropriately among hemodialysis patients. It may also assist policy makers in developing context specific and relevant policies capable of improving the management of hypertension among hemodialysis patients in health facilities.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

Literature review is an important component of research because it reveals similar studies done on a given topic and prevents unnecessary duplication of studies. It guides the choice of a sound conceptual framework suitable for the research in question while exposing the researcher to the fundamental issues concerning the topic (Burns & Grove 2005). This chapter is centered on hypertension in chronic kidney disease, antihypertensive medication regimen, adherence to antihypertensive, measurement of adherence to antihypertensive, factors affecting adherence to antihypertensive medication and aspects related to its management and the Health Belief Model as a conceptual framework.

### **2.2 Chronic Kidney Disease and Hypertension**

Chronic kidney disease is defined as persistent kidney damage accompanied by a reduction in the glomerular filtration rate and the presence of albuminuria. The prevalence of chronic kidney disease has steadily increased over the past two decades, and was reported to affect over 13% of the United States population in 2004 (Coresh *et al.*, 2007).

Hypertension is defined as a blood pressure above 140/90 mmHg as per the JNC 7<sup>th</sup> guidelines. However it is clearly demonstrated that more stringent treatment targets result in better outcomes for cardiovascular risk as well as to retard the progression.

The JNC 7<sup>th</sup> guideline and The KDOQI guidelines suggest hypertension target as less than 130/80 mmHg (Chobanian *et al.*, 2003; KDOQI, 2004).

The prevalence of hypertension increases linearly as the glomerular filtration rate falls. Data from the Modification of Diet in Renal Disease study, for example, showed that the prevalence of hypertension rose progressively from 65 to 95% as the glomerular filtration rate fell from 85 to 15 mL/min per 1.73 m<sup>2</sup> (Buckalew *et al.*, 1996).

Hypertension has been reported to occur in 85% to 95% of patients with chronic kidney disease (stage 3-5) (Rao *et al.*, 2008). The relationship between hypertension and chronic kidney disease is cyclic in nature. Uncontrolled hypertension is a risk factor for developing chronic kidney disease, and is associated with a more rapid progression of chronic kidney disease, and is the second leading cause of End Stage Renal Disease (Botdorf *et al.*, 2011). Progressive renal disease can exacerbate uncontrolled hypertension due to volume expansion and increased systemic vascular resistance. It is important to lower blood pressure to slow the progression of renal disease and reduce cardiovascular morbidity and mortality (Chobanian *et al.*, 2003).

Cardiovascular disease accounts for almost 50% of deaths in patients with renal disease (USRDS, 2010). Hypertension in chronic hemodialysis patients contributes significantly to their morbidity and mortality. Hypertension is very prevalent among patients undergoing chronic hemodialysis.

Statistics indicate the prevalence of hypertension in hemodialysis patients is approximately 75% to 100% (Agarwal *et al.*, 2006; Horl and Horl, 2002). The National Kidney Foundation Task Force on cardiovascular disease in chronic kidney disease (CKD) has targeted hypertension as one of the major risk factors in the management of cardiovascular disease (National Kidney Foundation, 2005). Targeting a reduction in deaths due to cardiovascular causes will lead to significant reduction in the overall mortality of this population. Controlling hypertension in dialysis patients will help health care providers to meet healthy people 2010 goal for chronic kidney disease that is decreasing complications, disability and death in chronic kidney disease.

In a study by Agarwal *et al.* (2006) found the prevalence of hypertension in chronic disease patients to be 76% at the Kenyatta National Hospital Renal Unit, and only 16.6% of the patients had achieved the target blood pressure of 130/80 mmHg. While in a study done by Nadeem *et al.* (2004) to ascertain cardiovascular risk factors in chronic kidney disease, a prevalence of 51.8% were found amongst hypertensive patients. These findings could be as a result of only inclusion of patients with a blood pressure of 140/80 mmHg.

### **2.3 Adherence to Hypertension Medication Regimen**

The WHO defines adherence as “the extent to which the persons’ behavior (including medication-taking) corresponds with agreed recommendations from a healthcare provider” (Sabaté, 2003). It includes the initiation of the treatment, implementation of the prescribed regime, and continuation of the pharmacotherapy (Vrijens *et al.*, 2012).

Meanwhile, some studies classify adherence as either primary or secondary. Primary non adherence is the frequency with which patients fail to fill prescriptions when new medications are started so it is related to refilling and initiation of the medication therapy (Fischer *et al.*, 2012). Secondary non adherence is defined as the medication being not taken as prescribed when prescriptions are filled. It does not only affect the clinical outcome but also affect the financial outcome of the health system (Solomon and Majumdar, 2010).

A study by Kauric-Klein (2013) found poor blood pressure control in chronic hemodialysis patients. Systolic hypertension was much more prevalent in this sample than diastolic hypertension. The majority of patients were on three or more antihypertensives. Despite being on a number of antihypertensives, most of the participants did not have adequate blood pressure control. The most frequently prescribed antihypertensive agent were beta blockers followed by calcium channel blockers and angiotensin converting enzyme inhibitors. Total number of antihypertensives was not related to blood pressure or medication adherence. A possible explanation for poor blood pressure control in this population is non adherence to antihypertensive medications secondary to the complexity of the medication regimen.

In a cross-sectional analysis of data from the Reasons for Geographic and Racial Differences in Stroke study by Muntner *et al.*, 2010. Participants with chronic kidney disease were more likely to be medication adherent than participants without chronic kidney disease. Greater non adherence had higher odds of uncontrolled hypertension.

However, even in participants considered adherent, 25% of the non-chronic kidney disease cohort and 34.6% of the chronic kidney disease cohort had uncontrolled hypertension, defined as systolic blood pressure of >140 mm Hg or diastolic blood pressure >90 mm Hg. These numbers increased to 60.4% and 66.9% when using the cutoff of 130/80 mm Hg, respectively.

Although the high rate of poor blood pressure control in presumably adherent participants could reflect non response to the medications, alternatively, it could stem from inaccuracies with the measure of adherence, which may not reflect true medication-taking behaviors. Many factors can contribute to non-adherence with medication regimes. These include but are not limited to financial cost and insurance coverage, health beliefs, dosage frequency, side effects, age, sex, race/ethnicity, education level, socioeconomic status, depression, and forgetfulness (Loghman-Adham, 2003).

Ronita *et al.*, (2008) found that forgetfulness, inconvenience, and scheduling problems were the main reasons reported for non-compliance among hemodialysis patients (n=77) and concluded that more emphasis needs to be placed on ways to remind patients to take their medications. In 2006, Holley and DeVore found that financial cost and insurance coverage were leading causes for noncompliance among 15 peritoneal dialysis patients and 39 in-center hemodialysis patients. Regardless of the reason for non-adhere, it is clear that this is an area that needs additional research.

## **2.4 Measurement of Adherence to Antihypertensive Medication**

Although the high rate of poor blood pressure control in presumably adherent participants could reflect non response to the medications, alternatively, it could stem from inaccuracies with the measure of adherence, which may not reflect true medication-taking behaviors. Adherence measures fall into two general categories: direct and indirect measurements. Direct measurement which includes measures such as detection of the drug in biological fluid and direct observation of the patient taking the medication. More commonly used are the indirect measurements, which include medication monitoring, self report measures, and prescription claims data (Farmer, 1999).

Direct measures are considered to be more reliable and accurate than indirect measures. However, they are labor intensive and costly (Morris and Schulz, 1992). As an indirect measure an electronic bottle cap that records each time the bottle is opened as a marker of medication adherence. However, this technique is imperfect because some patients may remove multiple doses at once or open the bottle multiple times out of curiosity or to give the impression of adherence, especially if they are aware of the monitoring device. In addition, such electronic devices are costly, may get lost, and are difficult to implement outside of a research setting (Wetzels *et al.*, 2004).

Self report measures, if they are used to identify reasons for non-adherence, present the advantage of obtaining information from the patients' perspective, a view point that is increasingly being recognized as important. These measures however, are considered unreliable because of patient recall bias issues, although self-reported adherence has been

linked to long term health outcomes for patients with hypertension (Fairman and Motheral, 2000 ).

Self-report questionnaires, although subject to recall bias, are the easiest and least expensive methods to use in the clinical setting. No gold standard questionnaire for measuring patient adherence currently exists, although some validated questionnaires are available (Lau, 1997). Examples are:

**Hill-Bone Compliance Scale:** As a measure of reviewing patient's medication-taking behavior and barriers to adherence, Hill-Bone has a limited generalizability since it targets patients with antihypertensive medication only. The test consists of 3 subscales, medication-taking behavior, ability to keep appointment, and sodium intake, and is rated on a four-point Likert-type scale. The number of items available for testing varies among population types. 14-item and 9-item tests have been validated for urban black and community-dwelling populations, respectively (Lavsa *et al.*, 2011). When first designed, it has showed high internal consistency (Kim *et al.*, 2000) and so it did when used in a primary healthcare setting from a study in South Africa (Lambert *et al.*, 2006). The authors also described that Hill-Bone has a higher performance for black than nonblack populations despite its high cultural sensitivity (Krousel-Wood *et al.*, 2013). Meanwhile, the study with community-dwelling population also proved its high internal consistency in outpatient settings (Krousel-Wood *et al.*, 2005).

The Medication Adherence Questionnaire is also known as the 4-item Morisky Medication Adherence Scale (MMAS-4) (Nguyen *et al.*, 2014). This questionnaire is the quickest to administer and score and is only able to identify barriers to adherence due to its length (Lavsa *et al.*, 2011). The closed question format with “yes-saying” bias allows disclosures of non adherence (Tan *et al.*, 2014). Since it has been validated in the broadest range of diseases and in patients with low literacy, it is the most widely used scale for research (Culig and Lepee, 2014).

In a study on factor structure and validity of medication adherence questionnaire for cigarette smokers, it was reported that the coefficient alpha reliability of medication adherence questionnaire varied among studies as well as validity estimates (Toll *et al.*, 2007). Compared to MMAS-8, Medication Adherence Questionnaire has poorer psychometric properties. In the first validation for hypertensive population, the sensitivity and specificity were 81% and 44%, respectively (Morisky *et al.*, 2008). As a result, MMAS-8 has become more popular than Medication Adherence Questionnaire.

Eight-Item Morisky Medication Adherence Scale (MMAS-8). Based on the medication adherence questionnaire, Morisky *et al.* (2008) developed this 8-item MMAS (MMAS-8). The first seven items are Yes/No responses while the last item is a 5-point Likert response. The additional items focus on medication-taking behaviors, especially related to underuse, such as forgetfulness, so barriers to adherence can be identified more clearly (Tan *et al.*, 2014).

93% sensitivity and 53% specificity were reported while validating in “very low income minority patients treated for hypertension seeking routine care in a clinic setting” (Morisky *et al.*, 2008).

MMAS-8 was also validated with outstanding validity and reliability in patients with other chronic diseases (Tan *et al.*, 2014). As a result, it is probably the most accepted self-report measure for adherence to medication. Along with blood pressure control data, MMAS-8 should be able to identify medication adherence and help control blood pressure (Morisky *et al.*, 2008). Therefore, it is recommended to serve as a screening tool for validated conditions in the clinic setting.

In addition to self-report questionnaires, the two other most common methods used to measure adherence are pill count and pharmacy claims data; Pill counts, like medication event monitoring systems, can be manipulated by patients to improve apparent adherence and may be inaccurate if patients combine several pills into a single bottle.

Pharmacy claims data have an added benefit over pill counts in that they can pinpoint which medication was dispensed, how much, and when. However, patients may pick up medications but then choose to not take them, and pharmacy claims data cannot distinguish between non adherence and discontinuation by the prescriber. Additionally, neither of these two methods provides information about patients’ reasons for medication non adherence (DiMatteo, 2004).

## **2.5 Socio-demographic Factors and Adherence to Antihypertensive Medication Regimen**

Among the most frequently assessed demographic predictors of antihypertensive medication adherence, age seems to be a strong predictor of adherence in patients with end stage renal disease undergoing hemodialysis in most, albeit not all studies. Some articles have reported that older age, particularly > 65 years, was associated with higher levels of adherence (Berman *et al.*, 2004). This is in contrast to recent observations, reporting an emerging cognitive impairment and dementia in the aging dialysis population (Hain, 2008).

In a study by Ghimire *et al.* (2015) age was one of the most frequently reported variables. Although younger age was commonly associated with non adherence, non adherence was found prevalent in older population as well. Other factors significantly associated with measures of adherence were: non-Caucasian ethnicity; illness interfering family life; being a smoker; and living single and being divorced or widowed.

Female gender, low education, and unemployment were not found to be significantly associated with adherence. A study by Hyman and Paylik (2001) found differences in control rates between genders were largely attributed to respective differences in awareness and treatment. This could be related to women being more attentive to the risks of hypertension.

In another study on antihypertensive medication adherence in 135 hemodialysis patients, Curtin *et al.* (1999) found only race or ethnicity to be associated with adherence with antihypertensive medication. A study by Hsu *et al.* (2003) found lower blood pressure control rates in non-Hispanic blacks compared with whites, which could be because hypertension management in black patients is more difficult and black patients have a much higher risk of kidney disease progression.

Socio-demographic factors of individuals have been found to be related to patient's perception of adherence to antihypertensive medication. Horne *et al.* (2004) showed that men had more negative perceptions about antihypertensive medication adherence than women. Conversely, a population based study found women to view antihypertensive medicines being harmful and possibly having negative perception about taking antihypertensive medication as prescribed. In terms of age, older patients were found to have more positive views about antihypertensive medicines than the younger ones and patients with lower incomes viewed antihypertensive medicines as both harmful and beneficial than individuals on higher incomes (Isacson and Binglefors, 2002).

The level and type of education and patients own experience using antihypertensive medications have been significantly related to general perception about taking medication adherently. Weinman and Haskins, (1999) found hypertensive clients with lower education considered medicines as more harmful and less beneficial than those with higher education thus making them to have a low adherence.

## **2.6 Patients Knowledge on Antihypertensive Medication Regimen**

In a study by Rani *et al.* (2013) patient's knowledge on hypertensive medication among hemodialysis patients was measured using the Medication Knowledge Assessment Questionnaire (MKAQ). During the baseline assessment, some patients had a poor knowledge on the name and strength of the medication given to them and had a negative belief towards the medication usage as they thought that it was not so important to adhere to the instructions given to them regarding the doses, dosing interval and frequency. The study concluded that constant patient education would increase medication knowledge of the patients and improve their adherence.

In another study done by Kauric-Klein (2013) on whether knowledge can translate into improved blood pressure control in a chronic hemodialysis population of the treatment group compared to the control group. The study found overall there was a significant decrease in systolic ( $p=0.003$ ) and diastolic ( $p=0.001$ ) in the treatment group at 12 weeks. Thereby indicating increased knowledge results in patient's better adherence to antihypertensive medication thereby control of their blood pressure.

A study in the USA by Knight *et al.* (2001) the researchers found that among diagnosed hypertensive persons' awareness and knowledge of the disease was strongly related to good blood pressure control. Patients, who indicated lack of knowledge of what a normal systolic blood pressure value of  $\leq 140$ mmHg signifies, had significantly higher blood pressures than those who knew. However, the relationship between knowledge of hypertension and medication adherence has been inconsistent. Wang *et al.* (2002) found

no significant effect between prior knowledge of hypertension and compliance with medication but reported depression was a significant predictor of non-adherence in their study.

Knowledge of the disease is also an important factor that influences perceptions and ultimately adherence behavior. In a population-based study of knowledge, attitudes and practices regarding hypertension in Seychelles in 1998, Aubert *et al.* (1998) reported that a significant proportion of the Seychelles population had good knowledge about hypertension.

More than 96% of the respondents knew there is a relationship between obesity, salt intake and hypertension. About 79% knew the benefits of physical exercise and a significant number believed smoking can cause hypertension. However, only 28% believed hypertension has no symptoms, 10% knew their blood pressure values and 14% knew what a normal blood pressure value is (Aubert *et al.*, 1998).

By implication persons who believe that hypertension is symptomatic would most probably not seek treatment or adhere with their prescribed antihypertensive medication regimen unless they develop the symptoms of hypertension. It is also important for patients to know what represents optimal blood pressure to enable them to strive to remain normotensive. Unfortunately no study has been conducted among hypertensive patients undergoing hemodialysis in Kenya to compare these findings.

## **2.7 Patients Perception of Hypertension and Antihypertensive Medication**

A hypertensive patient's perception towards adherence is influenced by a combination of the patient's beliefs about antihypertensive drugs and what they perceive as challenges in adhering to these drugs (Glanz *et al.*, 2002). Subjecting norms are also influenced by the patient's perception of whether or not his beliefs are upheld by other people close to him, or whether or not they approve his behavior towards the treatment. The more clinicians understand how perceptions and norms affect intent, the more accurately interventions can be designed to motivate adherence.

Patient's beliefs and attitudes about their blood pressure and their experiences with the providers regarding blood pressure management may ultimately affect adherence to treatment recommendations. The Health Belief Model (HBM) states that people adopt certain behavior change based on their perception (Glanz *et al.*, 2002).

Rosenstock (1974) first described four dimensions of health beliefs and proposed how they related to health behaviors through the Health Belief Model (HBM). The four dimensions of health beliefs are perceived susceptibility, perceived severity, perceived benefits, and perceived barriers.

Perceived susceptibility to an illness is one's "subjective perception of the risk of contracting an illness", whereas an individual's perception about the "seriousness and consequences of the illness if left untreated" is referred to as perceived severity (Janz & Becker, 1984).

Perceived benefits are identified as perceptions related to the effectiveness of the health behavior in reducing the susceptibility to an illness and severity of the illness; and perceived barriers are perceptions related to the negative attributes of initiating and engaging in a health behavior (Janz & Becker, 1984).

Since hypertension usually presents as an asymptomatic disease, patients must believe they are susceptible to develop complications with or without experiencing specific symptoms (Glanz *et al.*, 2002). In a cross sectional study done in Dar es Salaam, Participants with high perceptions of susceptibility of having hypertension or hypertension complications had higher proportion of treatment adherence (66.2%) with  $p = 0.012$  than those with low perceived susceptibility (Joho, 2012).

Perceived severity refers to the extent to which patient's view a condition such as hypertension to be a serious disease. Perceived severity is the patient's view of the ability of a disease to cause morbidity, disability or mortality (Edo, 2009). According to the health belief model, persons who perceive hypertension to be a serious disease would be more compliant with medication and lifestyle modifications than those who do not hold this perception (Glanz *et al.*, 2002).

The perceived benefits correspond to the belief that, patients hold that a proposed course of action will be effective only if they get rid of the potential risks.

The health belief model hypothesizes those patients who perceive benefits from adopting particular health behavior are more likely to demonstrate the required health behavior than those who do not (Green and Kreuter, 2000). A study done by Benson and Britten (2002) revealed that respondents who had a high perception of benefit from medication had better rates of adherence compared to those with lower rate of perception of medication benefit. In a qualitative descriptive study examining adherent and non-adherent medication taking behavior among 21 people with hypertension, the belief that medications were effective in reducing blood pressure was an important motivator for participants to continue with their medications (Johnson *et al.*, 1999).

According to Green and Kreuter (2000) perceived barriers are those hindrances that patients perceive are preventing them from observing the required health behavior like medication adherence. There are various perceived barriers to taking medication that have been identified in the literature which include side effects of the medication, complex medication dosages, alternative medication and perceived fear of addiction to the hypertensive medication (Jokisalo *et al.* 2001; Benson and Britten, 2003).

Medication side effects may be a reason for low adherence. In Finland, a study by Jokisalo *et al.*, (2001) confirmed that serious side-effects of medications led to low adherence. The study also confirmed that simplicity of dosing improved adherence particularly among the elderly respondents who had cognitive impairment.

Benson and Britten (2003) noted increased adherence with a single daily dose compared with multiple daily doses. Similarly a meta- analysis of eight studies on adherence by Isikedjian *et al.* (2002) reported that patients on single daily doses (91.4%) were more adherant with treatment than patients with multiple daily doses (83.2%,  $p < 0.001$ ).

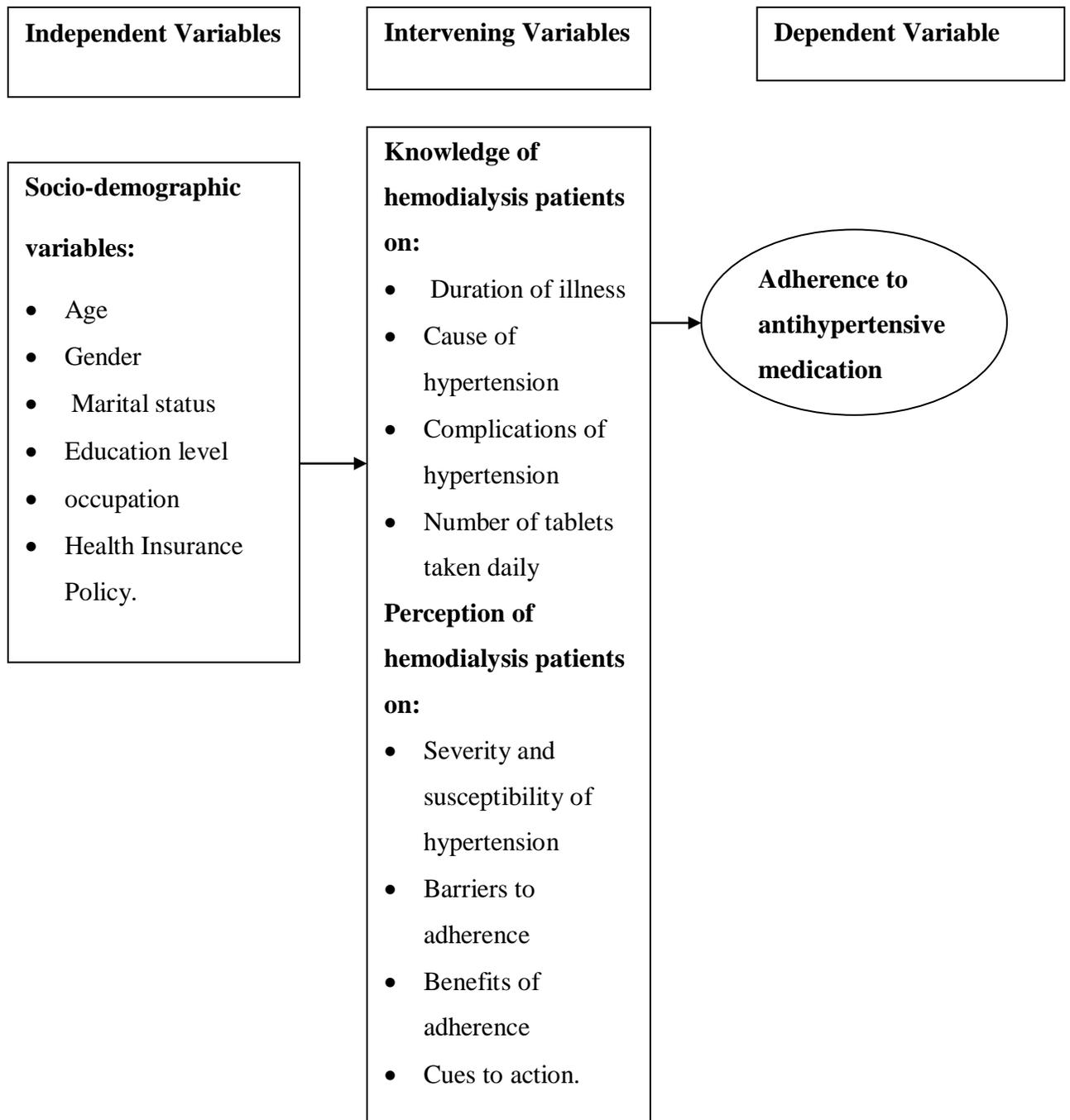
In contrast, Hashmi *et al.* (2007) conducted a study in Pakistan and found that respondents on multiple drugs (3 or more) were more compliant than those who were on a single daily drug regimen. The authors argued that this finding could have been due to the possibility that patients on multiple drugs considered their disease to be more severe compared to those on a single drug treatment.

Cues to action are factors that can initiate an individual to take action. According to Green and Kreuter (2000) they refer to cues as a precipitating force that makes the person feel the need to take action, and can be internal or external factors. Internal factors maybe the appearance of the signs and symptoms of a disease. External factors can be mass media advertising or effective health education directed at a target group (Glanz *et al.*, 2002). Thus there is need to investigate patient's perceptions in order to understand why they have uncontrolled hypertension then give them appropriate health education and positive behavior change.

## **2.8 Conceptual Framework**

Several factors play a role in determining the adherence of patients to their antihypertensive treatment. These factors may be inter-related and may contribute to adverse outcomes of non adherence which in turn are reflected by poor blood pressure control, cardiovascular complications, cerebrovascular accidents and eventually death.

The independent variables; socio demographic and economic factors affect the intervening variables; the knowledge of the patient about the antihypertensive medication for example the age of patient may result in the emerging cognitive impairment and dementia in the aging dialysis population (Hain, 2008). Thus affect the knowledge of the patient about antihypertensive medication resulting in poor adherence. The perception of the hemodialysis patient may be affected by the level of education and employment status of the patient. Appropriate treatment guidelines for hypertension that addresses these factors can lead to optimal adherence to treatment with consequent control of blood pressure and significant reduction in morbidity and mortality secondary to hypertension (Abera et al., 2012). This relationship between factors is illustrated in the on, Figure 2.1.



**Figure 2.1: Conceptual Framework (Rosenstock, 1974)**

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

This chapter presents the methods that were used to identify, collect and analyze data. Specifically, it covers the study setting, research design, study population, sample determination and sampling techniques, data collection, data collection procedure, data analysis, and ethical considerations.

### **3.2 Study Setting**

The research took place at Pandya Memorial Hospital, Mombasa. Pandya Memorial hospital is a private not for profit hospital situated in Kizingo Sub-location, Ganjoni Location, Kisauni constituency in Mombasa County. The hospital offers out-patient and in patient curative, promotive and rehabilitative services. It has a pediatric, medical, surgical, maternity, dental, renal, intensive care and high dependency units that are fully functional. It also houses the Mombasa Cardiac Centre and an imaging and MRI centre.

Mombasa County lies between latitude 3° 56" and 4° 10" South of the equator and longitudes 39° 34" and 39° 46" East. The study was conducted at the renal unit of Pandya Memorial Hospital the renal unit has a bed capacity of 5 beds and 7 dialyzing machines. An average of 8 patients under go hemodialysis and peritoneal dialysis in the unit in a day, meaning a total number of 240 patients undergo both hemodialysis and peritoneal dialysis per month in the renal unit. Most of these patients undergo dialysis weekly or after two weeks depending on the need, and recommendations by the nephrologists.

The renal unit at Pandya Memorial Hospital caters for both outpatients and in patients who need dialysis services.

### **3.3 Study Population**

The primary target populations in this study were patients undergoing hemodialysis and have a co morbidity of hypertension. Patients who undergo dialysis at the renal unit have their files and well documented history, from the files the researcher was able to identify patients who have already been diagnosed with hypertension. Out of the 290 patients undergoing hemodialysis at the Pandya memorial hospital renal unit, 240 were identified to be having hypertension. Hemodialysis patients meeting the inclusion criteria seeking hemodialysis services at the Pandya Memorial Hospital renal unit. Out of the 240 patients with hypertension, 195 met the inclusion criteria.

### **3.4 Inclusion Criteria**

Patients were recruited in the study if:

- i. They were 18 years and above.
- ii. Chronic Kidney disease patients and have been diagnosed with hypertension.
- iii. Patients undergoing hemodialysis at Pandya Memory Hospital renal unit.

### **3.5 Exclusion Criteria**

Patients were excluded from the study if they were:

- i. Hypertensive patients undergoing peritoneal dialysis at the Pandya Memorial Hospital renal unit.

### 3.6 Research Design

The study adopted a hospital based quantitative cross-sectional descriptive study design.

### 3.7 Sample Size Determination

The study adopted a sample using the Yamane Model, this formula is most ideal when the population parameter for the study is known (Yamane, 1967).

$$n = \frac{N}{1+N(e^2)}$$

Where;

n - Sample Size

N - Population Size

e - Precision level (at 0.95 confidence interval, e = 0.05)

Given N = 195

$$\begin{aligned} n &= 195 / 1 + 195(0.05^2) \\ &= 130 \end{aligned}$$

According to Naing *et al.* (2006) in order to avoid not achieving the desired precision due to non response, the researcher should over sample by 10%-20% depending on the anticipated non response rate and study population size. In this study the researcher over sampled by 10%, because of the size of the study population.

Thus  $(0.1 \times 195) = 19.5$  approximately 20 respondents

$$130+20$$

= 150 study respondents

### **3.8 Sampling Procedure**

The respondents were selected using simple random sampling technique using patients register at Pandya Memorial Hospital renal unit as the sampling frame. Whereby the researcher first wrote a list of all patients in the register who were meeting the inclusion criteria, then codes rather than names were assigned to the patients. From the list the researcher randomly selected the starting point and followed systematically until 150 respondents was selected.

### **3.9 Data Collection Instrument**

In the present study, data was collected using a structured questionnaire (Appendix II) questions were developed by the researcher according to the research objectives, the literature review, as well as the theoretical framework of the study using Health Belief Model.

### **3.10 Data Collection Procedure**

A questionnaire consisting of closed ended questions was used during the interviews. The structured data collection instrument permitted the researcher to ask the same questions to all participants and mark their responses using predetermined response options that were extracting information regarding patient's social demographic characteristics, Patient's knowledge of antihypertensive medication. It also highlighted perception of severity, perception of benefits, perception of barriers and cues to action.

The time used to complete one questionnaire per patient was approximating 20 minutes; data was collected within a period of three months. The participants had to give an informed consent before data was collected.

### **3.11 Reliability and Validity**

The reliability of the structured questionnaire was measured using the SPSS Cronbach's alpha coefficient. On average the Cronbach's alpha coefficient of the instrument was 0.89. According to Burns and Grove, (2007) Cronbach's alpha coefficient of 0.00 indicates no reliability and a coefficient of 1.00 indicates perfect reliability. However for a newly developed instrument, a reliability coefficient of 0.70 is acceptable. Completed questionnaire were checked daily and errors were corrected.

Validity of the research instrument was ensured through an elaborate literature review and guidance of the supervisors. A pre-test study was done to check on the accuracy of the questionnaire so that the answers obtained are checked to ensure the absence of errors and distortions of participant's answers.

### **3.12 Pre-testing**

The questionnaires were piloted at the Mombasa hospital renal unit among 15 patients' who had met the inclusion criteria. This was done to identify any mistakes and omissions that could have been in the questionnaires and correct, in order to address properly the issues under study.

### **3.13 Measurement of Variables**

Five items regarding socio-demographic data; age, gender, level of education, employment status and health insurance policy was asked in order to get the respondents socio demographic profile. Seven items designed to evaluate the patient's knowledge about antihypertensive medication regimen, it had two point likert scale; with scores of 1 indicating inadequate knowledge and 2 indicating adequate knowledge.

The outcome variable to be measured was adherence. Adherence in this study was measured using the Morisky's Medication Adherence Scale (MMAS-8) which has eight questions, with a yes or no response for items 1 through to 7 and item 8 has a five point likert scale (Morisky *et al.*, 2008) . Each "no" response is rated as 1 and each "yes" response is rated as 0 except for item 5, in which each "yes" is a 1 and "no" is a 0. For item 8, the code (0-4) has to be standardized by dividing the result by 4 to calculate a summated score. Total scores of above 6 reflects high adherence while below 6 indicate low adherence (Morisky *et al.*, 2008).

Patient's perception of severity of hypertension was measured using four items on a four point likert scale: 1-strongly disagree, 2- disagree, 3- agree and 4-strongly agree. Patient's perception of benefit of adhering to the medication regimen was measured using 5 items on a 4 point likert scale: 1-strongly disagree, 2-disagree, 3-agree and 4-strongly agree.

Patient's perception of barriers to adhering to the medication was asked using four items on a 4 point likert scale: 1-extremely low, 2-low, 3-high and 4-extremely high and the patient's perception of cues to action was asked using four items on a four point likert scale: 1-strongly disagree, 2-disagree, 3-agree and 4-strongly agree.

For the purpose of discussion the responses of perception were collapsed into two major categories, namely high perception and low perception; strongly disagree and disagree were termed as low perception while agree and strongly agree termed as high perception whereas extremely low and low as low perception and high and extremely high as high perception.

### **3.14 Data Analysis**

Data were entered into the computer using SPSS software programme 20.0 version. Data were cleaned before being subjected to analysis. Data analysis was performed using SPSS software programme. Information was summarized using frequency and percentage tables. Bivariate analysis using chi-square test was used to ascertain associations between variables and logistic regression was used to identify independent predictors of adherence using adherence status as the outcome variable and the various factors as the predictor variable. A p-value of equal or less than 0.05 was considered as statistically significant.

### **3.15 Ethical Considerations**

Permission to perform the study was obtained from Maseno University School of Graduate studies (SGS) (Appendix III). Ethical clearance was sought and granted from the Maseno University Ethical Review Committee (MUERC) (Appendix IV). Further approval was sought from the hospital administrator of Pandya Memorial Hospital (Appendix V). Participation was voluntary and details of the objectives and benefits of the study were explained to the respondents, anonymity of the participants was ensured by not having any identification on the data collection tool. Confidentiality was guaranteed by storing the data safe and only the researcher having access. The respondents were given the informed consent (Appendix I) and were requested to sign once they had read and agreed to participate in the study. The respondents were also informed that they were free to withdraw from the research at any stage without incurring any consequences.

### **3.16 Limitations of the Study**

1. This study only looked at a single hospital hence potential for selection bias as patients who did not come to this facility or sought care in other hospitals were not included, hence the study findings are not generalizable to the general population.
2. The Information on adherence to antihypertensive medication was obtained through self reporting which is prone to recall bias.

## **CHAPTER FOUR: RESULTS**

### **4.1 Introduction**

The major purpose of this chapter is to present the quantitative results of this study. The first section describes the sample and study variables using descriptive statistics and then description of the relationship between variables using inferential statistics.

### **4.2 Socio-Demographic Characteristics of the Respondents**

A total of 144 participants were interviewed. The participants were made up of 75 (52%) males and 69 (48%) females, with 70 (48.6%) of them being between 45-64 years of age. 61 (42%) had no formal education, 48 (33%) had primary education and 35 (24%) had above secondary education. 95 (66%) were not employed while 49 (34%) were employed, and 62 (43%) had no health insurance policy while 82 (57%) had a health insurance policy, Table 4.1

**Table 4.1: Socio-Demographic Characteristics of Study Participants**

<b>Variable</b>	<b>Freq(n)</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Male	75	52
Female	69	48
<b>Age</b>		
18-44	30	20.8
45-64	70	48.6
>65	44	30.6
<b>Education Level</b>		
No. formal education	61	42
Primary	48	33
Secondary and above	35	24
<b>Employment Status</b>		
Unemployed	95	66
Employed	49	34
<b>Health Insurance Policy</b>		
No	62	43
Yes	82	57

### **4.3 Adherence to Antihypertensive Medication**

83 (57.6%) of the patients had a high adherence, that is scores of  $>6$  while 61 (42.4%) had low adherence that is scores of  $<6$  using the Morisky's Medication Adherence Scale (MMAS-8).

When individual components of the MMAS-8 were assessed, 57% of the patients reported that they have ever stopped taking their medication without telling their doctor because they felt worse when they took it while 64% reported that they sometimes stop taking their medicine when they felt like their blood pressure was under control. 58% of the patients reported that they had taken their medication the previous day and 60% felt like sticking to their treatment plan wasn't a hassle at all. None of the patients found it difficult to remember to take their medicine, while 14% usually found it difficult, 21% sometimes found it difficult, 34% once in a while found it difficult while 31% rarely or never found it difficult to remember to take their medicine, Table 4.2

**Table 4.2 Adherence to Antihypertensive Medication Using MMAS-8**

<b>Questions</b>	<b>Frequency</b>
Do you sometimes forget to take your medicines?	
Yes	60(42%)
No	84(58%)
People sometimes miss their medicines for reasons other than forgetting. Thinking over the past two weeks was there any days you didn't take your medicines?	70(49%)
Yes	74(51%)
No	
Have you ever cut back or stopped taking your medicines without telling your doctor because you felt worse when you took it?	82(57%)
Yes	62(43%)
No	
When you travel or leave home, do you sometimes forget to bring along your medicine?	75(52%)
Yes	69(48%)
No	
Did you take all your medicines yesterday?	
Yes	84(58%)
No	60(42%)
When you feel like your blood pressure is under control, do you sometimes stop taking your medicines?	92(64%)
Yes	52(36%)
No	
Taking medicine everyday is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?	57(40%)
Yes	87(60%)
No	
How often do you have difficulty remembering to take all your medicine?	
Never/rarely	44(31%)
Once in a while	50(34%)
Sometimes	30(21%)
Usually	20(14%)
All the time	0
Scores	
>6	87(58%)
<6	61(42%)

#### **4.4 Comparison between Socio-demographic Characteristics and Adherence to Antihypertensive Treatment**

Adherence to antihypertensive medication among female (57.4%) was higher than that of males (42.6%) and the results were statistically significance with  $p=0.05$ . Participants between the age of 18-44 years with high adherence were 23%, those between 45-64 years were 59% and those >65 year were 18% the results were statistically significant with  $p=0.01$ . Those with no formal education as well as those who are unemployed reported higher adherence levels of (39.8%) and (66%) respectively. Those with medical insurance policy had higher adherence level (50.6%) compared to those with no health insurance policy (49.4%), Table 4.3

**Table 4.3: Adherence to Antihypertensive Regimen by Socio-demographic Characteristics of the Patients**

Characteristic	Frequency	MMAS Category (Score range)		p=value
	n =144	High >6	Low >6	
		n=83	n=61	
<b>Gender</b>				<b>0.05</b>
Male	75 (52%)	26(42.6%)	49(59%)	
Female	69 (48%)	35(57.4%)	34(41%)	
<b>Age</b>				<b>0.01</b>
18 – 44	30(20.8%)	19(23%)	11(18%)	
45 – 64	70(48.6%)	49(59%)	21(34%)	
>65	44(30.6%)	15(18%)	29(48%)	
<b>Education Level</b>				0.76
No formal Education	61(42%)	33(39.8%)	28(45.9%)	
Primary	48(33%)	29(34.9%)	19(31.1%)	
Secondary and above	35(24%)	21(25.3%)	14(23%)	
<b>Occupation</b>				0.93
Unemployed	95(66%)	55(66.3%)	40(65.6%)	
Employed	49(34%)	28(33.7%)	21(34.4%)	
<b>Health Insurance Policy</b>				<b>0.03</b>
No	62(43%)	41(49.4%)	21(34.4%)	
Yes	82(57%)	42(50.6%)	40(65.6%)	

#### **4.5 Knowledge on Antihypertensive Medication**

Respondents who had suffered from hypertension for more than 1 year had a high adherence of 60.2% while those who had hypertension for less than a year had 39.8% adherence. 68.7% of those who had adequate knowledge about the causes of hypertension had a high adherence while those with inadequate knowledge had 31.3% adherence. Those with adequate knowledge of the complications of hypertension had 80% adherence. Having an adequate knowledge about the name of the prescribed medication made the participants to have a high adherence of 80.5%. 97.6% of those with adequate knowledge on medication usage instructions had high adherence. Participants with adequate knowledge of medication side effects had a high adherence of 84.3% while those with inadequate knowledge of side effects had 15.7% adherence, the results were statistically significant with  $p=0.04$ , Table 4.4

**Table 4.4: Comparison between Knowledge and Adherence to Antihypertensive Medication Regimen**

Characteristic	Frequency	MMAS Category (Score range)		p=value	
		n =144	High >6		Low >6
			n=83		n=61
<b>Duration of Illness</b>				0.59	
< 1 year	60(41.7%)	33(39.8%)	27(44.3%)		
> 1 year	84(58.3%)	50(60.2%)	34(55.7%)		
<b>Causes of Hypertension</b>				0.16	
Adequate	92(63.9%)	57(68.7%)	35(57.4%)		
Inadequate	52(36.1%)	26(31.3%)	26(42.6%)		
<b>Complication of hypertension</b>				0.76	
Adequate	115(79.9%)	67(80%)	48(78.7%)		
Inadequate	29(20.1%)	16(19.3%)	13(21.3%)		
<b>Name of their prescribed medication</b>				0.63	
Adequate	117(81.3%)	66(80.5%)	51(83.6%)		
Inadequate	27(18.7%)	17(19.5%)	10(16.5%)		
<b>Medication usage instructions</b>				0.11	
Adequate	137(95%)	81(97.6%)	56(91.8%)		
Inadequate	7(5%)	2(2.4%)	5(8.2%)		
<b>Side effects of the medication</b>				<b>0.04</b>	
Adequate	128(88.9%)	70(84.3%)	58(95.1%)		
Inadequate	16(11.1%)	13(15.7%)	3(4.9%)		
<b>Adverse drug reaction</b>				0.13	
Adequate	141(97.9%)	80(96.4%)	61(100%)		
Inadequate	3(2.1%)	3(3.6%)	0		

#### 4.6 Perceived Severity of Hypertension

Eighty four percent of the respondents had a high perception of hypertension severity while 16% had a low perception. 76% of the respondents perceived their hypertension condition to be serious, 61% perceived hypertension as a real threat to life, 54% feared disability as a result of hypertension and 67% are usually worried about their hypertension condition, Table 4.5

**Table 4.5: Summary of Perception of Severity**

<b>To what extent do you agree with the following statements?</b>	<b>High perception of severity</b>	<b>Low perception of severity</b>
My blood pressure condition is serious	110 (76%)	34 (24%)
I am usually worried about my condition	96 (67%)	48 (33%)
Hypertension is a real threat to life	88 (61%)	56(39%)
I fear disability as a result of hypertension	78 (54%)	66 (46%)
<b>Score summary</b>		
High perception of severity	121 (84%)	
Low perception severity	23 (16%)	

#### 4.7 Perceived Benefit of Antihypertensive Medication Regimen Adherence

Respondents with a high perception of benefit were 84.7% while those with a low perception of benefit were 15.3%. 63% of the respondent's perceived antihypertensive will keep their blood pressure under control, 55% of respondent's perceived antihypertensive will increase their quality of life, and 60% perceived antihypertensive

increases their sense of wellbeing. 58% perceived antihypertensive protects them from complications and 64% perceived antihypertensive helps them to avoid added financial burden, Table 4.6

**Table 4.6: Summary of Perceived Benefit of Antihypertensive Medication Regimen Adherence**

<b>To what extent do you agree with the following statements on benefits of adhering to antihypertensive medication?</b>	<b>High perception of benefit</b>	<b>Low perception of benefit</b>
Keeping my blood pressure under control	90(63%)	54(38%)
Increasing my quality of life	79(55%)	65(45%)
Increasing my sense of wellbeing	87(60%)	57(40%)
Protecting me from complications	83(58%)	61(42%)
Avoiding added financial burden	92(64%)	52(36%)
Summary of score:		
High perception of benefit	122(84.7%)	
Low perception of benefit	22(15.3%)	

#### **4.8 Perception of Barriers to Antihypertensive Medication Regimen Adherence**

Only 20.8% of the respondents had a high perception of barriers to antihypertensive medication adherence while 79.2% had a low perception of adherence. 42% of perceived antihypertensive medication as ineffective and 49% perceived hypertension as difficult to cure. 39% of the respondents perceived that they lacked the discipline to adhere to

antihypertensive medication while 48% perceived that they lacked motivation to adhere because they can't be cured, Table 4.7

**Table 4.7: Summary of Perceived Barriers to Antihypertensive Medication Regimen Adherence**

<b>To what extent do you think the following barriers hinder you from adhering to antihypertensive medication</b>	<b>High perception of barriers</b>	<b>Low perception of barriers</b>
Ineffectiveness of the medication	61(42%)	83(58%)
Difficult of curing hypertension	70 (49%)	74 (51%)
Lack of discipline to adhering	56 (39%)	88 (61%)
Lack of motivation because I can't be cured	69 (48%)	75 (52%)
<b>Summary of score:</b>		
High perception of barriers	30(20.8%)	
Low perception of barriers	114(79.2%)	

#### **4.9 Cues to Action for Antihypertensive Medication Regimen Adherence**

Sixty point four percent of the respondents had a high cues to action while 39.6% had a low cues to action. 53% of the respondents considered advice from their doctor as their cue to action, 66% perceived feeling unwell as their cue to action and 23% perceived death of a relative due to hypertension as their cue to action. 56% of the respondents cue

to action of adhering to antihypertensive medication was a television or radio program, Table 4.8

**Table 4.8 Summary of Cues to Action for Antihypertensive Medication Regimen Adherence**

<b>Which of the following motivates you to adhere to your antihypertensive medication</b>	<b>High cues to Action</b>	<b>Low cues to action</b>
Advice from your doctor	76(53%)	68(47%)
When you feel unwell	95(66%)	49(34%)
Death from a relative due to hypertension	33(23%)	111(77%)
Television or radio program on hypertension	81(56%)	63(44%)
Summary of scores:		
High cues to action	87(60.4%)	
Low cues to action	57(39.6%)	

#### **4.10 Relationship between Perception of Antihypertensive Medication Regimen and Adherence**

84% of the respondents who had a high perception of hypertension severity had a high adherence (78%) compared to those who had a low perceived severity (16%) who had an adherence of 21.7%, the results were statistically significant with  $p=0.03$ . Respondents who had a high perception of benefitting from adhering to antihypertensive medication regimen (84.7%) had a high adherence (90.4%), the results were statistically significant with  $p=0.03$ . Respondents whose perceptions towards barriers of adhering to

antihypertensive medications to be low (79.2%) had a high adherence of 88%, and the results were statistically significant with  $p=0.01$ . Respondents 87% with high cues to action had a high adherence (66.3%), Table 4.9

**Table 4.9: Relationship between Perception and Adherence to Antihypertensive Medication**

Characteristic	Frequency	MMAS Category (Score range)		p=value
		High >6 n=83	Low >6 n=61	
<b>Perceived Severity</b>				<b>0.03</b>
Low	23(16%)	18(21.7%)	5(8.2%)	
High	121(84%)	65(78.3%)	56(91.8%)	
<b>Perceived Benefits</b>				<b>0.03</b>
Low	22(15.3%)	8(9.6%)	14(23%)	
High	122(84.7%)	75(90.4%)	47(77%)	
<b>Perceived Barriers</b>				<b>0.01</b>
Low	114(79.2%)	73(88%)	41(67.2%)	
High	30(20.8%)	10(12%)	20(32.8%)	
<b>Cues to Action</b>				0.09
Low	57(39.6%)	28(33.7%)	29(47.5%)	
High	87(60.4%)	55(66.3%)	32(52.5%)	

#### 4.11 Factors that Affect Hypertensive Medication Adherence

In the initial analysis using chi square test to determine association between adherence and independent variables, the following factors were found to be statistically significant to adherence: gender (p=0.05), age (p=0.01), medical insurance policy (p=0.03), knowledge of side effects (p=0.04), perception of severity (p=0.03), perception of benefit (p=0.03), and perception of barriers (p=0.01). Logistic regression was then done to identify the most important factors affecting adherence to antihypertensive medication the strength of association between those factors and adherence. No Variable was statistically significant ( $p \leq 0.05$ ) to adherence on logistic regression, Table 4.11

**Table 4.11: Logistic Regression Analysis of Hypertension Medication Adherence**

<b>Variables</b>	<b>OR</b>	<b>95% CI</b>	<b>p</b>
Age	1.02	0.98-1.07	0.23
Gender (Female=0; Male=1)	2.58	1.09-6.16	0.98
Health insurance (No=0; Yes=1)	0.35	0.15-0.84	0.92
Knowledge of side effects of medication (Little or nothing=0; Majority=1)	2.02	0.44-9.27	0.58
Perception of Severity (Low=0; High=1)	3.61	1.02-12.78	0.69
Perception of Benefit (Low=0; High=1)	3.22	1.06-9.79	0.30
Perception of Barriers (Low=0; High=1)	0.23	0.08-0.64	0.75

#### 4.12 Hypothesis Testing

1. Null Hypothesis: Socio-demographic factors are not related to adherence to antihypertensive medication among hemodialysis patients. Using level of significance as  $\leq 0.05$  and chi square test, the findings were as follows: gender ( $p=0.05$ ), age ( $p=0.01$ ), education level ( $p=0.76$ ), occupation ( $p=0.93$ ) and health insurance ( $p=0.03$ ). Thus, the above null hypothesis is rejected based on the p values that are less than  $\leq 0.05$ .
2. Null Hypothesis: Knowledge of hemodialysis patients on antihypertensive medication is not associated with adherence. Findings: duration of illness ( $p=0.59$ ), causes of hypertension ( $p=0.16$ ), complication of hypertension ( $p=0.76$ ), name of their prescribed medication ( $p=0.63$ ), medication usage instructions ( $p=0.11$ ), side effects of the medication ( $p=0.04$ ) and adverse drug reaction ( $p=0.13$ ). This null hypothesis is rejected based on the p values that are less than  $\leq 0.05$ .
3. Null Hypothesis: Perception of hemodialysis patients to their antihypertensive medication is not associated to adherence. Findings: perceived severity ( $p=0.03$ ), perceived benefits ( $p=0.03$ ), perceived barriers ( $p=0.01$ ) and cues to action ( $p=0.09$ ). This null hypothesis is also rejected due to  $p \leq 0.05$ .

## CHAPTER FIVE: DISCUSSION

### 5.1 Introduction

This chapter is about the discussion of results as per the study objectives in relation to the conceptual framework and research literature. This chapter discusses the major findings of this study. It addresses the findings about the proportion of patients undergoing hemodialysis at Pandya Memorial Hospital, followed by a discussion of the socio demographic characteristics of the patients in relation to their adherence to antihypertensive medication. The relationship of patient's knowledge to adherence to antihypertensive medication, patient's perception to antihypertensive medication effects to adherence.

### 5.2 Adherence to Antihypertensive Medication Regimen

The findings of the study showed (57.6%) of the patients had a high adherence, that is scores of >6 while (42.4%) had low adherence that is scores of <6 using the Morisky's Medication Adherence Scale (MMAS-8). This finding was similar to that of a study by Munter *et al.* (2010) where 69% of the participants were reported to have appropriate adherence. Studies by Ronita *et al.*, 2008 and Sontakke *et al.*, 2015, found patients who had low adherence to be 34% and 37% respectively. A study by Alkatheri *et al.* (2014) found only 28% of patients to be having a high adherence while 72% had a low adherence. These variations may be due to patient's socio-demographic characteristics of the various countries, adherence measurement tool, study design, study population, patients perception, patients self care behavior, medical and social support.

### **5.3 Socio-demographic Characteristics of Patients in Relation to Adherence**

Females were found to be high adherent to their medication (57.4%). Similarly a study by Sarafidis *et al.* (2008) also found woman to be more adherent, this could be related to women being more attentive to the risk of hypertension. However Theofilou (2012) found higher adherence in men than in women, this could be attributed to the fact that women are more prone to stress thus interfering with their adherence behavior.

Hemodialysis patients between the ages of 45-64 were found to have a higher adherence (59%), followed by those between the ages of 18-44 (23%) and those older than 65 had the low adherence (18%). A study by Theofilou (2012) and Islahudin *et al.* (2013) also found younger patients to be having a higher adherence than older patients, this could be explained by the fact that older patients could be having more co-morbidity hence making them to take more drugs and the pill burden could be making them to be less adherent. In addition a study by Murray (2008) reported that cognitive impairment and dementia is emerging in the aging dialysis population which could be another reason for low adherence in this population.

Monane *et al.*, 1994 and Evangelista *et al.*, 2003 found old age to be independently associated with better adherence, and reported that older participants (65 -85 years old) had 'no difficulty in adhering to medications when compared with younger patients. This could be attributed to older people having co morbidities making them perceive hypertension as severe and hence adhere better to antihypertensive drug regimen.

Patients who had a health insurance policy had a high adherence to their antihypertensive regimen (50.6%) and 49.4% of those with no insurance policy had low adherence, maybe because they could not afford to buy their medication on time because of the cost. This was in agreement with a study by Sontakke (2015) low adherence was attributed to lack of insurance. This could be attributed to patients not buying all medicines and not taking medicines for required duration, one of the major factors responsible for this is poor affordability. Cost has been implicated to low adherence in several studies in patients suffering from chronic diseases.

In a study of hemodialysis patients from 12 countries, proportion of patients who accepted not purchasing medicines due to high cost ranged from 3% (Japan) to 29% (United States) (Hirth *et al.*, 2008). The study by Sontakke (2015) 54% of patients suggested that government should provide free or subsidized medicines to poor patients as an intervention to low adherence to antihypertensive medication among patients with chronic kidney disease.

#### **5.4 Knowledge of Hemodialysis Patients on Antihypertensive Medication**

Patients who had adequate knowledge of the side effects of antihypertensive medication (84.3%) had a high adherence, while those with inadequate knowledge of side effects had low adherence (15.7%). This could be attributed to lack of knowledge of the side effects could make the patients to fear taking medication; in a study by Santakke *et al.* (2015) 47.05% of the patients who feared the side effects had a low adherence. Side effects, if present, can play a crucial role in deciding whether or not patients will take their medications as prescribed.

According to Horne *et al.* (1999) if attribution of a symptom to side effects reinforces concerns about adherence to antihypertensive medication, an appraisal of that outcome may then feedback to influence a change in perception in medication taking over time.

#### **5.5 Perception of Antihypertensive Medication**

In this current study hemodialysis patients who had a high perception of severity of hypertension had a high adherence (78.3%). Similarly Hareri *et al.* (2013) reported that patients who had a high perception of severity of hypertension significantly adhere to their medication and dietary changes, 5 times more likely adherent than those who had low perception.

This could be explained by improved perception of severity of hypertension may improve adherence status of patients. Venkatachalam *et al.* (2015) found that the prevalence of adherence in an Indian population was very low because of perceived susceptibility and

severity of hypertension was low among their study population. This could be attributed to low literacy levels to understand hypertension and its consequences if not controlled and also lack of continuous medical education to patients by health workers.

Patients who had a high perception of antihypertensive medication benefit had a high adherence (90.4%) than those with a low perception of benefit (9.6%). In a study by Venkateswararao *et al.* (2014) hemodialysis patients who perceived importance of treatment were having a higher adherence rate.

Patients who had a low perception of barriers had a high adherence (88%) compared to those with a high perception of barriers (12%). A study by OH (2013) also found patients with low perceived barriers having a higher adherence to their antihypertensive medication. According to the literature, perceived barriers in patients with chronic disease include forgetfulness, interference with daily life, lack of motivation, and family problems (Chao *et al.*, 2005).

## **CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS**

### **6.1 Conclusion**

This cross sectional study aimed at determining factors that affect adherence of hypertensive patients to their antihypertensive medication regimen among hemodialysis patients attending Pandya Memorial Hospital.

The study found that (57.6%) of the patients were fully adherent to their antihypertensive medication regimen among patients undergoing hemodialysis at Pandya Memorial Hospital, while 42.4% were not fully adherent as measured using self-reporting Morisky's Medication Adherence Scale (MMAS-8).

Demographic characteristics of hemodialysis patients that were found to be statistically significant to adherence to antihypertensive medication using the chi square test were; being of female gender 35(57.4%), being between the ages of 45-64 years 49(59%) and having a health insurance policy 42(50.6%).

Adequate knowledge of antihypertensive medication side effects was found to be statistically significant to adherence rate of hemodialysis patients to their antihypertensive medication regimen 70(84.3%). Based on health belief model, the respondents who perceived high severity, benefit had high adherence compared with low perceived severity, benefit. While patients with low perception of barrier had high adherence compared to those with high perception of barriers.

## **6.2 Recommendations**

1. This study showed an adherence of (57.6%) therefore healthcare workers need to develop context specific interventions in order to ensure that all patients adhere to their antihypertensive medication.
2. Health care workers should create interventions that are tailored in the demographic characteristics of hemodialysis patients, with much emphasis on gender, age and economic status of the patient in order to improve their adherence to antihypertensive medication.
3. Interventions aimed at increasing patient's knowledge on hypertension with emphasis on its causes, severity, types and side effects of the medications and the consequences of non adherence with the antihypertensive treatment regimen.
4. Routine adherence counseling by the clinician on the importance of adhering to antihypertensive medication and the consequences of uncontrolled blood pressure should be done to hemodialysis patients in order improve the patient's perception of antihypertensive medication regimen.

### **6.3 Suggestions for Future Research**

1. This study utilized a self- report the Morisky's Medication Adherence Scale (MMAS-8) to measure adherence of hemodialysis patients to antihypertensive medication, in the next studies objective tools such as; clinical or laboratory indicators should be used for assessing a larger population of hemodialysis patients' treatment adherence.
2. Future research should investigate healthcare factors/organizational factors that affect hemodialysis patients' adherence to antihypertensive medication.

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**APPENDICES**

**APPENDIX I: INFORMED CONSENT**

My name is Otenyo Salome. I am a student at Maseno University, school of Public Health and Community Development. I am carrying out a study whose aim is, Identify factors that affect the adherence to medication among hypertensive patients undergoing hemodialysis. This study will be taking place at Pandya Memorial Hospital, Mombasa.

The information from this study will be strictly for learning purposes. It will also help to identify factors that will contribute to effective management of hypertension. Policymakers within the government, Ministry of health and healthcare providers can use this information to improve the treatment of hypertension. It may also be used by the ministry of health and other stakeholders to promote appropriate use of anti-hypertensive in the society.

I would like to ask a few questions concerning the topic. Your participation will be purely voluntary and you can withdraw anytime without from the study. You will need approximately 30 minutes to respond to these questions. The information will be given to the researcher and it will be treated with confidentiality. Your sincere and true response will contribute to the achievement of the aims of this study.

**Are you willing to be interviewed today, at this time?**

**Yes**..... **No**.....  
Signature of interviewer..... Date.....  
Signature of interviewee..... Date.....

## APPENDIX II: QUESTIONNAIRE

Respondent's Identification Number.....

Interviewer code.....

### Section 1: Socio-demographic Information

1. What is your age .....
2. Gender .....
3. What is your highest level of education?
  - No formal education        ( )
  - Primary                        ( )
  - Secondary and above        ( )
4. What is your employment Status?
  - Unemployed                    ( )
  - Employee                      ( )
5. Do you have a health insurance policy?
  - No                                ( )
  - Yes                                ( )

## Section 2: Knowledge about Antihypertensive Medication Regimen

(1- Inadequate Knowledge, 2- Adequate Knowledge)

- |   | <b>1</b>   | <b>2</b> |
|---|------------|----------|
| 6. Name the medications that you use for hypertension                                       | ( )        | ( )      |
| 7. How do you take your medications   | ( )        | ( )      |
| 8. What are the major side effects of the hypertensive drugs that you are currently taking? | ( )        | ( )      |
| 9. What are the adverse drug reaction of the hypertensive drugs that you are using?         | ( )        | ( )      |
| 10. What are the causes of hypertension?  | ( )        | ( )      |
| 11. What are the complications of hypertension?   | ( )        | ( )      |
| 12. How long have you been diagnosed with hypertension?                                     |            |          |
| <1year ( )  | >1year ( ) |          |

## Section 3: Measurement of Adherence (Morisky 8 Item Measurement Medication Adherence Scale)

13. Do you sometimes forget to take your medicines?  
Yes ( ) No ( )
14. People sometimes miss their medicines for reasons other than forgetting. Thinking over the past two weeks was there any days you didn't take your medicine?  
Yes ( ) No ( )
15. Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?  
Yes ( ) No ( )
16. When you travel or leave home, do you sometimes forget to bring along your medicine?  
Yes ( ) No ( )

17. Did you take all your medicines yesterday?

Yes ( )

No ( )

18. When you feel like your blood pressure is under control, do you sometimes stop taking your medicine

Yes ( )

No ( )

19. Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?

Yes ( )

No ( )

20. How often do you have difficulty remembering to take all your medicine?

Never/ Rarely ( )

Once In a While ( )

Sometimes ( )

Usually ( )

All the time ( )

#### Section 4: Perception of Severity

To what extent do you agree or disagree with each of the following statements? (1-Strongly Disagree, 2-Disagree, 3 -Agree, 4-Strongly Agree)

	1	2	3	4
29. My blood pressure condition is serious	( )	( )	( )	( )
30. I am usually worried about the condition	( )	( )	( )	( )
31. Hypertension is a real threat to life	( )	( )	( )	( )
32. I fear disability as a result of hypertension	( )	( )	( )	( )

### Section 5: Perceived Benefits of Antihypertensive Medication Regimen

To what extent do you agree or disagree with each of the following benefits of complying with anti-hypertensive medication? (1-Strongly Disagree, 2- Disagree, 3-Agree, 4-Strongly Agree).

	1	2	3	4
33. Keeping my blood pressure under control	( )	( )	( )	( )
34. Increasing my quality of life	( )	( )	( )	( )
35. Increasing my sense of well-being	( )	( )	( )	( )
36. Protecting me from complications	( )	( )	( )	( )
37. Avoiding added financial burden	( )	( )	( )	( )

### Section 6: Perceived Barriers to Adherence

To what extent do you think the following barriers hinder you from adhering to medication? (1-Extremely Low, 2-Low, 3-High, 4-Extremely High)

38. Ineffectiveness of the medication	( )	( )	( )	( )
39. Difficult of curing hypertension	( )	( )	( )	( )
40. Lack of discipline to complying	( )	( )	( )	( )
41. Lack of motivation because				
I can't be cured	( )	( )	( )	( )

## Section 7: Cues to Action

Which of the following motivates you to adhere with your hypertension treatment?

(1-Extremely Low, 2-Low, 3-High, 4-Extremely High)

	1	2	3	4
42. Television and Radio programs on hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43. Advice from your doctor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
44. Death from a relative due to hypertension	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45. When you feel unwell	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**APPENDIX III: SGS LETTER OF APPROVAL**



**MASENO UNIVERSITY  
SCHOOL OF GRADUATE STUDIES**

*Office of the Dean*

**Our Ref:** PG/MPH/00088/2011

Private Bag, MASENO, KENYA  
Tel:(057)351 22/351008/351011  
FAX: 254-057-351153/351221  
Email: [sgs@maseno.ac.ke](mailto:sgs@maseno.ac.ke)

Date: 28<sup>th</sup> May, 2015

**TO WHOM IT MAY CONCERN**

**RE: PROPOSAL APPROVAL FOR OTENYO SALOME—  
PG/MPH/00088/2011**

The above named is registered in the Master of Public Health Programme of the School of Public Health & Community Development, Maseno University. This is to confirm that her research proposal titled "Factors Affecting Adherence to Antihypertensive Medication Regimen among Patients Undergoing Haemodialysis attending Pandya Memorial Hospital, Mombasa" has been approved for conduct of research subject to obtaining all other permissions/clearances that may be required beforehand.

  
Prof. P.O. Owuor  
**DEAN, SCHOOL OF GRADUATE STUDIES**



## APPENDIX IV: MUERC APPROVAL



### MASENO UNIVERSITY ETHICS REVIEW COMMITTEE

Tel: +254 057 351 822 Ext: 3050  
Fax: +254 057 351 221

Private Bag – 40105, Maseno, Kenya  
Email: muerc-secretariat@maseno.ac.ke

**FROM:** Secretary - MUERC

**DATE:** 21<sup>st</sup> July, 2015

**TO:** Salome Otenyo  
PG/MPH/00088/2011  
Department of Public Health  
School of Public Health and Community Development  
Maseno University

**REF:** MSU/DRPI/MUERC/00186/15

**RE: Factors Affecting Adherence to Anti-hypertensive Medication Regimen among Hemodialysis Patients attending Pandya Memorial Hospital Mombasa. Proposal Reference Number MSU/DRPI/MUERC/000186/15**

This is to inform you that the Maseno University Ethics Review Committee (MUERC) determined that the ethics issues raised at the initial review were adequately addressed in the revised proposal. Consequently, the study is granted approval for implementation effective this 21<sup>st</sup> day of July, 2015 for a period of one (1) year.

Please note that authorization to conduct this study will automatically expire on 20<sup>th</sup> July, 2016. If you plan to continue with the study beyond this date, please submit an application for continuation approval to the MUERC Secretariat by 12<sup>th</sup> June, 2016.

Approval for continuation of the study will be subject to successful submission of an annual progress report that is to reach the MUERC Secretariat by 12<sup>th</sup> June, 2016.

Please note that any unanticipated problems resulting from the conduct of this study must be reported to MUERC. You are required to submit any proposed changes to this study to MUERC for review and approval prior to initiation. Please advise MUERC when the study is completed or discontinued.

Thank you.

Yours faithfully,

Dr. Bonuke Anyona,  
Secretary,  
Maseno University Ethics Review Committee.



Cc: Chairman,  
Maseno University Ethics Review Committee.

MASENO UNIVERSITY IS ISO 9001:2008 CERTIFIED



**APPENDIX V: APPROVAL FROM PANDYA HOSPITAL**



**EXCELLENCE  
IN PATIENT CARE**

**PANDYA MEMORIAL HOSPITAL**

*(Owned and Managed by Pandya Memorial Society)*

**DEDAN KIMATHI AVENUE**

**P. O. Box 90434 - 80100, MOMBASA, KENYA**

**TEL: 2313930, MOBILE: 0722-206424 / 0734-600663 / 0704-314140**

**0789-999334 / 0789-999332 / 0789-999559 / 0701-314141**

**E-mail: [info@pandyahospital.org](mailto:info@pandyahospital.org)**

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November 28, 2014

To

Salome Otenyo

Dear Madam

**RE: CONDUCTING RESEARCH**

Reference is made to your letter requesting to conduct research at our hospital in the renal unit department on factors affecting medication adherence among hemodialysis patients.

Your request has been accepted.

Kind regards

**PANDYA MEMORIAL HOSPITAL  
P. O. Box 90434 TEL. 2313930  
MOMBASA**

**RAJESH SHUKLA**

**CHIEF ADMINISTRATOR**