

FACTORS AFFECTING BLOOD PRESSURE CONTROL IN PATIENTS ATTENDING OUTPATIENT HYPERTENSION CLINIC AT MWANZA DISTRICT HOSPITAL IN MALAWI

MSC (COMMUNITY HEALTH NURSING) THESIS

By

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DECLARATION

I, the undersigned, hereby declare that this thesis is a result of my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used acknowledgements have been made.

_____

Full Legal Name

_____

Signature

_____

Date

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

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DEDICATION

This study is dedicated to my loving husband and best friend Isaac, and our wonderful lovely children, Takondwa, Isaac Junior, Rachael Tawina and Maureen Chisomo, whose love and encouragement have been the basis of the entire efforts.

It is also dedicated to my father, Thomson Lyton Idana who taught me that every challenge is the next step up towards success and that everything is possible with focus and determination. To my mother, Emily Kwalenga Idana who taught me that my greatest guide and strength lies within me and is always with me.

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ABSTRACT

The goal of treatment of hypertension is to normalize the blood pressure and to prevent cardiovascular and renal complication. Assessment of factors related to hypertension control is important in treatment of hypertension.

The overall aim was to assess factors affecting blood pressure control in patients attending outpatient hypertension clinic at Mwanza District in Malawi. Specific objectives were to (i) determine socio-demographic factors (ii) assess hypertensive patients' knowledge related factors (iii) identify compliance with antihypertensive medications factors (iv) investigate lifestyle factors affecting blood pressure control in hypertensive patients in outpatient clinic at Mwanza District Hospital

One hundred and twenty six hypertensive patients (82 female and 44 male) were interviewed through a structured questionnaire from the outpatient hypertension clinic at Mwanza District Hospital between April to August, 2014. Pearson's chi-square statistical technique was used to test the significance of the factors affecting blood pressure control. The results were presented in tables.

Among 126 participants, 37.0% (n=47) of the participants had controlled blood pressure while 63.0% (n=79) did not control. The results of the chi-square showed that gender; age; occupation; salt intake and physical exercises were factors significantly associated with blood pressure control among the hypertensive patients.

Blood pressure can be controlled by regular exercise, reducing occupational stress and salt intake. Community health nursing providers can use the findings in designing and developing appropriate information, education and communication patients and community about the effect of the disease will help to control blood pressure.

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LIST OF ABBREVIATIONS

DASH	Dietary Approach to Stop Hypertension
DHO	District Health Office
ESCOM	Electricity Supply Corporation of Malawi
GoM	Government of Malawi
HMIS	Health Management Information System
JNC	Joint National Committee
MOH	Ministry of Health
MSTG	Malawi Standard Treatment Guidelines
NHANES	National Health and Nutrition Examination Survey
NCD	Non Communicable Disease
STEPS	STEPwise approach to surveillance
WHS	World Health Survey
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION AND BACKGROUND INFORMATION

Introduction

Blood pressure is the force that vascular volume exerts on the vascular system. It is the product of cardiac output and peripheral vascular resistance. Cardiac output determines the highest level of blood pressure, which is called systolic blood pressure (SBP); and peripheral resistance determines the lowest level of blood pressure, called diastolic blood pressure (DBP) (Barret, Boitano, Brooks, 2009). A raised blood pressure (hypertension) is defined as a persistent systolic blood pressure reading of 140mmHg or greater and or a diastolic blood pressure reading of 90mmHg or greater based on the average of two or more correct blood pressure measurement taken two or more contact with health care providers (World Health Organisation, 2011). Hypertension has been linked to an increased risk of developing cardiovascular diseases

The exact causes of hypertension are not known, but several factors and conditions may play a role in its development, including smoking tobacco, obese or overweight, lack of physical activity, too much salt in the diet, too much alcohol consumption (more than 1 to 2 drinks per day), stress, older age, family history of high blood pressure, chronic kidney disease (Lichisa, Tegegne, Gelaw, Defersha, Alebachew et al., 2014).There are many factors that cause uncontrolled hypertension which include

modified and non modified factors. Non modified factors are age, gender, ethnicity and family history. Modified factors include compliance with medication, access to health care and life style (Elhadi, 2007).

The prevention and control of hypertension has not received due attention by many developing countries. However, awareness about treatment and treatment of hypertension was extremely low among developing nations including Malawi. In these countries, health care resources are overwhelmed by other priorities including Human Immune Virus (HIV) and Acquired Immune Deficiency Syndrome (AIDS), tuberculosis and Malaria (Awoke, Awoke, Alemu & Megabiaw, 2012).

Background Information

Hypertension is a leading cause of cardiovascular diseases (CVDs) such as myocardial infarction and stroke worldwide (Lozano, Naghavi, Foreman, Lim, Shibuya, Aboyans, 2012). The proportion of the global burden of disease attributable to hypertension has significantly increased from about 4.5 percent (nearly 1 billion adults) in 2000 (Kearney, Whelton, Reynolds, Muntner, Whelton et al., 2005), to 7 percent in 2010 (Lim, Vos, Flaxman, Danaei, Shibuya et al., 2012). This makes hypertension the single most important cause of morbidity and mortality globally. Globally cardiovascular disease accounts for approximately 17 million deaths a year, nearly one third of the total (WHO, 2012). Of these, complications of hypertension account for 9.4 million deaths worldwide every year (WHO, 2013: Lawes, Vander Hoorn & Rodgers, 2008).

Hypertension is the biggest contributor to the total cardiovascular mortality and so the most important modifiable risk factor worldwide (Vergara, 2013). Eighty percent

(80%) of hypertension-related mortality occurs in low and middle income countries (Vergara, 2013). Lawes et al., (2008) reported that population with mean systolic blood pressure higher than 115 mm Hg contributed to 62% of stroke, 49% of ischemic cardiac, 76% of hypertensive disease and 14% of other cardiovascular disease worldwide. Although the hypertension cardiovascular risk increased with blood pressure levels, the largest amount of deaths is observed in those with lower blood pressure levels (WHO, 2010).

Traditionally in Africa, communicable diseases and maternal, perinatal and nutritional causes of morbidity and mortality accounted for the greatest burden of morbidity and mortality (Lopez, Mathers & Ezzati, 2006). This burden is fast shifting towards chronic non- communicable diseases, and by extension CVDs. This phenomenon is what is being termed as a "double burden of disease" (Bygbjerg, 2012). Whereas high blood pressure was almost non-existent in African societies in the first half of the twentieth century, estimates now show that in some settings in Africa more than 40 percent of adults have hypertension (Addo, Smeeth & Leon, 2007). The prevalence of hypertension has increased significantly over the past two to three decades (Imperial College, London, 2013). There were approximately 80 million adults with hypertension in sub-Saharan Africa in 2000 and projections based on current epidemiological data suggest that this figure will rise to 150 million by 2025 (Joho, 2012). Further, there is evidence that indicates that related complications of hypertension, and in particular stroke and heart failure are also becoming increasingly more common in this region (Mensah, 2008). These trends have been strongly linked with changes in individual and societal lifestyle such as an increase in tobacco use, excessive alcohol consumption, reduced

physical activity and adoption of "Western" diets that are high in salt, refined sugar and unhealthy fats and oils (Vergara, 2013)..

In Malawi, a national World Health Organisation STEPwise approach to Surveillance (STEPS) for chronic non-communicable diseases and their risk factors found high rates (33%) of hypertension were found among adults aged 25-64 years, 37.2% among men and 29.2% among women (Msyamboza, Ngwira, Dzowela, Mvula, Kathyola et al., 2011). This number is likely to be even higher in coming years because of population growth and growing urbanisation. Furthermore, the study showed that 8.9% hypertensive adults suffered from its consequent complications of cardiovascular, cerebrovascular and renal diseases. In addition, the results revealed associated risk factors for hypertension as tobacco smoking (14.1 %), alcohol consumption: (16.9%), overweight (21.9%) and physical inactivity (9.2%). Alcohol consumption and cigarette smoking were more common in males than females (Msyamboza et al., 2011). World Health Organisation (2011) data, showed that hypertension deaths in Malawi reached 1,944 (0.93%) of total deaths and age adjusted death rate of 33.26 per 100,000 of population. In addition, stroke deaths reached 11,187 (5.37%) of total deaths, age adjusted death rate was 18,555 per 100,000 of the population. The knowledge that reduction of blood pressure in hypertension reduces complications implies long term supervision of therapy for many patients who are hypertensive, to ensure maximum control of blood pressure in order to prevent the complications of a sub optimally controlled blood pressure. Thus, in management of hypertension, the issue of control of blood pressure emerges as an important factor to consider. Undiagnosed, untreated, and

uncontrolled hypertension all clearly places a substantial strain on the health care delivery system (Opie & Seedat, 2005).

Problem Statement

Countries in Sub-Saharan Africa are burdened by morbidity and mortality from communicable diseases and there is an increasing contribution to this disease burden from non- communicable diseases (Temu, 2011). Non communicable diseases (NCDs) however are rarely a public health priority in these settings. According to the WHO global burden of disease report (WHO, 2010), NCDs accounted for nearly half of the global burden of disease. Almost 45% of the adult disease burden in low and middle income countries globally is now attributable to NCDs (WHO, 2010). This is mainly due to cardiovascular diseases, principally ischaemic heart disease and stroke, whose age standardized burden is substantially higher in low and middle-income countries than in high-income countries (Temu, 2011). In Africa, 15% of the population has hypertension (Feyie & Hajito, 2014).

In Malawi, hypertension prevalence among adults aged 25-64 years is 33%, 8.9% suffer from its consequent complications of cardiovascular, cerebrovascular and renal diseases, and there is a trend indicating increasing prevalence with time (Msyamboza et al., 2011). Cardiovascular deaths reached 0.93% and cerebrovascular deaths reached 5.37% of total deaths (WHO, 2012). Cardiovascular disease is one of the major causes of deaths in Malawi and the risk of cardiovascular disease increases with uncontrolled blood pressure (Government of Malawi, 2010). The degree of control of blood pressure in Malawi is not known. Uncontrolled blood pressure was identified in 62.7% hypertensive patients at Mwanza District hospital as a risk factor for subsequent complications of

hypertension. This shows that there will be increasing morbidity and mortality from the complications of uncontrolled blood pressure, with an increased burden to health care resources and to the nation as a whole (Msyamboza et al, 2011). However, there is little published information on hypertension in Malawi, hence there was need to fill a gap in research literature by establishing baseline information for factors affecting blood pressure control among hypertensive patients attending hypertension clinic at Mwanza Distrct Hospital.

Significance of the study

Malawi, like other Sub Saharan Africa, is a region plagued by infectious and parasitic diseases, malnutrition and excessive infant mortality, the prevention and treatment of hypertension is rarely considered as a public health priority. Hypertension however remains the leading risk factor of cardiovascular disease on a global scale. It is the leading cause of congestive heart failure, chronic renal failure, cerebrovascular disease, cardiovascular mortality and sudden cardiac death. An important goal of treating hypertension is to improve the percentage of patients whose blood pressure is adequately controlled. Unnecessary treatment of hypertension without adequate blood pressure control could be a futile attempt in managing these patients

While there are attempts to treat hypertension in Malawi, the factors affecting blood pressure control are not known. Identifying potential factors affecting blood pressure control is crucial for determining key areas that public health and clinical efforts should concentrate on in order to reduce the health and economic burdens related to hypertension. Data from this study will help to formulate strategies in the management of patients with hypertension that will target the factors affecting control of blood pressure

in order to avoid the complications of a poorly controlled blood pressure and thus reduce cardiovascular morbidity and mortality and the economic burden of these conditions.The findings can also be used as a reference for further research in order to filling a gap in literature. It is on these bases that this study sought to assess factors at Mwanza District Hospital outpatient hypertension clinic.

Objectives of the study

Main Objective

To assess factors affecting blood pressure control among patients attending hypertension clinic at Mwanza District Hospital in Malawi

Specific objectives

- To determine socio-demographic factors affecting blood pressure control in hypertensive patients at Mwanza District Hospital
- To assess hypertensive patients' knowledge related factors affecting blood pressure control at Mwanza District Hospital
- To identify hypertensive patients' compliance with antihypertensive medications at Mwanza District Hospital
- To investigate hypertensive patients' lifestyle factors affecting blood pressure control at Mwanza District Hospital

Operational definitions

Hypertension (High Blood Pressure)

The researcher adopted WHO definition of hypertension as a systolic and/or diastolic BP equals or greater than 140 per 90 mmHg (World Health Organisation, 2011).

Hypertensive patient

In this study, hypertensive patient was a person diagnosed with high blood pressure reading and receiving antihypertensive medical treatment.

Blood pressure:

Blood pressure is the force of blood against the walls of the arteries as the heart pumps blood throughout the body of an individual. The blood pressure in this study was an average of the blood pressure reading taken on the previous clinic visit, and the current blood pressure taken from the patient's health passbook reading.

Controlled Blood Pressure

A patient was defined as having controlled blood pressure if his or her blood pressure at the time of study visit was below 140mmHg per 90 mmHg without comorbid conditions, and below 130mmHg per 80mmHg in diabetics (World Health Oganisation, 2011; Government of Malawi, 2015).

Uncontrolled Blood pressure:

Uncontrolled blood pressure according to Elhadi (2007) is blood pressure equals or above140mmHg systolic and/ or equals or above 90mmHg diastolic among hypertension patients who had attended hypertension clinic, had treatment for at least three months and above and had not achieved goal blood pressure control.

Co-morbidity

Co-morbidity indicates the presence of one or more disorders or diseases in addition to a primary disorder or disease. Here it refers to clinical conditions associated with hypertension particularly diabetes mellitus, kidney disease and heart disease.

Lifestyle factors

Applied to this study, lifestyle patterns are those attitudes, habits and behaviours (dietary habits, physical exercise/activity, sedentary lifestyle, alcohol consumption, tobacco smoking) of hypertensive patients that influence the blood pressure control.

Sedentary lifestyle

In this study, sedentary lifestyle refers to sitting or reclining at work, at home, getting to and from places, or with friends including time spent such as sitting at a desk, sitting with friends, travelling in car, bus, reading, playing cards , bawo or watching television, but do not include time spent sleeping.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter examines the relevant literature on factors affecting blood pressure control in patients attending outpatient hypertension clinic. A narrative review of literature was done to critique and summarise factors affecting blood pressure control in hypertensive patients. Relevant studies that addressed this area were reviewed. This type of review was chosen in order to provide background for understanding factors affecting blood pressure control in the patients attending hypertension clinics. The review highlighted gaps in the body of knowledge and significance of conducting research. It also helped in refining the study area.

The literature review was achieved through an intensive search of several data bases and included Pub Med/Medline, Cochrane data base of systematic reviews, WHO data bases, EBSCO host, HINARI. The search used "demographic factors AND blood pressure control", hypertensive patients' knowledge AND blood pressure control", "compliance with medication AND blood pressure control", and lifestyle AND blood pressure control" in Medical Subject Headings (Mesh). In addition, the search was also

conducted by study titles. Search was limited to articles between 2003 and 2015 in the English language.

Overview of Hypertension

Hypertension is defined as a persistent systolic blood pressure reading of 140 mmHg or greater and or a diastolic blood pressure reading of 90 mmHg or greater, it is considered to be one of the most prevalent and serious risk factor for cardiovascular disease

(Mandal, 2009). Hypertension is divided into two main categories that is, essential hypertension and secondary hypertension. Essential hypertension occurs in 90% of the cases and has no identifiable causes, while secondary hypertension occurs in the remaining 10% of the cases and has identified causes (Elhadi, 2007). Hypertension is important due to its high frequency and because it is a major modifiable risk factor for cardiovascular and kidney disease (Kearney, et al., 2006). Many patients remain uncontrolled despite treatment (Temu, 2011).

Classification of Hypertension

The seventh report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment (JNC 7) of high blood pressure classified blood pressure into four categories namely, normal, prehypertension, stage one hypertension and stage two hypertension (Chobanian, Bakris, Black, Cushman et al., 2003). The normal category refers to blood pressure ranges of less than 120/80 mmHg, prehypertension is in the 120-139/80-89 mmHg range, stage one is 140-159/ 90-99 mmHg range and stage two is blood pressure equal to or more than 160/100 mmHg (Mandal, 2009). This classification is based on average of two or more measurements on two or more clinic visits. Patients with

prehypertension are at increased risk of progression to hypertension and they are twice more likely the risk to develop hypertension as those at a lower value (Joho, 2012). However, the Malawi Standard Treatment Guidelines (MSTG) 5th edition (GoM, 2015) classifies hypertension as follows: mild hypertension refers to blood pressure ranges of 140-159/90-99 mmHg, moderate 160-179/100-109 mmHg and severe greater than 180/110 mmHg.

Prevalence of hypertension

The proportion of the global burden of disease attributable to hypertension has significantly increased from about 4.5 percent (nearly1 billion adults) in 2000, to 7 percent in 2010 (WHO, 2010). A world-wide systematic review found that in the year 2000, 26.4% (972 million) of the world's population had hypertension; two thirds were in developing countries. World Health Organization (2011) estimated that about 62% of cerebrovascular disease and 49% of ischemic heart disease burden worldwide are attributable to uncontrolled blood pressure levels whereby high blood pressure is estimated to cause 7.1 million deaths annually, accounting for 13% of all deaths globally. Global burden of hypertension by Kearney, et al., (2005) projected that the number of adults with hypertension will increase by 60% to a total of 1·56 billion (1·54 billion–1·58 billion) in 2025. Most of this rise can be attributed to an expected increase in the number of people with hypertension in economically developing regions, where by between 2000 and 2025. Specifically, a larger proportion of the world population is expected to be older by 2025. It is also estimated that by 2030, 23 million cardiovascular deaths would have occurred, with approximately 85% occurring in low- and middle-income countries (Joho, 2012

Hajjar and Kotchen (2013) in the National Health and Nutrition Examination Survey (NHANES) done in the United States of America reported that hypertension prevalence was 31.3% with an estimate of 65 million. Of hypertensive subjects, 68.9% were found to be aware of their condition, 58.4% were on treatment and 31% had controlled their hypertension. In Malaysia, the National Health and Morbidity survey of 21,391 individuals over the age of 30 by Xu, Chen, Li, Lei and Ma (2013) showed a high prevalence of high blood pressure with 33% of adults having hypertension. Among hypertensive individuals, 33% were aware of their hypertension, 23% were on treatment while only 6% had controlled their hypertension (Xu et al., 2013). In South Korea, the prevalence of hypertension was found to be 27.2% in the adult population aged between 35 to 74 years of these 44.7% were aware of their condition, 28.2% were on treatment while only 8.1% had their blood pressure under control (Lee, Park & Kwon, 2010). In a survey of rural Older Chinese Immigrants to the United States of America, the prevalence of hypertension was found to be 23%, 42% were diagnosed, 47% were on treatment, while blood pressure was controlled in 35% of the treated patients and in 17% of all hypertensive patients (Li, Wallhagen & Froelicher, 2010). Awareness of hypertension is important to control blood pressure. Many patients are not aware of their condition leading to a low rate of hypertension control. In some communities about half of the patients were not aware of their condition. For instance, among the Parsi community of India, the prevalence of hypertension was 36.4% of which 48.5% were not aware of their condition. Among those who were aware, 36.4% were not compliant and only 13.6% had controlled their hypertension (Ham & Yang, 2013). In Vietnamm, Son (2012) reported that hypertension prevalence was high (overall 25.1%, 28.3% in men and 23.1% in

women). The proportions of hypertensives aware, treated and controlled were unacceptably low (48.4%, 29.6% and 10.7% respectively). Most Vietnamese adults (82.4%) had good knowledge about high blood pressure.

Hypertension in Africa

As in other parts of the world, the prevalence of hypertension in the sub-Saharan Africa region has increased as a manifestation of the epidemiological transition (Mbewu &, Jean-Claude, 2006). Hypertension has become a significant problem in many African countries experiencing the epidemiological transition from communicable to non-communicable diseases (Agyemang, 2006). Rural-to-urban migration coupled with acculturation and modernization high blood pressure as observed in Kenyan and Ghanaian epidemiologic studies (Agyemang, 2006). The World Health Organisation STEPS survey for Chronic Non-Communicable Diseases and their Risk Factors survey conducted between 2003 and 2009 in 20 African countries reported high rates of hypertension in most countries, particularly among men (Vijver, Akinyi, Oti, Olajide, Agyemang, Aboderin et al., 2014). The prevalence ranged from 19.3% in Eritrea to 39.6% in Seychelles. The prevalence is for the adult population aged 18 years and above. In Africa, hypertension is usually more pronounced in males than in females (Vijver et al., (2014). However, in a few countries there were higher levels of prevalence in women than men such as in Algeria 31.6 percent vs. 25.7 percent in 2003, Botswana 37.0 percent vs. 28.8 percent in 2006 and Mali 25.8 percent vs. 16.6 percent in 2007, for women and men, respectively. Apart from sex differences in the prevalence of hypertension, there are also large differences based on residence. In all countries where data are available from

the World Health Study (WHS), the urban population has a higher prevalence of hypertension than the rural population. In South Africa and Democratic Republic Congo, the urban has almost 10 percentage points higher prevalence than the rural population. This is in comparison to countries like Ethiopia and Tanzania where the prevalence is only a bit more than 5 percent higher. It is noteworthy that since countries are at different stages of the epidemiological transitions, there are some rural populations in some countries whose prevalence is higher than some urban populations in other countries. For instance, rural populations in Ghana, South Africa, and DRC have a higher prevalence than the urban populations in Ethiopia and Tanzania. It is well known that urban averages mask great intra-urban disparities largely due to the presence of large populations in poor slum settlements that characterize most urban centers in Africa. Data from Nairobi collected from the adult population in two slum settlements show a high prevalence of hypertension (overall of 19%) with large sex and age-specific differences. The data also dispel the notion that hypertension is a disease of affluence since the majority of residents surveyed are poor.

In Zimbabwe 53% of patients with stroke lesions on Computed Tomography (CT) scan had hypertension, of which 45% were not diagnosed and another 45% had defaulted on treatment (Temu, 2011).

One systematic review of hypertension in Sub Saharan Africa by Addo, Smith and Leon (2007) found a prevalence of hypertension of 11% in Cameroon in one study, 47% in females in one South African study, and 32% in Ghana. A study in Tanzania showed prevalence of 37.3% in men and 39.1% in women in an urban region and 26.3%

in men and 27.4% in women in a rural region (Joho, 2012). In a survey among adults in slums of Nairobi, the prevalence of hypertension was found to be 23% (Osmar & Omuni, 2011).

In Malawi, a national STEPS survey for Chronic Non-Communicable Diseases and their Risk Factors revealed that of 5, 206 adult participants aged 25 to 64 years old, the prevalence of hypertension was 33.0 % and 8.9% had hypertension complications such as cardiovascular (heart attack and stroke), renal disease and cerebrovascular diseases (Msyamboza et al., 2011). Of the hypertensive participants, 94.9% were not on medication and /or was not aware that they were hypertensive. In this study, all participants were aware of the condition.

Blood pressure control

The aim of lowering blood pressure is to reverse the hypertension-related cardiovascular risk (Katibi, Olarinaye & Kuranga, 2010). Reductions in blood pressure lead to reductions in hypertension-related cardiovascular risk. With a 10 mm Hg reduction in systolic blood pressure or 5 mmHg in diastolic blood pressure, the risk of coronary heart disease and stroke events drops by 24% and 33% re-spectively (Verdecchia, Gentile, Angeli, Mazzotta, Mancia et al., 2010). However, to what extent blood pressure levels must be lowered is a matter of controversy (Zanchetti, Grassi & Mancia, 2009). Clinical guidelines have suggested that the achievement of a recommended blood pressure level, that is defined targets, determines the control of blood pressure. Hypertensive patients are classified into those with controlled or uncontrolled hypertension based upon whether or not they achieve that target (National Institute for Health and Clinical Excellence, 2011).

For hypertensive patients with diabetes, the use of targets below 140/90 mmHg have been promoted by different guidelines (Chobanian et al., 2003; Mancia, Laurent, Rosei, Ambrosioni, Burnier, et al., 2009; GOM, 2015). Whereas, the JNC 7 recommends a blood pressure below 130/80 mmHg (Chobanian et al., 2003), the European Society of Hypertension recommends a blood pressure target between 130-139/80-85 mmHg (Mancia et al., 2009). The recommendation initially arose from the analysis of subgroups in the Systolic Hypertension in the Elderly Program (Zanchetti et al., 2010) and the Hypertension Optimal Treatment study trials in diabetic patients in United States of America by Curb, Pressel, Cutler, Savage, Applegate et al., (2011). The study showed that diabetic patients who achieved diastolic blood pressure below 80 mmHg have a 30% lower risk of total cardiovascular mortality than those without diabetes with similar diastolic blood pressure (Curb et al., 2011). In another study by Gaede, Vedel, Larsen, Jensen, Parving et al., (2008) in North England, reported that diabetic patients exposed to a multi-factorial intervention who achieved blood pressure below 135/85 mmHg had 47% lower risk of cardiovascular morbidity than those who received the standard intervention and achieved 150/86 mmHg blood pressure. The more intensive blood pressure target of systolic blood pressure below 130 mmHg was achieved by 45% of patients allocated to the intensive blood pressure intervention group. The aim of the study was to evaluate the impact of an intensive program for the management of diabetic patients (Gaede et al., 2008). According to World Health Organisation (2011) and Government of Malawi (2015), the targets for blood pressure control is 140/90 mmHg for patients without diabetes mellitus and without kidney disease, 130/80 mmHg for patients with diabetes mellitus. Blood pressure is considered controlled only when these targets are achieved.

The goal of therapy is to normalize blood pressure and to prevent the consequencies of cardiovascular complications. In clinical trial in Kwazulu- Natal, antihypertensive therapy was associated with a 35% to 40% mean reduction in stroke incidence, a 20% to 25% reduction in myocardial infarction, and a more than 50% reduction in heart failure (Adebolu & Naidoo, 2013). However in clinical practice, blood pressure control is difficult to achieve.

Surveys reveal that hypertension is under diagnosed, patients diagnosed are often not treated and those treated are often not satisfactorily controlled (Joho, 2012; Mandal, 2009; Elhadi, 2007). For example, globally less than 30% of treated hypertensive achieves blood pressure targets (Pereira, Lunet, Azevedo, & Barros, 2009). In the United States of America (USA) one study revealed a hypertension control rate of 39% in outpatient private practice (Ogedegbe & Schoenthaler, 2008). A study on hypertension in 9 primary health care centers in Bahrain on effect of lifestyle risk factors on prevalence of hypertension, found that of 281 treated patients, only 16.5% had controlled blood pressure (Desai & Kavishwar, 2009). Globally, according to Ogedegbe & Schoenthaler (2008) revealed a hypertension control rate of 39% in outpatient private practice. Studies have been conducted to identify the causes of uncontrolled blood pressure. It showed that many factors contribute to uncontrolled blood pressure. Most of these factors relate to the patients while others relate to health care providers. A Japanese survey on the impact of antihypertensive side effects found that 49% of patients with well controlled blood pressure had at least one side effect with a current antihypertensive agent, whereas a significantly greater percentage of patients (61%) whose blood pressure was poorly controlled tend to have a higher incidence of side effects (Ohta, Tsuchihihashi &

Kiyohara, 2011). In South Africa, one study revealed a hypertension control rate of 61.2 % (Rayner & Schoemann, 2009). One cross-sectional study in a tertiary centre in Nigeria on blood pressure control among treated hypertensive in a tertiary institution revealed a hypertension control rate of 33 % (Sani, Mijinyawa, Adam, Abdu & Borodo, 2008). In Uganda, a study in Wakiso district on knowledge and practice of hypertensive patients, the rate of blood pressure control was found to be only 27.5%, and that was in the group of patients who were treated for hypertension, whereby it was only the 47.8% who were aware of their hypertension who attempted some kind of treatment (Katibi, Olarinoye, & Kuranga, 2010). In this study, the rate of blood pressure control was found to be 36.7%. Studies conducted in developed and developing countries revealed various factors including socio-demographic, knowledge, compliance and lifestyle affecting blood pressure control in hypertensive patients.

Factors affecting blood pressure control

Without adequate control, despite taking antihypertensive medication, risk of cardiovascular and renal disease is still increased in patients with hypertension. Despite the available interventions, the target of 140/90 mmHg is not attained by the majority of hypertensive patients. The proportion of patients achieving this target is still below 50% worldwide and the proportion of hypertensive patients achieving this target varies between different countries (Vergara, 2013). The lowest rates of blood pressure control have been observed in developing countries. For instance in a survey from Asian countries, van Minh, Soonthornthada , Ng, Juvekar, Razzaque et al., (2009) reported that only 5.4% of hypertensive participants had blood pressure below 140/90 mmHg . By contrast, in a comparison between the National Health and Nutrition Examination Survey

(NHANES) 1988-1994 and 1999-2008, on assessing progress in treating and controlling hypertension in the United States, Egan, Zhao and Axon (2010) found the percentage of hypertensive patients with controlled blood pressure increased from 27.3% to 50.1% over the period. A similar trend has been observed in England by Falaschetti, Chaudhury, Mindell & Poulter (2009) in a study on continued improvement in hypertension management in England: results from the Health Survey for England, found the overall rates of control were significantly higher from 37% in 2003 to 69% in 2006. In studies from countries with advanced primary care services, such as in a clinical-epidemiological study of 50.000 primary care patients in Germany, the percentage of hypertensive patients with blood pressure below or equal to 140/90 mm Hg has been shown to vary from 20.3% to 54% among those receiving care within these settings (Schafer, Sudano, Theus, Noll & Burnier, 2012; Labeit, Klotsche, Pieper, Pittrow, Einsle et al., 2012; Brenner, Waeber & Allemann, 2011). The achievement of controlled blood pressure depends upon individual conditions, social conditions and the quality of care from health providers. Then diverse factors have been associated with poor blood pressure control. These factors have been classified into socio-demographic, knowledge of hypertension, compliance with antihypertensive medication and lifestyle factors. This chapter presents factors affecting blood pressure control.

Socio-demographic factors

Age

Being older is commonly associated with poor controlled blood pressure. Hypertension tends to rise with increasing age due to the stiffening of the arterial walls (Mungati, Manangazira, Takundwa, Gombe, Rusakaniko et al., 2012). This association

has been reported either in studies conducted at population level or the community (Tian, Dong, Wang, Liu, Lin et al., 2011 ; Qvarnstrom , Wettermark , Ljungman , Zarrinkoub , Hasselstrom et al., 2011; Ebrahimi , Mansournia , Haghdoost , Abazari , Alaeddini et al., 2010). It may be due to age-related increases in blood pressure leading to a higher prevalence of systolic hypertension in individuals over 50 years (Saleheen, Hashmi & Zaidi 2010). The association has been observed regardless of socio-economic and education status. By contrast, only a few studies have reported that younger patients such those below 40 years have been less likely to have controlled blood pressure (Qvarnstrom et al., 2011; Victor, Leonard, Hess, Bhat, Jones et al., 2008). A review of the Framingham heart study and the Epidemiology of Cardiovascular disease in Massachusetts, United States of America by Manhood, Vasan, Levy and Wang (2014) showed that increasing age was associated with uncontrolled blood pressure.

In a study in Elderly French hypertensive patients as reported by Temu, (2011), the proportion of controlled subjects decreased with age. In cross-sectional and longitudinal population studies on treatment and control of hypertension among people over 40 years old in rural area of South Korea: the Chungju Metabolic Disease Cohort (CMC) Study showed that increasing age was associated with uncontrolled blood pressure (Lee, Park & Kwon, 2010). Hypertension occurred in more than two thirds of individual above 65 years (Addo, Smeeth & Leon, 2007). Contemporary Reviews in Cardiovascular Medicine Epidemiology of Uncontrolled Hypertension in the United States by Wang and Vasan (2015) reported that hypertension control rates among those younger than 60 years was 38% in both men and women, those aged between 60 and 79 years was 36% in men 28% in women, and those aged 80 years and older were 38% in

men and 23% in women. Even in compliant patients, blood pressure control was found to be difficult in old people and such control decreased with aging. In a study of hypertensive compliant men who attended the Veterans Affair Centre in United States, hypertension was controlled only in 34.8% of patients; the rate of hypertension control in patients of less than 60 years was 42.1% (Wright, Hughes, Ostchega, Yoon & Nwankwo, 2011). Good hypertension control in primary care was associated with those aged 60 years and younger (Llisterri, Barrios, Sierra, Bertomeu, Escorbar et al., 2011). The goal of treatment in older patients should be the same as in younger patients (Llisterri et al., 2011).

Sex

Females usually have a higher body mass index (BMI) which is associated with higher prevalence of hypertension (Mungati et al, 2012). However, the relationship between sex and poor blood pressure control has been contradictory. Some studies revealed a negative association between women and blood pressure control (Ostchega, Hughes, Wright, McDowell & Louis, 2008; Gu, Burt, Paulose-Ram & Dillon, 2008; Lloyd-Jones, Evans & Levy, 2005). By contrast other studies revealed that women were more likely to have controlled blood pressure (Labeit et al., 2012; Son, Quang, Viet, Khai, Wall, et al., 2012; Damasceno, Azevedo, Matos, Prista & Diogo 2009). Some studies reported being male as a predictor for inadequate blood pressure control (Dzudie, Kengne, Muna, Ba, Menanga et al., 2012; Son, 2012). Similarly, other studies found that the male gender is associated with poor blood pressure control (Ogedegbe, Fernandez, Fournier, Silver, Kong et al., 2013; Okoro & Ngong, 2012; Mandal, 2009). However, in a cross sectional study in Singapore, Temu (2011) reported that women were more likely to

receive treatment for high blood pressure but the control rate did not differ between men and women. In Sweden a study showed that men were more likely to be controlled than women (Torma, Carlberg, Eriksson, Jansson & Eliasso, 2015). A study in France revealed better control in women compared to men (Heisler, Hogan, Hofer, Schmittediel, Pladevall et al., 2008). Due to these discrepancies, there does not seem to be strong evidence supporting any particular association between sex and poor blood pressure control.

Education

There seems to be some association between education and hypertension, although they are not directly related. Moreover educated people are more aware of this problem than uneducated people (Edo, 2009). In studies by Sandoval, Bravo, Koch , Gatica and Ahlers (2012); Paulsen , Andersen , Munck , Larsen , Hansen et al., (2012); Ebrahimi et al., (2010); Ostchega et al., (2008) reported a high level of education was associated with better blood pressure control.

In study conducted in 184 Danish general practices with free access to care, Paulsen et al., (2012) identified that patients with less than 10 years education were less likely to achieve blood pressure control compared to those with higher levels of education. In a study titled Are demographic characteristics, health care access and utilization, and comorbid conditions associated with hypertension among US adults by Ostchega et al., (2008) found that hypertensive patients with lower levels of education and in the lowest socio-economic category were less likely to have controlled blood pressure. Sandoval, et al., (2012) in a study on barriers in the management of hypertension: the experience of the cardiovascular health program in Chilean primary

health care centers, found that low education was associated with poor blood pressure control. Ebrahimi et al., (2010) in their study on social disparities in prevalence, treatment and control of hypertension in Iran: second National Surveillance of Risk Factors of Noncommunicable Diseases found that individuals with lower education background had 3.5 times higher life years lost than those with higher education. Ischemic heart disease was the most important contributor to this disparity accounting for 11.7% the total difference in years lost between both groups. Hypertension accounted for 3.5% of that difference. This association was found regardless of age and sex condition (Ebrahimi et al., 2010).

However, in a population survey in Cienfuegos (Cuba), Ordunez-Garcia, Munoz, Pedraza, Brito and Silva (2006) did not find an association between education and blood pressure control. This observation may be attributed to universal access based on an extensive primary care services presented in that country.

Residence

Apart from sex differences in the prevalence of hypertension, there are also large differences based on residence. Status report on hypertension in Africa by Vijver et al., (2014) indicated that in all countries where data are available from the World Health Study, the urban population has a higher prevalence of hypertension than the rural population. In South Africa and Democratic Republic of Congo, the urban has almost 10 percentage higher prevalence than the rural population. This is in comparison to countries like Ethiopia and Tanzania where the prevalence is only a bit more than 5 percent higher (Vijver et al., 2014). It is noteworthy that since countries are at different stages of the

epidemiological transitions, there are some rural populations in some countries whose prevalence is higher than some urban populations in other countries. For instance, rural populations in Ghana, South Africa, and Democratic Republic of Congo have a higher prevalence than the urban populations in Ethiopia and Tanzania (Vijver et al., 2014). It is well known that urban averages mask great intra-urban disparities largely due to the presence of large populations in poor slum settlements that characterize most urban centers in Africa. Data from Nairobi collected from the adult population in two slum settlements in a study prevalence, awareness, treatment and control of hypertension among slum dwellers in Nairobi, Kenya by Vijver, Oti, Agyemang, Gomez, Kyobutungi, (2013) showed a high prevalence of hypertension (overall of 19%) with large sex and age-specific differences.The data also dispelled the perception that hypertension is a disease of affluence since the majority of residents surveyed were poor. The data also showed a reversal of the general trend of males having higher prevalence than females.

Socio-economic status

A comprehensive review of the literature indicates that there is a general inverse relationship between various socio- economic status measures (income, education, and occupation) and hypertension (Vergara, 2013; Desai and Kavishwar, 2009). These conditions have been found as determinant of blood pressure control and hypertension-related morbidity (Kagamimori, Gaina and Nasermoaddel, 2009).

Individual measures of socio-economic status, such as income and education level attained, are also likely to influence hypertension awareness, treatment, and control. For

example, individuals in higher socio-economic status categories may be more likely to have access to quality health care and more likely to seek routine medical care. If this were the case, such individuals may also be more likely to be aware of their conditions, as"…awareness of hypertension presumes sufficient contact with a health care professional to permit an accurate diagnosis and communication of the finding to the effected party Fryar, Chen and Li (2012).

Socio-economic status may also impact the probability that a hypertensive individual is currently being treated and has his or her condition under control (Ohta, Tsuchihihashi, & Kiyohara, 2011). Both low socio-economic status and lack of education are also associated with unhealthy behaviors, such as cigarette smoking (Paulsen, Sondergaard, Reuther, Larsen, Munck et al., 2011). Poor health behaviors are likely associated with less overall concern over health, and reduced likelihoods of adopting healthy lifestyles, seeking routine medical care, and adhering to recommended treatment regimens. Further investigation of how individual measures of socio-economic status may contribute to the distributions of hypertension awareness, treatment, and control is important in determining why the recent reductions in hypertension prevalence are not uniformly seen in all segments of society.

This study sample's income was measured using the natural logarithm of per capita household consumption expenditures as an empirical measure of income constructed from the sum of personal expenditures (Malawian Kwacha), though in general it is difficult to obtain a composite measure that captures income from all

sources,. On average, a Malawian consumes about MK150 per day (GoM, 2010). Average annual consumption per capita in Malawi is MK54, 568 (GoM, 2010).

Other social factors have also been associated with poor blood pressure control. In an analysis of predictors of uncontrolled hypertension and antihypertensive medication non-adherence of 222 patients from outpatient clinics in Portugal by Morgado, Rolo, Macedo, Pereira and Castelo-Branco (2010) identified that those living alone were less likely to have controlled blood pressure. In addition, those who were single were less likely to have controlled blood pressure than those who had a partner. In a second Australian National blood pressure longitudinal study on barriers to achieving blood pressure treatment targets in elderly hypertensive individuals of 6083 hypertensive patients (aged 65 to 84 years) by Chowdhury , Owen , Krum , Wing , Ryan et al., (2013) found that those living in rural areas were more likely to have uncontrolled blood pressure than those living in urban areas.

Knowledge related factors of hypertension

Other individual aspects such as knowledge of hypertension have also been associated with poor blood pressure control. Hypertensive individuals unaware of a blood pressure target, with hypertension-related morbidity and with poor knowledge about hypertension could be more likely to have uncontrolled blood pressure. Personal perceptions about hypertension complications, symptoms and importance of having controlled blood pressure may also explain poor blood pressure control (Wehedy, Elhameed & El-Hameeda, 2014). In a qualitative study on an Investigation into the Factors Affecting the Utilisation of Mother to Child Transmission Services by Human

Immuno-Deficiency Virus Positive Women with hypertension in Onitsha, Nigeria by Okagbue (2009) found that hypertensive patients believed that antihypertensive medications can cure high blood pressure levels, anti-hypertensive drugs can be stopped and these drugs are only needed to relief symptoms.

In an interview of 525 hypertensive patients in three heath care centers in Uganda in a study suboptimal blood pressure control and its associated factors in hypertensive patients attending Mulago hospital hypertension clinic by Temu (2011) found that poor blood pressure control was found to be associated with a lack of knowledge about the target of systolic blood pressure. On the other hand, patient's knowledge about hypertension was found to be associated positively with blood pressure control (Abolfotouh, Soliman, Abofotouh & Raafat, 2011). Similarly, Almas, Godil, Lalani, Samani and Khan (2012) in their study on good knowledge about hypertension is linked to better control of hypertension; A multicentre cross- sectional study in Karachi, Pakistan reported that awareness of hypertension was found to be associated with hypertension control. In the same vein, another study by Son (2012) on hypertension in Vietnam from Community-Based Studies to a NationalTargeted Programme Epidemiology and Global Health in Sweden found that patients with low awareness about hypertension were found to have poor control of hypertension, this association was especially found to be clear in patients who were 65 years and older, male and those who had not been to see a physician in the previous year.

Complications of hypertension

The relationship between BP and risk of cerebrovascular disease events is continuous, consistent, and independent of other risk factors. The higher the blood

pressure, the greater is the chance of heart attack, heart failure, stroke, and kidney diseases (Edo, 2009). Inadequate blood pressure control is the leading cause of death globally, responsible for 7 million deaths annually mainly in low income countries (WHO, 2011). According to the WHO global status report on non- communicable disease by Joho (2012), raised blood pressure is said to cause 7.5 million deaths, 12.8% of total annual deaths. Two-thirds of stroke and one-half of ischaemic heart disease were due to non-optimal blood pressure (WHO, 2011). High blood pressure is the risk factor most often reported in patients with stroke in SSA, with a frequency of over 90% at the time of presentation of stroke. In Zimbabwe 53% of patients with stroke lesions on Computerised Tomography (CT) scan had hypertension, of which 45% were not diagnosed and another 45% had defaulted on treatment (Mungati, et al., 2012). In Uganda, a study done to describe the pattern of cardiac disease in the cardiac clinic and in the general medical wards of a tertiary centre, revealed that a history of hypertension was the most common risk factor for heart disease (Temu, 2011). In Malawi, a national STEPS Survey for Chronic Non-Communicable Diseases and their Risk Factors revealed that cardiovascular disease accounted for 5.4 % of all deaths and that hypertension was the most common risk factor for heart disease (Msyamboza et al., 2011).

Hypertension symptoms and diagnosis

Most patients with hypertension are asymptomatic, which often is a cause for delay in diagnosis (WHO, 2011). A study in Germany showed the most common symptoms were difficulty in breathing (42%), nervousness (35%), palpitations (32%), dizziness (30%), and (26 %) angina (Vijver et al., 2014). Hypertension is diagnosed by

measurement of a blood pressure that is equals or above 140mmHg systolic blood pressure and/or equals or above 90mmHg diastolic blood pressure on two or more occasions (GoM, 2015).

Importance of blood pressure control

A study in United States of American older Chinese immigrants on medical outpatients in 18 different hospitals showed, 73% of hypertensive patients believed hypertension was not a serious problem, and required no regular medication (Li, Wallhagen & Froelicher, 2010). Lowering blood pressure within the whole population by lifestyle interventions, such as reducing dietary salt intake and increasing the consumption of fruit and vegetables, will be of great benefit. Blood pressure-lowering trials also demonstrate immense benefits in preventing strokes, heart failure and coronary heart disease **(**MacGregor & He, 2005). Furthermore, there are no differences in outcome between the different methods used to lower blood pressure and the benefit is proportional to the degree of blood pressure-lowering.

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Presence of Comorbidity

The association between the presence of other comorbidities and blood pressure control varied across the studies. Many studies reported that having an additional cardiovascular co-morbidity reduced the probability of having controlled blood pressure below 140/90 mmHg (Suarez , Galgo , Mantilla , Leal & Escobar 2013; Schafer et al.,

2012; Brenner, Waeber, Allemann, 2011; Al-Saadi, Al-Shukaili , Al-Mahrazi & Al-Busaidi, 2011). These studies mainly included older hypertensive patients being prescribed more than one antihypertensive drug. Diabetes and chronic renal disease are of the most frequently cardiovascular comorbidity occurring in these patients. It seems that this patient group has longstanding hypertension and also higher baseline blood pressure levels. Patients with long established hypertension have been found more likely to have uncontrolled blood pressure (Kim, Kim, Kim, Kang, Park et al., 2010). This may indicate that a simultaneous control of more than one cardiovascular risk factor is hardly achieved. By contrast, some studies found that hypertensive patients having additional cardiovascular comorbidity were more likely to have controlled blood pressure (Labeit et al., 2012; Paulsen et al., 2012; Sandoval et al., 2012). Within these studies coronary heart disease and stroke were the most commonly associated cardiovascular comorbidity reported. Patients on antihypertensive treatment were also older. That could be due to the quality of care provided to these patients. Petersen, Woodard, Henderson, Urech and Pietz (2009) revealed that hypertensive patients with an additional comorbidity received better or equal care than those without other comorbidities and so they were more likely to have controlled hypertension. Other non-cardiovascular comorbidities have also been related to blood pressure control. The relationship between depression and blood pressure control has been contradictory. Bautista, Vera-Cala, Colombo and Smith (2012) in a longitudinal study of 178 patients in USA reported that hypertensive patients with depression and anxiety were more likely to be non-adherent to antihypertensive medication. Michal, Wiltink, Lackner, Wild, Zwiener et al., (2013) assessed the relationship between depression and hypertension in a cross-sectional study of 5000

patients from Germany general practices. Compared to those without hypertension, patients unaware of hypertension were less likely to have depression or symptoms of depression. There was no association between having controlled hypertension and depression (Michal et al., 2013). In a meta-analysis of some observational studies which assessed the relationship between depression and adherence to antihypertensive medication, Eze, Thombs, Lima , Smith & Ziegalstein (2012) found that a positive association between depression and poor adherence to antihypertensive medication. Additionally patients with both poor adherence and depression were more likely to have uncontrolled blood pressure in all the studies. However, the methodological differences observed between the studies prevented from establishing a conclusive association between both conditions.

Hypertension commonly occurs in diabetic patients. It affects about 20-60% of patients with diabetes mellitus depending on obesity, and age. Hypertension in type 2 diabetes mellitus occurs as a part of metabolic syndrome while hypertension in type 1 diabetes mellitus usually reflects the presence of diabetic nephropathy (WHO, 2011). In a study of hypertension in type 1 diabetes population compared to general population in US, individuals with type 1 diabetes mellitus had more hypertension (43% vs. 15%), than did non diabetic individuals (Edo, 2009). The presence of hypertension increases the risk of morbidity and mortality

In a study titled assessment of patient's antihypertensive medication adherence levelin non-comorbid hypertension in a tertiary hospital in Nigeria by Okoro and Ngong, (2012) cited the need for hypertension to be detected and treated early in diabetes mellitus to prevent cardiovascular disease and to delay the onset of diabetic nephropathy.

In fact, it is recommended that the treatment of hypertension in diabetes mellitus should be started if blood pressure is equal to or more than 130/80 mmHg (WHO, 2011; Malawian Standard Treatment Guidelines on the Management of Hypertension (GoM, 2015). In diabetic hypertensive patients, a lower target blood pressure is needed to get maximum reduction in development of cardiovascular and diabetic renal disease. The target of less than 130/80 mmHg is difficult to achieve but multiple drug prescription may assist in the attainment of this target (Parati, 2013). Studies show that hypertension is difficult to be controlled in diabetic patients. For instance, a study in general medicine clinics found that diabetic patients were more likely to have uncontrolled hypertension than did non diabetic patients (Parati, Parati, Omboni, Compare, Grossi et al., 2013). In another study in Malasysia, only 25% of diabetics had their blood pressure controlled compared to 31% of all hypertensive patients (Elhadi, 2007). Another study on a cohort of 1090 diabetic patients in primary care clinics in Uganda, reported that hypertension was controlled in 40% of the patients surveyed (Temu, 2011). In a study in a hospital hypertension unit in Spain, only 10.5% of diabetic patients had their blood pressure controlled compared to 43.5% of those without diabetes (Oke & Bandele, 2004). A study of 800 hypertensive male veterans in New England reported that blood pressure was less than 140/90 mmHg in only 27% of diabetic persons compared to 34% in those without diabetes (Morgado et al., 2010). In a cross-sectional study in South Africa, diabetic patients were more likely to have uncontrolled diastolic blood pressure than did non diabetic patients (Edo, 2009). In a self measurement of blood pressure, assessment and follow-up study in elderly in Korea, diabetes was associated with less optimal control of

blood pressure, only 6% had a blood pressure adequately controlled at below 130/85 mm Hg (Kim, et al., 2010)

A survey on the epidemiology of hypertension in Tunisia reported that 10.2% of the subjects were diabetic, 27.7% were obese, 56.7% were overweight and 21.5% were smokers (Elhadi, 2007). Another study on hypertensive patients in their first visit to a hypertension unit in Spain, showed that family history was present in 53%, a sedentary life style in 52%, high cholesterol levels in 37%, smoking in 35%, obesity in 33%, left ventricular hypertrophy in 16%, alcohol consumption in 13% and diabetes mellitus in 11% (Osmar & Owumi, 2011). In Pakistan, according to Ahmed, Khaliq, Shah and Answar (2008) hypertension was found to be associated with the high prevalence of diabetes mellitus (19%), obesity (39.4%) and hypercholesterolemia (70.7%). The presence of other risk factors affects the incidence of hypertension. In a study in an urban health clinic in the Pacific Northwest, hypertensive patients were found to have diabetes mellitus, depression, heart disease and renal disease more than did non- hypertensive patients (Morgado et al., 2010).

Family History

A positive family history of hypertension is another known risk factor for developing hypertension. In addition to sharing similar genetic profiles, individuals within the same family share a number of environmental factors throughout the life course, such as physical environment, dietary habits, health beliefs and practices, and socioeconomic status. These familial genetic and environmental factors may condition a common blood pressure level. If evident, such between-family variation in blood pressure levels would suggest that genetic and environmental (or interactions between the two)

contextual effects could operate in ways that might influence individual blood pressure levels and/or the probability of hypertension control. Furthermore, evidence for familial clustering of blood pressure levels and hypertension outcomes suggests that strategies for preventing and controlling hypertension that are focused at the family level may prove to be effective.

In a screening of more than a half million people in Geneva, Switzerland, hypertension prevalence in individuals with a positive family history of hypertension was double than that found in individuals with a negative history (Guessous, Bochud, Theler, Gaspoz & Pachere, 2012). In a survey among rural residences in the Philippine an association between hypertension and family history was found (Pereira et al., 2009). In a longitudinal study of two samples of 745 subjects (age ranging from 4.9- 27.5 years) and 687 subjects (age ranging from 8.2-27.5) in Georgia in the United States, it was found that subjects with a positive family history of hypertension had higher systolic blood pressure than subjects with a negative family history of hypertension (Li, Wallhagen & Froelicher , 2010). Hypertensive patients with family history of hypertension tend to have poor blood pressure control as proven by a study of outpatients in a nephrology clinic in Italy which found that a family history of hypertension was associated with poor control of hypertension (Elhadi, 2007).

Last blood pressure check-up

One study in the USA was able to demonstrate that shorter return visit intervals were associated with better percent reduction in blood pressure (Kearney, et al., 2005). Return visit interval may be a proxy for increased intervention (pharmacotherapy or education) or a specific behavior of the physician or patient, or it may act to strengthen

the doctor–patient relationship. The exact reason why a shorter return visit interval is associated with greater improvement in BP remains to be defined (Guthmann, Davis, Brown, & Elizondo, 2005).

The trend of greater percent increase in systolic blood pressure following a longer return visit interval persisted throughout the series for controlled intervals. Diastolic blood pressure for controlled intervals had a statistically significantly lesser percent increase following intervals of less than 60 days.

Compliance with medication

The World Health Organisation (2011) defined compliance to long term therapy as the extent to which a person's taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider.The definition incorporates the two concepts of compliance and persistence with therapy (Halper, Khan, Schmier, Burnier, Caro et al., 2006). Poor compliance with antihypertensive medication is commonly observed among antihypertensive patients. In a population survey from China, by Tian et al., (2011) found that only 27.7% of hypertensive patient were not taking antihypertensive medications regularly. The reasons for not taking medications were not having enough money to purchase them and not being aware of the health risk related to hypertension. In an analysis of antihypertensive drug persistence and compliance among newly treated elderly hypertensives in Ontario, United States of America on prescribing records from 22918 hypertensive patients, Friedman, McAlister, Yun, Campbell and Tu (2010) detected that only around 50% of patients continued on antihypertensive treatment six months after starting therapy. In a review of a study assessing adherence to antihypertensive medication in three district

hospitals in Dar es Salaam, Tanzania, Joho (2012) reported that the percentage of patients regularly taking antihypertensive medication varied between 4% and 86 %. In an analysis on adherence to prescribed antihypertensive drug treatments: longitudinal study of electronically compiled dosing histories of 4378 clinical records of hypertensive patients in United States of America , Vrijens, Vincze, Kristanto, Urquhart and Burnier (2008) found that up to 50% of patients stopped taking antihypertensive medication over one year. They also reported that among patients continually taking antihypertensive medication at least 10% of scheduled prescriptions were omitted. In a study on lifestyle factors associated with blood pressure control among those taking antihypertensive medication in 82824 hypertensive patients aged 65 years and over, Ham and Yang (2013) found that only 50% of newly treated hypertensive patients reported continue use of antihypertensive drugs after having the initial prescription. By comparison, some authors have been reported good compliance to antihypertensive medications. In a cohort study on factors affecting antihypertensive treatment adherence: a Saudi Arabian perspective of 207473 hypertensive patients with mean age 74 years, Alsolami, Hou and Velez (2012) reported that compliance with antihypertensive medication increased up to levels between 50% and 75% over a seven year follow-up period. Similarly, Inkster, Donnan, MacDonald, Sullivan and Fahey (2006) reported a 91% level of compliance among hypertensive patients in Dundee, United Kingdom primary care. Then although compliance is commonly reported, its frequency varies across studies.

The consequences of poor and/or good adherence varied between different studies. In a study in China on factors associated with blood pressure control in hypertensive patients with coronary heart disease: evidence from the Chinese cholesterol

education program by Xu et al., (2013) reported that hypertensive patients with good adherence were more likely to have controlled blood pressure compared to those with poor adherence. By contrast, in an analysis of 110 outpatients on blood pressure treatment adherence and control through 24-hour ambulatory monitoring, Grezzana, Stein and Pellanda (2013) also established that the level of compliance did not explain the failures in lowering blood pressure. From a review of 30 studies assessing compliance to antihypertensive medication, Saleheen et al., (2010) concluded that the association between poor adherence and poor blood pressure control is not totally supported by the available evidence. Some studies did not find differences in adherence between those with good and poor blood pressure control. Those studies which support the association between poor adherence and poor blood pressure control did not have a control group. The lack of a standard method for assessing adherence to medication is one of the reasons for these divergences between studies. It also results in different estimations of adherence to antihypertensive medications between studies (Bailey, Wan, Tang, Ghani & Cushman, 2010). Therefore, although a lack of compliance with antihypertensive medications is frequently among hypertensive patients, its impact on blood pressure control has not precisely been estimated.

The consequences of poor compliance with antihypertensive medication go beyond poor blood pressure control. Bailey et al., (2010) in their study in USA on antihypertensive medication adherence, ambulatory visits, and risk of stroke and death reported that there was a reduction in the risk of stroke associated with increases in the level of compliance with antihypertensive medication. Thus for each 15% increase in the compliance score, there was a reduction of 0.91 (CI 95% 0.86-0.97) in the hazard ratio of stroke (Bailey et

al., 2010). Gao, Chen, Tian, Lin, Lu et al., (2013) in a study in West China Hospital on prevalence of hypertension in china: a cross-sectional study reported that compared to those patients stopping antihypertensive medication at any time, those who did not stop medication had a reduction of 37% in coronary or cerebrovascular outcomes. This evidence came from data collecting from general practices and so can be considered to reflect possible achievements within clinical practice (Corrao, Parodi, Nicotra, Zambon, Merlino et al., 2011). One study in hypertensive patients who received treatment at a cardiology clinic in the Government Medical College in India showed that 61% of those with uncontrolled hypertension did not comply with the prescriptions prescribed (Ahmed et al., 2008). Some studies also showed that non compliance was also present among patients with controlled hypertension but was generally more among patients with uncontrolled hypertension. Katibi et al., (2010) reported that a survey in Japan found noncompliance to be higher in patients with poor control of hypertension compared with patients with well controlled hypertension (43% vs. 32%). A study in Nigeria in a tertiary hypertension clinic showed that blood pressure control was significantly better among compliant patients (45.9%) than 27.3% in non-compliant patients (Akpa, Alasia & Chioma, 2008). Hence, compliance with medication should be considered an important factor for improving blood pressure control.

Patients' lifestyle and dietary factors

In the third National Health and Nutrition Examination Survey (NHANES) on factors associated with hypertensive patients' compliance with recommende lifestyle behaviour in United States of America, respondents with better blood pressure control reported using lifestyle modification to control their blood pressure (Heymann, Gross &

Tabenkin, 2011). The adoption of healthy behaviors is essential in reducing and maintaining appropriate blood pressure levels, preventing hypertension incidence, improving antihypertensive drug efficacy, and reducing cardiovascular disease risk (Greene, 2009). Lifestyle modifications should be used as initial therapy to control blood pressure and should be standard in all hypertensive patients (Mandal, 2009).The recommended lifestyles with proven efficacy for preventing hypertension include: maintaining normal body weight; adopting a diet that is low in sodium and saturated fats, and rich in fruits, vegetables, and potassium; engaging in regular aerobic physical activity; and limiting alcohol consumption (Edo, 2009). The British Hypertension Society guidelines proposed the following lifestyle changes: reduce dietary sodium intake to less than 2.4 g of sodium per day; engage in regular aerobic physical activity such as brisk walking 30 or more minutes per day most days of the week; limit alcohol consumption to no more than 3 units per day in men and no more than 2 units per day in women and consume a diet rich in fruit and vegetables at least five portions or servings per day (Greene, 2009). Although cigarette smoking has not been established as an independent risk factor for hypertension, it does increase risk for both coronary heart disease and stroke. As such, smoking cessation is suggested for overall CVD risk reduction (Ham & Yang, 2013).

Results from a clinical trial on lifestyle interventions has by Greene (2009) suggested that combining two or more of the recommended behaviors may be even more effective at reducing and maintaining blood pressure levels (Drake, 2009). Accordingly, combining a diet rich in fruits and vegetables (and hence potassium) with low dietary sodium intake has been shown to decrease SBP by at least 5 mmHg, a reduction that is

comparable to the reductions obtained with an effective antihypertensive agent (Greene, 2009). Antihypertensive medications are among the most frequently used medications in most countries. One of the challenges in achieving blood pressure control is the difficulty in predicting how effective a particular antihypertensive regimen will be for a particular patient. Without a priori knowledge of how individuals will respond to a medication, a "trial-and-error" approach is typically employed to find the ideal drug for a given patient (GoM, 2010). Furthermore, it is recognized that hypertension is a multifactorial disease and that combinations of antihypertensive agents, acting through different mechanisms at different sites, are often prescribed, with most patients requiring two or more drugs to achieve target blood pressure (GoM, 2015). This illustrates the importance of incorporating lifestyle modifications into treatment plans and public health efforts, versus a predominant reliance on the prescription of antihypertensive medications, as a means of controlling blood pressure levels among hypertensive individuals.

Tobacco smoking

Tobacco smoking is known to increase the risk of developing hypertension and cardiovascular diseases like stroke, thrombosis and heart attack. Smoking causes an immediate increase in blood pressure resulting in higher ambulatory blood pressure levels for smokers than for non-smokers. Smoking cessation is known to reduce the overall risk of cardiovascular diseases (Rodgers, Ezzati, Hoorn & Lopez, 2004). In order to reduce smoking at the population level, it is important to implement multi-sectoral interventions like increasing taxes on tobacco products, banning of tobacco advertisements and banning smoking in public spaces (Beaglehole, Bonita, Horton, & Adams, 2011). The prevalence of tobacco smoking varied widely in the World Health Survey. In all

countries, men smoked more than women, with the largest disparities observed in Central and Western Africa (Vijver et al., 2014). Among men, the prevalence of smoking was highest in Southern Africa followed by Eastern Africa. Remarkably, smoking was more prevalent in rural than in urban areas in most countries. Only in Kenya, Mauritania, Senegal and South Africa, were smoking levels higher among the urban population than their rural counterparts. A similar trend is observed in results from the STEPS survey (2003-2009). Daily smokers represented a greater proportion of actual smokers and were disproportionately male. Smoking was more likely in the island nations of Seychelles (22.2 percent), Madagascar (19.6 percent) and Mauritania (19.0 percent) and less pronounced in Western and Eastern African countries. For example, Ethiopia reported prevalence at 4.6 percent in 2006 and Benin was slightly lower at 3.8 percent in 2007.

Different associations between smoking and having controlled blood pressure have been reported. Omuemu, Okojie & Omuemu (2007) reported that compared to patients with controlled hypertension, those with uncontrolled hypertension were more likely to be current smokers (369). In an analysis of 122 hypertensive patients of hypertension in India: a systematic review and meta-analysis of prevalence, awareness, and control of hypertension by Anhala, Kannuri, Pnti, Khan, Franco et al., (2014) found that smoking was positively associated with having uncontrolled blood pressure. In a Swiss survey the rate of blood pressure control was higher in non-smokers (Brenner, Waeber &Allemann, 2011).

Tobacco smoking cessation may lower blood pressure. It is well established that cigarette smoking increases the risk of heart disease and stroke in individuals with hypertension (Omuemu, Okojie & Omuemu, 2007). Thus, cessation of tobacco smoking

would decrease one's risk for cardiovascular diseases, in addition to other chronic diseases. Smoking is associated with hypertension when it is chronic and heavy (Akpa, Alasia & Chioma, 2008). Blood pressure rises acutely during smoking. In a study of 19 smokers with hypertension, blood pressure rose from 140±7/ 99mmHg±3 to 151±5/108±2mmHg within 10 minutes after smoking (Drake, 2009). Extensive observation data show that smoking has a graded adverse effect on the risk of cardiovascular complications and smoking increases cerebrovascular disease risk more than mild hypertension (Drake, 2009). Those who stop smoking experience a rapid decline in risk about 50% after 1year but they need about 10 years to reach the level of non-smokers (Joubert & Ehrlich, 2010). Repeated advice from physicians has been shown to decrease smoking by 21% (Edo, 2009).

A research manual on Epidemiology for South Africa indicated that smoking status does not affect blood pressure control but smokers were given a higher dose of antihypertensive to control their blood pressure (Joubert & Ehrlich, 2010). In a study on factors associated with hypertensive patients' compliance with recommended lifestyle behaviour by Heyman, Gross & Tabenkin (2011) reported that there was no difference in smoking rates between controlled hypertension and uncontrolled hypertension patients. The association between smoking and hypertension control is not very clear as some studies showed a positive relation, while others showed a negative one. Omuemu, Okojie & Omuemu (2007) reported good hypertension control among smokers and explained that it was because most smokers were younger and used diuretics more than non - smokers did.

Another study in the general population of United States showed a low BP control among smokers (Rayner & Schoeman, 2009). In a study conducted in an inner city hospital, it was found that African American smokers were more likely to have uncontrolled hypertension than did non-smokers (Xu et al., 2013). Additionally, hypertension control was found to be lower among smokers (4.4%) compared to those who never smoked (8.7%) and those who stopped smoking (14.7%). Further, stress relief techniques like meditation may help manage blood pressure, although scientific studies are largely lacking.

Alcohol Consumption

Several other dietary factors may affect blood pressure. For instance, consuming excessive amounts of alcohol is associated with hypertension (Iloh, Ofoedu, Njoku, Amadu & Uko, 2013). In fact, drinking more than two alcoholic drinks daily dose-dependently increases blood pressure (Drake, 2009). Accordingly, heavy drinkers who decrease their consumption of alcoholic beverages experience a dose-dependent reduction in both systolic blood pressure and diastolic blood pressure. Hajjar and Kotchen (2013) observed that moderate amounts of alcohol, two drinks daily for men and one drink daily for women, may not significantly increase blood pressure and, compared to nondrinkers, may actually decrease blood pressure in women. Moreover, moderate consumption of alcohol has been associated with significant reductions in the risk of coronary heart disease, ischemic stroke, and overall mortality. However, drinking more than this amount increases the risk for hypertension, various cancers, and mortality (Bulatova, Yousef, AbuRuz and Farha, 2013).

In both the STEPS and the World Heath Survey, prevalence of alcohol consumption did not vary significantly between rural and urban populations (Vijver et al., 2014). This implies an increase in prevalence rates in the rural, to levels similar to those previously only found in urban areas. Men show higher prevalence of alcohol consumption in terms of current and daily drinkers and are more likely to be frequent drinkers (defined as having more than four standard drinks/day on average on most days of the week) than women (Vijver et al., 2014). Thus, limiting alcohol consumption is important for controlling blood pressure. Additionally, some studies indicate that regular consumption of foods, such as wine, tea, and cocoa, may reduce blood pressure (Seedat & Rayner, 2011; Drake, 2009; Dragomir, Cote, Roy, Blais, Lalonde et al., 2013).

Dietary factors

Dietary change such as a low sodium diet is beneficial. A long term (more than 4 weeks) low sodium diet is effective in reducing blood pressure, both in people with hypertension and in people with normal blood pressure. Also, the Dietary Approaches to Stop Hypertension (DASH) which is a diet rich in nuts, whole grains, fish, poultry, fruits and vegetables lowers blood pressure (Drake, 2009; Ohta, Tsuchihihashi, & Kiyohara, 2011). A major feature of the plan is limiting intake of sodium. In a study by Ham and Yang (2013) to explore the relations between lifestyle factors and blood pressure control among patients with hypertension who were regularly taking antihypertensive medication as prescribed, reports that out of 690 individuals diagnosed with hypertension who were regularly taking antihypertensive medication, slightly more than half of the patients (54.3%) had their blood pressure under control. In addition, younger patients, those having one or more comorbidities and those performing physical

activity at least 4 days a week were more likely to have their blood pressure under control, while overweight patients, heavy alcohol drinkers, and those with mild to very severe stress had lower rates of blood pressure control. A number of dietary changes can help lower blood pressure in people with normal or high blood pressure. High sodium intakes are linked with high blood pressure. Accordingly, several randomized controlled trials have found that dietary sodium or salt reduction lowers blood pressure (Drake, 2009; Edo, 2009; Ham & Yang, 2013).

Few intervention studies have been conducted to show that a reduction in salt intake and an increase in potassium improve the blood pressure in African populations. A study done in Tanzania on ethnic differences in salt sensitivity, genetic and environmental factors indicated that a low sodium diet leading to a low urinary excretion level of 52 mmols per day, reduced blood pressure in normotensive people significantly within four to five days (Mtabaji, Nara, Mano Yamori, 2007). A study in Kenya on potassium supplementation versus bendrofluazide in mildly to moderately hypersensive Kenyans reported that supplementation with potassium in newly diagnosed patients with hypertension reduced the blood pressure to a level similar to that found in patients treated with a diuretic (Obel & Koech, 2008).These studies provide evidence of the impact of community-based and context specific salt-reduction programs in Africa where most salt is still discretionary rather than from processed foods as is the case in developed countries. One analysis found that sodium reduction (1,800 mg/day of sodium or 4.6 grams/day of salt) in individuals with elevated blood pressure lowered systolic blood pressure by 5 mm Hg and diastolic blood pressure by 2.7 mm Hg (Drake, 2009). A low sodium diet was also found to reduce systolic blood pressure by 2 mm Hg and diastolic

blood pressure by 1 mm Hg in subjects with normal blood pressure (Drake, 2009). According to WHO (2006) recommendations, healthy adults should limit sodium consumption to 2,300 mg daily (5.8 grams of salt), which is about a teaspoon of salt. Individuals who tend to be more sensitive to the effects of sodium on blood pressure, those with diagnosed hypertension, people over 50 years of age, and individuals of African origin, should consume less than 1,500 mg of sodium (3.8 grams of salt) daily (Gudina, Michael & Assegid, 2013). The DASH diet emphasizes fruits, vegetables, whole grains, poultry, fish, nuts, and low-fat dairy products.

In initial DASH trial, according to Edo (2009), sodium levels were kept constant throughout the study in order to better evaluate the effects of other dietary components. At each level of salt intake, individuals on the DASH diet had lower systolic blood pressure and diastolic blood pressure compared to individuals on the typical normal diet. This blood pressure reduction was observed in individuals with hypertension and in those with normal blood pressure. The combination of the DASH diet and reduction in salt has a preservative effect, lowering blood pressure more than either intervention alone (Edo, 2009).

Fruit and vegetable consumption is one element of a healthy diet and varies considerably among countries, reflecting economic, cultural and agricultural production environments (Popkin, 2006). Most of the benefits of fruits and vegetables come from reduction in CVD and risk factors, particularly hypertension. In addition to a high salt intake, many people in Africa often eat insufficient fruits and vegetables, resulting in low

potassium intake. This in turn is associated with higher blood pressure in some patients; a potassium intake of 90 mmol /day is recommended (Popkin, 2006).

The STEPS surveys reported sufficient fruits and vegetables intake, defined as five or more servings of fruits or vegetables per one typical day, as being very low across all 20 African countries (Vijver et al., 2014). There were slight gender variations in mean servings of fruit and vegetables reported with women more likely to consume the recommended number of servings than men. This finding was mirrored in the World Health Survey where also, rural people were more likely to consume insufficient amounts of fruits and vegetables compared to their urban counterparts (Vijver et al., 2014).

Physical activity

In addition to dietary changes, regular exercise has been shown to lower resting blood pressure in people with normal or high blood pressure. Adequate physical activity has been shown to have many health-promoting effects and has a direct, independent role in reducing hypertension (Gersh, Sliwa, Mayosi, & Yusuf, 2010). Traditionally, it has been thought that a high level of physical activity could in part explain the low levels of chronic diseases found in most of Africa. However, the amounts of physical activity have been decreasing as a result of the high rate of urbanization that has been occurring across the continent (Gersh et al., 2010). Few studies on the physical activity patterns of African populations have been published. One pooled analysis of controlled trials found that exercise significantly reduced blood pressure by an average of 3.8 mm Hg for systolic blood pressure and 2.6 mm Hg for diastolic blood pressure (Agudo, 2005). The blood pressure-lowering effect observed in this analysis was not dependent on weight loss of

participants or on the frequency, intensity, or type of exercise. Another pooled analysis reported that progressive resistance exercise decreased both resting systolic blood pressure and diastolic blood pressure by 3 mm Hg (Agudo, 2005). It is not clear how regular aerobic or resistance exercise lowers blood pressure, but suggested mechanisms include decreased peripheral resistance in blood vessels, effects on the nervous and renal systems, and reductions in body weight (Agudo, 2005).

According to Mandal (2009) physical activity is essential in improving physical and mental health of people. It reduces the risk of non-comminicable diseases such as hypertension, heart disease, diabetes mellitus and also increases social interaction by community engagement. It is not only related to the public health issue but also to the promotion of general well being. A study on lifestyle factors associated with blood pressure control among those taking antihypertensive medication by Ham and Yang (2013) suggested that regular physical activity can reduce blood pressure in those with high blood pressure levels. Physical activity reduces body fat, which is associated with high blood pressure. Although some health benefits seem to begin with as little as 60 minutes (1 hour) a week, research shows that a total amount of 150 minutes (2 hours and 30 minutes) a week of moderate-intensity aerobic activity, such as brisk walking, consistently reduces the risk of many chronic diseases and other adverse health outcomes such as hypertension (Glynn, Murphy, Smith, Schroedar & Fahey, 2010).

From the STEPS survey, adequate physical activity, defined as more than 150 minutes per week walking/moderate activity/vigorous activity, reported by males was markedly higher than that of females. In a report by the World Health Survey, women

also reported lower levels of physical activity than men, probably because of their traditionally defined roles, such as caregiving, that requires less physical strain (Vijver et al., 2014). Adequate physical activity is more prevalent in rural than urban regions of Africa, which partly explains the high prevalence of obesity in urban areas.

Blood pressure reductions resulting from routine physical activity may be more pronounced in overweight or obese individuals compared to those who are normal weight. Individuals should aim for at least 30 minutes of moderate-intensity physical activity, such as brisk walking most days of the week (Drake, 2009). Regular exercise is important in the controlling and treatment of hypertension and offers other health benefits as well. According to the National Heart, Lung, and Blood Institute, overweight and obese individuals should strive for a 10% loss in body weight over a six-month period. Weight loss of 10 kg generally results in 5-20 mm Hg reductions in systolic blood pressure (Ham & Yang, 2013). In fact, experts recommend the performance of mild exercise such as walking for 30-60 minutes at least 3 times a week in order to lower blood pressure (Mandal, 2009). Physical exercise was found to be associated with lower systolic and diastolic blood pressure especially in women (Xu et al., 2013). In general, physical exercise is associated with hypertension control (Lee et al., 2010). Increasing exercise was found to be associated with hypertension control while a sedentary life style is associated with poor BP control. The latter statement was affirmed by a study in Sweden according to Elhadi (2007) that sedentary life style was associated with uncontrolled systolic hypertension. Furthermore, Elhadi (2007) reported a high sedentary rate of 91.7% in uncontrolled hypertensive patients in Kuwait.

Conclusion

The literature has revealed that in most developed and developing countries' including Malawi, the prevalence of hypertension is high. What emerged clearly is that blood pressure control rate is low globally. The literature review showed several factors affecting blood pressure control in both developed and developing countries. These included sex, age, socio-economic status, presence of other conditions in addition to hypertension, family history of hypertension, missing antihypertensive dosed, vegetable and fruit consumption and doing exercises were the factors that affected blood pressure control. Malawi National STEPS survey for
Chronic Non-Communicable Diseases and their Risk factors revealed high morbidity and mortality rate due to hypertension and its subsequent complications. Available information does not provide evidence regarding coverage of hypertension control rates, factors affecting blood pressure control and interventions at both facility and community levels in Malawi. It is clear that there is limited information on Malawian literature on hypertension care. The available literature is from other African countries and developed countries. As such, this study has therefore attempted to assess the factors affecting blood pressure control in patients attending hypertension outpatient clinic in Malawian setting. In addition, most of the studies focused on prevalence, awareness and treatment of hypertension, and on factors affecting medication adherence among hypertension patients. This study has specifically identified factors affecting blood pressure control in patients attending outpatient hypertension clinic bringing the difficulty of the hypertensive patients to policy makers, educators, managers and service providers.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter describes the methodological approach used to conduct this study.The research design, setting, sampling methods, data collection techniques, the instrument which was used are described. The chapter includes an overview of ethical considerations, the measures which were observed to protect the rights of the study participants and limitation of the study. Validity of the instrument to measure the extent and accuracy to what it was supposed to measure and reliability of the instrument to produce the same results on more than one occasion are also included

Study design

A quantitative cross--sectional descriptive study design was used to assess factors affecting blood pressure control in patients attending outpatient hypertension clinic at Mwanza District Hospital. According to Polit and Beck (2010) cross-sectional studies involve the collection of data at one point in time for a short time period. Descriptive studies provide a picture of situations as they naturally occur (Burns & Grove, 2009).Study Setting

The study was conducted in the hypertension clinic of Mwanza District Hospital which serves patients within Mwanza district and some from other districts. Mwanza is one of the districts in the southern region of Malawi which is along the Mozambique boarder. The hospital has a projected catchment population of 102,571and covers an area of about 826 square (Mwanza District Hospital Health Management Information System

(HMIS), 2014). Approximately 45% of the population is under the age of 18 years while 55% (47, 368) are adults above 18 years (HMIS, 2014). The topography is generally hilly, with flat areas where there are permanent streams and rivers. The district is bordered by districts of Neno to the North-East, Chikhwawa to the South and the People's Republic of Mozambique to the North-West.

The hospital serves as both a primary and a secondary contact health facility. The hospital started providing outpatient hypertension clinic services to hypertensive patients in 2007. The clinic run every Tuesday except on public holidays, from 8.00 am to 5.00 pm. The place is a natural setting for the patients under study as they periodically go for blood pressure check- ups and seek advice on their condition. The study site was also chosen because it was where hypertension patients from all health centres under Mwanza district catchment area, (Kunenekude, Thambani, Tulonkhondo and Mwanza hospital) attend hypertension clinic health care services. It also served for some districts such as Chikhwawa and Neno and surrounding areas of Mozambique for outpatient hypertension services.

For many years, Mwanza district has economically depended upon citrus fruits (tangerine, lemon and oranges) as the district was one of the few areas of the country where the climate is favourable for the growth of such crops. However, for over a decade,

production has been falling and the citrus industry has been in decline, despite efforts by the citrus growers association ZIPATSO (Matemba, 2011). Urbanization, modernization and lifestyle changes are high due to its migration and immigration of the population.

The clinic had over 200 registered patients (as of 2007). Appointment dates generally ranged from monthly to 3 monthly.

Study Period

The study proposal was approved by the College of Medicine Research Ethics Committee in April, 2014. Preparations for the study and pretesting of the study were done in May, 2014. Thereafter, data collection was done between May, 2014 and August, 2014. Data analysis was done between September, 2014 and November, 2014 and thereafter report writing commenced.

Study population

All follow up adult hypertensive patients, who attended Mwanza District Hospital hypertension clinic from April to August, 2014 who met the eligibility criteria for the study. Population refers to a well- defined set that has certain specified properties (Polit & Hungler, 2010).

Sample size

Using Creswell (2009) formula $n = Z^2P(1-P) \div e^2$ by Creswell (2009), sample size for the prevalence of blood pressure control was calculated as follows: $n=Z^2P(1-P) \div e^2$

n= the required minimum sample size,

Z= the constant value of a normally distributed variate which for a 95% confidence interval takes the value of 1.96

P= estimated proportion of the parameter being studied(9%)- This value was taken from ranges of blood pressure control in hypertensive outpatients in SSA region countries, where blood pressure control was from 3%-65% (Ahmed, Khaliq, Shah & Anwar, 2008). The author assumed that only 9 % of the hypertensive patients had their blood pressure controlled just like other countries in the region such as Tanzania because some aspects of factors may be the same as those of Malawi.

e = desired accuracy or standard error (5%).

Therefore n=$1.96^2 \times 0.09(1-0.09) \div 0.05^2$

$= (3.8416 \times 0.09) \times 0.91 \div 0.0025$

= 0.31462704÷0.0025

n = 126

Therefore, sample size targeted for this study was 126 participants.

Sampling

Systematic random sampling technique was used in the study to select the required sample of participants on each clinic day. Patients' appointments to the clinic were given by date. Therefore, all the patients arrived at the clinic almost at the same time, between 6.00 and 8.00 o'clock in the morning to get their blood pressures and weights measured before consultation with the clinician. Forty to forty five (40-45) hypertensive patients were booked on each clinic day.The total number of patients booked for a particular day was divided by the expected number to be recruited that day and if the result was for example 4, then every fourth patient was checked for eligibility.

It took on average 30-40 minutes to interview and examine each study participant. On average, ten patients per clinic day were recruited by the researcher.

Inclusion criteria

- Hypertensive patients who were 18 years age and above, whose previous clinic visit was at least 3 months after the date of registration at the Mwanza District Hospital hypertension clinic. The minimum of three months and above was considered adequate as per literature recommendations to be able to achieve goal blood pressure control.
- Patients who gave informed consent

Exclusion criteria

- Patients below 18 years of age (patients under 18 years were excluded from the study as they are classified as being minors by Malawi's government constitution and were not to give consent)
- Patients who were not able to converse in English and Chichewa.
- Patients who had attended the clinic less than three months
- Patients who were sick and could not communicate effectively.

Data Collection instrument

A pre- tested questionnaire was used to collect data on most of the variables above and it was administered by the researcher. The questionnaire was adapted from Malawi NCD-STEPS survey (Msyamboza et al, 2011), a standard hypertension questionnaire (Li, Wallhagen & Froelicher, 2010) and Malawi Standard Treatment Guidelines (GoM, 2015) on hypertension and comprised four sections which addressed

the study objectives. The first section (A) had seven questions on demographic characteristics of participants on age, sex, occupation, marital status, education, income, residence and included blood pressure outcome. On blood pressure outcome, the current and previous blood pressure reading recorded in the patient health passbook record was taken as the outcome blood pressure. The overall blood pressure was used to categorise the individual as either having optimal or suboptimal blood pressure control as per criteria above. Blood pressure readings were categorized as controlled and not controlled, applying the prevailing WHO recommended goal for blood pressure classification (Chobanian et al., 2003) and the MSTG (GoM, 2015) on hypertension management. Systolic and diastolic levels are the most significant parameters that determine the outcome of blood pressure control in hypertensive patients. A hypertensive patient was considered to have reverted or achieved goal blood pressure control if blood pressure was below 140/90mmHg for patients without co-morbid conditions such as diabetes and renal diseases and blood pressure below130/80 mmHg for patients with diabetes over time (from four weeks) of getting treatment.

The second section (B) had twelve questions on participant's knowledge related factors on hypertension. The specific areas included awareness, duration, complications, factors that control hypertension, symptoms, whether hypertension is a lifelong condition, period of taking antihypertensive, family history and last blood pressure check-up. The third section (C) contained nine questions on participant's compliance with medication. Specific areas included frequency, quantity, dose (s), compliance with prescription (s), reasons for not taking drugs as prescribed, action taken when missed medication, compliance with clinic appointment. The fourth section (D) had thirty three questions on

participant's lifestyle behavior. The lifestyles specific areas included tobacco smoking, alcohol consumption, dietary behavior which included fruit, vegetable, oil/fat, salt and sort of food eaten most. Physical activities/exercises included areas on type, frequency and length.

Data were collected using the questionnaire which was translated into Chichewa (Appendix A and B). A questionnaire is appropriate when questions are asked orally in either face to face or telephone format. It is easy to use and can be used in large groups (Polit & Beck, 2010). All interviews were conducted in Chichewa. The researcher collected data alone. The questionnaire was administered orally by the investigator in a face - to - face encounter. The advantages of a questionnaire are that it assists with determining facts about the subjects or persons known by the subject. Furthermore, it can determine facts about events or situations known by the subject and beliefs, attitudes, opinions, level of knowledge and intentions of the subjects. Additionally, questionnaires can easily be distributed to a large group of people (Burns & Grove, 2009).

Validity

The questionnaire focused on content validity which refers to the accuracy with which the instrument measures the factors under study. Content validity was concerned with how accurately the questions asked tended to elicit the response being sought. To ensure content validity the instrument was based on an extensive literature survey, local knowledge of the participants, recommendations from the standard hypertension treatment questionnaire (Li, Wallhagen & Froelicher, 2010), the Malawi national STEPS survey (Msyamboza et al, 2011), the MSTG on hypertension (GoM, 2015) and WHO (Chobanian et al., 2003) as this ensured that most of the relevant areas on factors

affecting hypertension control were included. It was also given to the supervisors for assessment and acceptance. Furthermore, the instrument was pre-tested on hypertensive patients at Nkula ESCOM clinic in Neno district which assisted the researcher in evaluating and refining the questionnaire.

Reliability

Reliability of the instrument was ensured by accurate and careful phrasing of the questions to avoid ambiguity and leading participants to a particular answer. Participants were informed of the purpose for the study and the need to answer truthfully. Additionally, the questionnaire was pre-tested on hypertensive patients to ensure that the wording, format, length, and sequence of questions were appropriate. The pre-testing also assisted in identifying any parts of the instrument that were difficult for the participants to understand or that may have been misinterpreted by them. After pre-test study, feedback was obtained from the participants to help refine the quality of the questions. In addition, the use of face-to-face interview and the use of a structured questionnaire were some of the methods which were used to improve reliability in the study

Pretesting of the instrument

The researcher piloted the interview with twelve participants in Nkula ESCOM clinic at Neno district. This enabled the researcher to gauge how participants responded, how long the interviews would take and how easily understood the topics were. The clinician in-charge of the hypertension clinic was approached for his permission for the researcher to conduct a pretest study. The researcher was welcomed and given a private quiet room for the interviews. Detailed information about the study was given to the clinician in-charge of the hypertension clinic and to the patients who were attending

hypertension clinic. According to Connelly (2008), existing literature suggests that a pilot study sample should be 10-30 while Hertzog (2008) suggested 10% participants of the sample projected for the larger parent study. However, Julious (2005) cautions that this is not a simple or straight forward issue to resolve because these types of studies are influenced by many factors. However, the researcher recruited twelve (12) hypertensive adult patients for pretest study based on the inclusion criteria and after a verbal consent was obtained from each of them.

The interviws took about thirty to fourty-five minutes. Following the pretest study, some vague questions were rephrased and those which were repeated were removed. The questions that were rephrased were A5 and A7 in section A. In section B, K4 and K5 the original questions were vague for participants as a result they were asking for clarification of the questions several times before answering hence the questions were rephrased and combined to make K4. Four more questions K5, K6, K7, K8, and K11 were added to solicit more information on knowledge.

Data Collection procedure

Data was collected over a period of 12 weeks from May to August, 2014. Data collection started at 8.00am on each clinic day. Permission was sought from the District Health Officer (Appendix F), and the In-charge and staff of outpatient hypertension clinic of Mwanza District Hospital. Detailed information about the study was given to the patients attending the hypertension clinic and their consent to participate (Appendix C and D). The researcher with the help from the clinic staff who were checking weights and blood pressure on the patients identified the potential eligible clients, before they were reviewed by the clinicians. Each patient was referred to the researcher

to be informed about the study. The clinic staff was not involved in recruitment of patients and data collection. The researcher avoided pressurising potential participants to make instant decisions to participate in the study as it usually leads to resistance and high rate of refusals (Burns & Grove, 2009).

Patients' health passbooks were reviewed to identify patients who met the eligibility requirements for the study. Once the patient was selected to see the researcher, a sticker was placed on the passbook of those eligible and willing to participate in the study for easy identification during interviews. Identification numbers were assigned to assure anonymity. The participants were taken to a quiet room for privacy and to avoid disturbances. This assisted in selecting participants that represented the population of hypertensive patients and it was carefully followed because participant's decision to participate in the study was influenced by factors like an approach of the investigator which should be pleasant, positive, informative and non-aggressive as observed by Burns and Grove (2009).

If the patient was not eligible, the researcher still thanked the patient for coming and explained that she/he was selected to participate in a study but were ineligible therefore would not be interviewed. If the patient was eligible to participate, the researcher informed the patient about the blood pressure control study, the researcher's name, title and aim of study, the objectives, sample selection, data collection procedure and length of the interview. Emphasis was made that participation was voluntary, and even after volunteering if patients changed their decision would withdraw from the study without any penalty. If patient was willing, the researcher further explained clearly the study benefits and risks, if clear and or if there were some areas that needed clarification,

the researcher clarified. If the patient understood all the information, the researcher asked the patient to sign a written consent form which was kept in the file as evidence of patient's understanding of the study information. Patients who were unable to sign were assisted with an ink pad to do a right thumb print before data was collected. Furthermore potential participants were told that interviews were going to be conducted in Chichewa and responses would be documented on the space provided on the questionnaire. Assurance was made to the participants on dissemination of the results to assist in the development of interventions that will be beneficial to all hypertensive patients in Malawi.The administration of the questionnare was done face to face. Health passbooks were reviewed to verify the information collected from the subject and noted the latest blood pressure reading. Each interview took about 30 to 45 minutes and each data collection was managed up to ten interviews a day during the data collection period since the clinic run up to late afternoon hours.

After the interview, each participant was thanked for participating and for their cooperation and was escorted out of the room to the consultation room. The researcher then waited for the next patient. The same procedure was followed until all the patients were seen.

Data Management

Data management involved data cleaning which is the preparation of data for analysis by performing checks to ensure that the data are consistent, and correct (Polit & Hungler, 2010). Data cleaning involved checking questionnaires for completeness and consistency of information at the end of each collection day. This was done to maintain quality of the data. The raw data forms were stored securely to maintain confidentiality

and ensure data was not lost during the study. No names or identifying information was placed on the interview schedule however, only numbers were assigned. This was done to protect the confidentiality, intergrity, and availability of information. Editing of the data occurred after data entry was done by running frequencies and checking for out of range responses. The records will be kept until the research has been completed and afterwards destroyed.

Data analysis

Data were entered, cleaned and managed using Statistical Package for Social Sciences (SPSS) Windows Release 16, SPSS Inc., Chicago, IL, USA by the researcher. Data were analysed using descriptive statistics. Data were summarised using means, frequencies and percentages. Pearson's chi-square test was used to test the significance of the factors affecting blood pressure control and the result was significant when *p*-value was equal to or <0.05. The results were presented in tables. Main outcome measure was blood pressure control among the hypertensive patients. Socio-demographic such as age, gender, occupation, and lifestyle such as salt intake and exercises were found to be the significant factors that affected blood pressure control in the study participants.

Dissemination of the Results

The report was submitted to Kamuzu College of Nursing Postgraduate Academic Committee as a requirement for Master of Science in Community Health Nursing thesis. It will also be presented at professional conferences and scientific meetings locally and internationally.A copy of the final report was also submitted to Mwanza District Health Office, Kamuzu College of Nursing Library and Ministry of Health, Malawi.

The results will be presented in scientific gatherings such as conferences and may be published in a peer reviewed publication.

Ethical Considerations

Human rights need to be protected during research. It is crucial that all researchers are aware of research ethics. Researchers have ethical obligations and responsibilitites to protect the rights of the subjects and ensure that no harm is done to the subjects (Burns & Grove, 2010). During the research study, the following ethical considerations were made to protect the rights of participants during the course of the research study.

Institutional authorisation

Approval for carrying out the study was sought from the following

- College of Medicine Research Ethics Committee (COMREC) for ethical approval (Appendix E).
- Mwanza District Health Officer (Appendix F).

Consent from study participants

Written informed consent for involvement in the study was sought from the patients. Patients were informed that enrolment is voluntary and consent may be withdrawn at any time without any consequences to the patient. Verbal consent was also obtained to use their clinical passbook records. Assurance was made to all participants that none of them would be subjected to any form of punishment or penalty should they choose to refuse or withdraw from the study at any point in time. In the event that the participant would want to seek further clarification about the study, she/he was

encouraged to consult the investigator or COMREC secretariat through the contacts provided on the information sheet.

Privacy and confidentiality

Confidentiality was maintained by using a specific study identification number for each of the participants used in the data collection, storage and report writing. Furthermore, respondents' responses were made completely anonymous, their identities remained confidential and responses were not linked to their names and address in any way. All paper documents were stored by the researcher in a secure place to prevent public viewing. The questionnaires will be destroyed after study completion.

Benefits of the study

Finally, the benefits of the study were explained to the participants. There were no direct benefits for participating. However, the results of the study will be used to improve control of blood pressure in hypertensive patients attending outpatient hypertension clinic, and inform relevant stakeholders on the status of blood pressure control in Mwanza district. In the event that the participant wanted to seek further clarification about the study, she/he was encouraged to consult the investigator or COMREC secretariat through the contacts provided on the information sheet.

Study constraints

The study was done as part of partial fulfillment of the Community Health Nursing course.There was a time limit since t study was conducted during the last semester of the programme. This limited the study period to be short. In addition, the

finances for the study were very little, limiting the study in Mwanza District Hospital for easy to reach even though hypertension clinics are conducted in almost all 28 districts in Malawi. Hence, results were not generalized for Malawi. Furthermore, there was little information on hypertension in Malawi, therefore most literature utilised in the study was from other countries.

Conclusion

This chapter has discussed the study design and methodology used in the study. The descriptive study involved the data collection methods of interviewing and documenting analysis. Various factors related to the factors affecting blood pressure control of 126 hypertensive participants were investigated. Data collection was done involving a questionnaire. Various measures were applied to comply with the principles of research ethics. The following chapter presents the data and findings obtained of the study.

CHAPTER FOUR

PRESENTATION OF RESULTS

Introduction

This chapter presents results of a study on assessment of factors affecting blood pressure control among hypertensive patients attending outpatient clinic at Mwanza District Hospital, Malawi. The objectives of the study were to: determine socio-demographic factors affecting blood pressure control in hypertensive patients, assess knowledge of hypertension affecting blood pressure control, identify compliance with antihypertensive medication and investigate lifestyle factors affecting blood pressure control in patients attending hypertension outpatient clinic at Mwanza District Hospital.

Socio-demographic characteristics

The total number of participants in this study was 126. Over half 65.0% (n=82) of the participants were females and 35.0.0% (n=44) were male and ages ranged from 29 to 87 years with mean age of 60.9 years (SD=12.3 years). Over half 60.2% (n=76) of participants were married. Only 28.6% (n=36) of the participants had no education, 34.1% (n=43) participants attended primary education between standard 1 and 5, 19.8% (n=25) received primary education between standard 6 and 8, and 17.5% (n=22)

participants had secondary education and above (Table 1). Half (n=63) of the participants did farming, 17.5% (n=22) were unemployed, 15.1% (n=19) owned small scale businesses, 8.7% (n=11) were retired with no occupation and only 8.7% (n=11) were employed. There were 64.3% (n=81) participants who earned monthly income of less than MK50, 000.00, 26.2% (n=33) earned between MK51, 000.00 to 100,000. 00 and 9.5% (n=12) earned more than MK100, 000.00 a month. Most 71.4% (n=90) participants resided in rural area and only 28.6% (n=36) resided in urban area.

Table 1: Frequency distribution of participants on socio-demographic characteristics (N=126)

Variable	Frequency(N)	Percentage (%)
Sex		
Female	92	73.0
Male	34	27.0
Age (years)		
Adult age 29-39	5	4.0
Middle age 40-59	46	36.5
Old age 60-79	67	52.2
80 and above	8	6.3
Marital status		
Married	76	60.2
Widowed	38	30.2
Divorced/separated	6	4.8
Single	6	4.8
Education		
None	36	28.6
Standard 1-5	43	34.1
Standard 6-8	25	19.8
Secondary and above	22	17.5
Occupation		

Farming	63	50.0
Unemployed	22	17.5
Small scale business	19	15.1
Employed	11	8.7
Retired without occupation	11	8.7
Income per month (Malawi Kwacha)		
0-50, 000	81	64.3
51, 000-100, 000	33	26.2
Above 100, 000	12	9.5
Residence		
Rural	90	71.4
Urban	36	28.6

Knowledge related to hypertension

The results showed that 67.5% (n=85) of the participants were not aware that hypertension is a lifelong medical condition in which blood pressure is chronically elevated and 32.5% (n=41) knew that hypertension was a lifelong medical condition in which blood pressure is chronically elevated. Symptoms of hypertension mentioned were headache by 22.0% (n= 28) of the participants, 12.7% (n=16) of the participants mentioned blurred vision, 23.0% (n=29) indicated shortness of breath, 9.5% (n=12) mentioned dizziness, another 9.5% (n=12) indicated chest pains, 8.7% (n=11) mentioned excessive sweating while 14.3% (n=18) mentioned that hypertension is asymptomatic. The results showed that 46.0% (n=58) of the participants were not aware of any complication of hypertension, 20.6% (n=26) mentioned breathing problems, 14.3% (n=18) reported visual problem, 13.5% (n=17) indicated heart attack, 12.7% (n=16) mentioned paralysis of a limb, kidney problems was mentioned by 5.6% (n=7),and 18.2% (n=23) mentioned other complications such as headache, painful legs, malaria, stress, disoriented. Half 50.8% (n=64) of the participants did not know that antihypertensive medications were to be taken for life and 49.2% (n=62) of participants knew that antihypertensive medications were to be taken for life (Table 2).

Most (65.9%, n=83) of the participants mentioned psychological stress as a factor affecting blood pressure control, another 65.9% (n=83) of the participants mentioned non-restriction to fat intake, 30.2% (n=38) mentioned non-restriction to salt intake, 12.7% (n=16) mentioned non-compliance with antihypertensive medication, one participant mentioned excessive alcohol intake, inadequate fruit and vegetable intake and

lack of exercises each respectively and 34.1% (n=43) of the participants did not mention any factor.

The majority 74.6% (n=94) of the participants knew that they had no other conditions, 17.5% (n=22) of the participants reported heart disease, 11.0% (n=14) of the participants reported diabetes mellitus in addition to hypertension. Just above half 52.4% (n=66) of the participants reported no history of hypertension in their families, 23.0% (n=29) mentioned their siblings had suffered from hypertension, 11.9% (n=15) reported their parents (father or mother) had suffered from hypertension, 12.7% (n=16) were not aware of hypertension in their families. Seventy-seven percent (n=97) of the participants mentioned that they had hypertension over 5 years and 23.0% (n=29) had hypertension for less than five years. The results showed that majority 84.1% (n=106) of the participants had their blood pressure last checked within 3 months ago before the day of interview and 14.3.0% (n=18) participants had blood pressure checked more than three months ago and only 2(1.6) did not remember when their blood pressure was last checked.

Table 2: Frequency distribution of participants on knowledge related to hypertension

Variable	Frequency (N=126)	Percentage (%)
Hypertension is lifelong medical condition		
No 85	85	67.5
Yes 41	41	32.2
Symptoms of hypertension*		
Shortness of breath	29	23.0
Headache	28	22.2
**Asymptomatic or no symptom	18	14.3
Blurred vision	16	12.7
Dizziness	12	9.5
Chest pains	12	9.5
Excessive sweating	11	8.7
Antihypertensive medications have to be taken for life		
No	64	50.8
Yes	62	49.2
Complications of hypertension*		
Do not know	58	46.0
Breathing problems	26	20.6

Visual problems	18	14.3
Heart attack leading to death	17	13.5
Paralysis of a limb	16	12.7
Kidney problems	7	5.6
Others (headache, painful legs, insomnia, disoriented)	23	18.2
Factors that worsens blood pressure *		
Psychological stress	83	65.9
Non-fat restriction	83	65.9
Do not know	43	34.1
Non-restriction to salt intake	38	30.2
Non-compliance with antihypertensive medication	16	12.7
Excessive alcohol intake	1	0.8
Inadequate fruit and vegetable intake	1	0.8
Lack of physical activities	1	0.8
***Presence of other conditions**		
None	94	74.6
Heart disease	22	17.5
Diabetes mellitus	14	11.0
Family history of hypertension		
None	66	52.4
Siblings (brother, sister, aunt, cousin,	29	23.0

grandparents)		
Do not know	16	12.7
Parents (father and mother)	15	11.9
Last blood pressure check-up		
Within the last 3 months	106	84.1
More than 3 months ago	18	14.3
Do not remember	2	1.6
Duration of hypertension		
Over 5 years	97	77.0
Less than 5 years	29	23.0

*Participants were asked to mention any symptoms of hypertension, any complications of hypertension, any factors they know can worsen a high blood pressure and presence of other conditions. Responses were checked off from a list of possible correct answers.

** 'Asymptomatic or no symptoms' was expected to be mentioned as a possible symptom since most people with hypertension have no symptoms.

Compliance with antihypertensive medication

On compliance with antihypertensive medication among the participants, majority 87.3% (n=110) reported not missing or skipping a dose and 12.7% (n=16) of the participants missed or skipped one or more doses. The results further showed that 10.3% (n=13) of participants who missed or skipped doses took the medication as soon as they remembered or skipped if the time was close to the next dose, 1.6% (n=2) participants reported that they forgot the medication completely, while one participant indicated he took double dose next day. Reasons for missing or skipping doses were mainly forgetfulness as mentioned by (6.3%, n=8) of the participants, drugs out of stock (3.2%, n=4), 1.6% (n=2) participants mentioned that they felt better and another 1.6% (n=2) of the participants were afraid of side effects (Table 3).

Table 3: Frequency distribution of participants on compliance with antihypertensive medications

Variable	Frequency(N=126)	Percentage (%)
Missed doses		
None	110	87.3
One or more	16	12.7
Action taken when missed dose		
Took as soon as remembered	13	10.3
Forgot completely	2	1.6
Took double dose next day	1	0.8
Reasons for missing dose		
Forgetfulness	8	6.3
Drugs out of stock	4	3.2
Felt better	2	1.6
Fear of side effects	2	1.6

Lifestyle and dietary habits

Regarding lifestyle and dietary habits which affect control of hypertension, results indicated that none of the participants smoked tobacco. The results further showed that majority 89.7% (n=116) did not consume alcohol and 7.9% (n=10) consumed alcohol. However, participants who consumed alcohol were found to drink from once a week to almost everyday in a week. The amount of alcohol consumed ranged from 1-10 cups or bottles. The average number of drinks consumed per day was 2.

Most participants 64.3% (n=81) reported fruit consumption on more than 5 days a week during the last month, 38.9% (n=49) had eaten fruit on less than 5 days a week (Table 4). The results showed that 91.3% (n=115) of participants reported vegetable consumption on more than 5 days a week during the last month whereas 8.7% (n=11) of participants consumed vegetables on less than 5 days in a week. The results showed that 77.0% (n=97) of participants used no specific type of oil for their meal preparation, 15.9% (n=20) used vegetable oil, 4.8 % (n=6) reported not using any oil, 1.6% (n=2) did not know the type of oil used while only one participant used butter. The results showed that 17.5% (n=76) participants reported adding extra salt to cooked food, and 82.5% (n=104) participants did not.

Most 94.4% (n=119) of the participants led a physically active lifestyle while 5.6 (n=7) participants were physically inactive. The majority 89.7% (n=113) of the participants were engaged in physical activities on more than 4 days a week while only 10.3% (n=6) participants reported doing activities for less than 4 days a week.

Table 4: Frequency distribution of participants on lifestyle and dietary habits

Variable	Frequency (N=126)	Percentage (%)
Alcohol consumption		
No	116	92.1
Yes	10	7.9
Fruit consumption per week		
More than 5 days	81	64.3
Less than 5 days	43	34.1
Did not remember	2	1.6
Vegetable consumption		
More than 5 days	115	91.3
Less than 5 days	11	7.1
Type of oil used		
No specific type of oil	97	77.0
Vegetable	20	15.9
None	6	4.8
Do not know	2	1.6
Butter	1	0.8
Added extra salt to cooked food		
Yes	22	17.5
No	104	82.5
Physical activities		
Doing	119	94.4
Not doing	7	5.6

Distribution of participant's variables in controlled and uncontrolled blood pressure

The results showed that among the participants, 37.3% (n=47) can control blood pressure while over half 62.7% (n=79) cannot control blood pressure.socio-demographic variables

Socio-demographic variables

Among the participants with controlled blood pressure, 60.0% (n=3) were aged between 29-39 years, 52.0% (n=24) were between 40-59 years, 29.0% (n=18) were 60-79 years and only 25.0% (n=5) were aged 80 and above (Table 5). There was statistical significance between blood pressure control and age ($\chi 2 = 5.86$, $p = 0.001$).

The results showed that females (51.2%, n=42) can control blood pressure while males 88.6% (n=39) cannot. There was statistical significance between blood pressure control and gender ($\chi 2 = 1.07$, $p = 0.026$).

The results showed that 53.5% (n=23) participants among those with controlled blood pressure had education between standard 1 and 5, 30.6% (n=11) participants had no education, 28.5% (n=7) participants had education between standard 6 and 8 and 27.0% (n=6) had secondary education and above. There was no significant association between blood pressure control and educational level ($\chi 2 = 0.03$, $p = 0.875$).

Out of the participants with controlled blood pressure, 34.9% (n=22) participants were farmers, 54.5% (n=12) were unemployed, 45.5% (n=5) were employed, another 26.3% (n=5) were doing small scale business and only 27.3% (n=3) were retired without employment. There was statistical significance between blood pressure control and occupation ($\chi 2 = 3.51$, $p = 0.007$).

Most 46.9% (n=38) of the participants among those with blood pressure control had low monthly income of below MK50, 000, 9.1% (n=3) earned between 51 and 100, and half 50.0% (n=6) participants earned above MK100, 000. There was no significant association between blood pressure control and income ($\chi 2 = .84$, $p = 0.359$).

Among the participants with controlled blood pressure, 34.4% (n=31) participants resided in rural area and 44.4% (n=16) resided in urban area. There was no significant association between blood pressure control and residence ($\chi 2 = 2.96$, $p = 0.085$).

Knowledge related to hypertension

In terms of presence of other conditions, 37.2% (n=35) participants with no presence of other conditions can control blood pressure, while 41.2% (n=7) with heart disease can control blood pressure and 33.2% (n=5) with diabetes can control blood pressure.

Results indicated that 45.5% (n=30) of the participants with no history of hypertension can control, 34.5% (n=10) with history of siblings with hypertension, 46.7% (n=7) with history of parents with hypertension, and 37.5% (n=6) participants not aware of family history of hypertension can control blood pressure. There were no significant differences in presence of other conditions and family history of hypertension between participants with controlled and uncontrolled blood pressure. None of the p-values were < 0.05 and this may be due to the small sample sizes in the groups.

Compliance with antihypertension medication

Regarding compliance with antihypertensive medication, 39.1% (n=43) of the participants who did not miss doses can control blood pressure and 25.0% (n=4) who did not can control blood pressure. There was no significant association between missed doses and blood pressure control ($\chi 2 = 0.86$, $p = 0.354$).

Lifestyle and dietary habits

As for lifestyle and dietary habits, 37.9% (n=44) of the participants who did not consume alcohol controlled blood pressure while 30.0% (n=3) who did consume alcohol controlled blood pressure. There was significant association between missed doses and blood pressure control ($\chi 2 = 0.86$, $p = 0.354$).

The results showed that 40.7% (n=33) of the participants who consumed fruits over 5 days a week controlled blood pressure while 31.1% (n=14) consumed less than 5 days controlled blood pressure. There was no significant association between missed doses and blood pressure control ($\chi 2 = 0.85$, $p = 0.357$).

Participants were ssked about times of vegetable consumption. Blood pressure was controlled in 36.5% (n=42) among participants who consumed vegetables for over 5 days a week and blood pressure was controlled in 45.5% (n=5) participants who consumed vegetables for less than 5 days. There was no significant association between missed doses and blood pressure control ($\chi 2 = 0.86$, $p = 0.354$).

In terms of salt intake, 45.5% (n=10) participants with salt restriction controlled blood pressure while 35.6% (n=37) without salt restriction controlled blood

pressure.There was significant association between missed doses and blood pressure control ($\chi 2 = 7.60$, $p = 0.006$).

Among the participants with controlled blood pressure, 30.2% (n=13) participants with fat intake restriction controlled blood pressure while 41.0% (n=49) without restriction of fat intake controlled blood pressure. There was no significant association between missed doses and blood pressure control (p=0.197).

Thirty seven percent (n=44) of participants who were doing physical activities or exercises controlled blood pressure and 42.9% (n=3) who did not controlled blood pressure. There was significant association between physical activities/exercises and blood pressure control ($\chi 2 = 5.69$, $p = 0.017$)

Table 5: Distribution of socio-demographic knowledge related, compliance with medication and lifestyle factors in controlled and uncontrolled blood pressure

Variables	Controlled BP N (%)	Uncontrolled BP N (%)	Participants N (%)	P- values*
Blood pressure outcome	**47 (37.0)**	**79 (63.0)**	**126 (100.0)**	**-**
Socio-demographic factors				
Sex				
Female	42 (51.2)	40 (48.8)	82 (100.0)	
Male	5 (13.4)	39 (88.6)	44 (100.0)	**0.026**
Age (years)				
29-39	3(60.0)	2 (40.0)	5 (100.0)	
40-59	24 (52.0)	22 (45.7)	46(100.0)	0.001
60-79	18 (29.0)	49 (73.0)	67(100.0)	
80 and above	2 (25.0)	6 (62.5)	8(100.0)	
Education				
None	11 (30.6)	25 (69.4)	36 (100.0)	
Standard 1-5	23 (53.5)	20 (46.5)	43 (100.0)	0.875
Standard 6-8	7 (28.0)	18 (82.0)	25 (100.0)	
Secondary and above	6 (27.3)	16 (72.7)	22 (100.0)	

Occupation				
Farmer	22 (34.9)	41 (65.1)	63 (100.0)	
Unemployed	12 (54.5)	10 (45.5)	22 (100.0)	
Employed	5 (45.5)	6 (54.5)	11 (100.0)	0.007
Small scale business	5 (26.3)	14 (73.7)	19 (100.0)	
Retired without employment	3 (27.3)	8 (72.7)	11 (100.0)	
Income (MK/month)				
0-50	38 (46.9)	43 (53.1)	81 (100.0)	0.359
51-100	3 (9.1)	30(90.9)	33 (100.0)	
Above 100	6 (50.0)	6 (50.0)	12 (100.0)	
Residence				
Rural	31 (34.4)	59 (65.6)	90 (100.0)	0.085
Urban	16 (44.4)	20 (55.6)	36 (100.0)	
Knowledge related to hypertension				
Other conditions				
None	35 (37.2)	58 (62.8)	94 (100.0)	0.305
Heart disease	7 (41.2)	10 (58.8)	17 (100.0)	
Diabetes mellitus	5 (33.3)	10 (66.7)	15 (100.0)	
Family history of HTN				
None	30 (45.5)	36 (54.5))	66 (100.0)	
Sibling	10 (34.5)	19 (65.5)	29 (100.0)	
Parents	7 (46.7)	8 (53.3)	15 (100.0)	0.359
Do not know	6 (37.5)	10 (62.5)	16 (100.0)	

Medication compliance				
Missed doses				
No	43 (39.1)	67 (60.9)	110 (100.0)	0.354
Yes	4 (25.0)	12 (75.0)	16 (100.0)	
Lifestyle behavior				
Alcohol intake				
Yes	3 (30.0)	7 (70.0)	10 (100.0)	0.535
No	44 (37.9)	72 (62.1)	116 (100.0)	
Fruit consumption				
More than 5 days	33 (40.7)	48 (59.3)	81(100.0)	0.357
Less than 5 days	14 (31.1)	31 (68.9)	45(100.0)	
Vegetable consumption				
More than 5 days	42 (36.5)	73 (63.5)	115 (100.0)	0.354
Less than 5 days	5 (45.5)	6 (54.5)	11 (100.0)	
Salt intake				
Restriction	10 (45.5)	12(54.5)	22 (100.0)	0.006
No restriction	37 (35.6)	67 (64.4)	104 (100.0)	
Fat intake				
Restriction	13(30.2)	30 (70.0)	43 (100.0)	0.197
No restriction	34(41.0)	49 (59.0)	83 (100.0)	
Physical activity				
Doing	44(37.0)	75(63.0)	119 (100.0)	0.017
Not doing	3(42.9)	4(57.1)	7 (100.0)	

*Chi-square test

Conclusion

This chapter has presented factors affecting blood pressure control in patients attending outpatient hypertension clinic. The results of the study showed that sex, age, occupation, salt intake and exercises were the factors significance with blood pressure control in patients attending hypertension clinic at Mwanza District Hospital

CHAPTER FIVE

DISCUSSION, LIMITATION, CONCLUSIONS AND RECOMMENDATIONS

Introduction

A discussion of the study findings, limitations, and recommendations for improving blood pressure control in hypertensive patients is presented. The study identified several factors affecting blood pressure control, however for patients attending Mwanza District Hospital hypertension clinic socio-demographic such as sex, age, occupation and lifestyle such as salt intake and physical exercises / activities were the factors identified to affect their blood pressure control. The discussion focussed on objectives of the study.

However, in this study BP control rate was low (37.3%) and poor control was majority due to lack of systolic blood pressure control. Higher systolic blood pressure levels account for most cases of uncontrolled hypertensive patients occurring particularly in elderly over 60 years because systolic blood pressure continually increases with age. Most participants in the study were above 60 years.

Socio-demographic characteristics of the participants

It can be seen from the results that age, sex/gender and occupation were the socio-demographic characteristics together with lifestyle factors such as salt intake and physical exercises were the factors that were found to be affecting blood pressure control.

Age of participants

Participants aged below 60 years were found to having controlled blood pressure. This suggested that old age might be accountable to poorly controlled blood pressure. The result of the study was consistent with the findings of a study conducted in Thailand

where control rate of hypertension in patients of age between 60 and 75 years was poor at

33.7% and for those older than 75 years was 29.4% (Mandal, 2007). The study confirmed that blood pressure was poorly controlled in elderly participants aged 60 years In Jordanian renal transplant recipient and PREseAP study showed, BP control was poor in elderly greater than 65 years Feyie and Hajito (2014). A possible explanation for poor BP control in this population was due to elderly are highly risky to communicable and non-communicable diseases and may be attributed to the age related changes in arterial stiffness and decreased elasticity. Most of the study participants were above 60 years old. In this study, age was found to be statistically significant factor associated with blood pressure control.

Gender

Blood pressure was more controlled in female participants than in male participants. The results of this study are similar to the findings in Bedele, Southwest

Ethiopia by Lichisa et al (2014), which reported that blood pressure, was found to be more controlled in females than males. However, the results of this study are not in agreement with the findings of studies by Dessie, Asres, Meseret, & Birhanu (2012) in Adam, Ethiopia and in Pakistan by Ahmed et al., (2008) which reported more controlled blood pressure in males than females. It is however important to consider the fact that most of the participants in this study were females and this could confound the comparisons made in the findings between the two genders, and also means generalisation of the findings of the study to both genders should not be taken as the rule. Concerning the reasons behind the disparity in the proportions of the sexes in clinic attendance in this study, better health seeking behaviour in females may be a possible explanation. Indeed a study done in a hypertension clinic in England reported byb Temu (2011) showed that there is a greater drop-out rate of male patients from the clinic compared to female patients during follow up.In a study by Mungati et al., (2012) in Zimbabwe, found that due to societal norms, females are in constant contact with the health delivery system more than men. Additionally, Li et al (2010) in their study titled factors predicting blood pressure control in older Chinese immigrants to the United States of America; women have been reported previously to have higher study participation rates than men. In this study gender was also found to be statistically significant.

Education

The results of this study showed that more controlled blood pressure was in participants who had low education level compared to those with high education level. This may be due to the reason that patients with lower educational level might have more trust in physicians' advice compared to those with higher level of education. In contrast

to studies in Dar es Salaam, Tanzania by Joho (2012); on Praslin Island in South Africa by Edo (2009); in Thailand by Mandal (2009) found that patients with higher educational level might have better understanding of health related issues and better health outcomes of controlled blood pressure. On the other hand, other studies done in Malaysia by Elhadi (2007) and in Kwazulu Natal in South Africa by Addo, Smeeth and Leon (2007) found no association between blood pressure control and educational status of their participants. It is argued that there seem to be some association between education and hypertension, although they are not directly related. However, according to Pandit, Tang, Bailey, Davis, Bocchini et al., (2009) lower education attainment and more limited literacy are important predictors of poorer hypertension knowledge and control.However, education in this study, was not statistically significant factor affecting blood pressure control.

Socio-economic status (occupation, income, education, residence)

Blood pressure was more controlled in participants with low socio-economic status such as participants who were not employed, had low education status, low monthly income and though not much difference regarding residential areas. The results of this study support the findings of a study done in Singapore by Temu (2011) which showed that participants with low socio-economic status were more likely to have more controlled blood pressure. Participants who resided in the rural area had more controlled blood pressure than urban. This finding is in line with a study conducted in Ethiopia by Lichisa et al., (2014) which reported that rural participants had more controlled blood pressure than those who resided in urban area. Contrary to the findings of this, a study done in Zimbabwe by Mungati et al., (2012) found that blood pressure control rates were higher among patients from urban areas. The reason for controlled blood pressure of the

participants in this study may be environmental, cultural, traditional and socioeconomic factors as well as the life style or way of living of resident. Statistical test indicated no significance difference between education, income and residence and blood pressure control of the participants in this study.

Knowledge related to hypertension

Knowledge of hypertension being a lifelong medical condition was poor. Similar results have been reported from Gulf region, Pakistan in a cross-sectional study by Almas et al., (2012) which found gaps in knowledge with regard to factors associated with hypertension control in 110 university students.

In the study, blood pressure was more controlled in the participants with no other conditions. This might be due to the absence of other risk factors that affect the control of blood pressure. In the same line, a study done in Uganda by Temu (2011) reported blood pressure was more controlled in patients with no co-morbidity. Similarly, a study done in Ethiopia by Vergara (2013) showed that co-morbidity affected blood pressure control with those with more than one co-morbid condition which was attributed to the pill burden. Contrary to the findings of this study, in Ethiopia a study by Lichisa et al., (2014) reported blood pressure was more controlled in patients with hypertension and other conditions because participants were afraid of complications from the other conditions. This study also found that participants who had family history of hypertension had poor blood pressure control. Similarly, a study done in Tanzania by Joho (2012) found hypertensive patients with family history of hypertension tend to have poor blood pressure control. It is suggested that this could be based on both genetic factors and the family environment which are likely explained by a combination of

shared environmental and genetic influences, and further numerous environmental factors are indexed by socioeconomic status, which aggregates in families and correlates inversely with blood pressure levels (Elhadi, 2007). Hence family history of hypertension is an important factor worthy noting in hypertensive patients. However, knowledge related to hypertension was not statistically significant in this study.

Compliance with antihypertensive medication

Compliance with antihypertensive medication plays an important role in hypertension control though none of the variables pertaining to compliance with anthypertensive medication was found to be statistically significant in the study. On the other hand, the participants in the study with controlled blood pressure did not miss their antihypertensive doses. This concurs with the findings of Edo (2009) who reported that majority of the respondents with blood pressure control (70.59%) did not skip doses of medications during the previous three days and 29.41% skipped doses. Similarly, a case study conducted in Jordan by Bulatovu et al., (2013) reported more (67%) patients with controlled blood pressure did not miss medications compared.

Joho (2012) reported that a survey in Japan found noncompliance to prescribed medication higher with poor control of hypertension compared with patients with well controlled hypertension (43% vs. 32%). The finding in this study may be supported by the fact that most participants did not miss or skip doses to seek alternative treatment as they believed their drug treatment was effective. The findings demonstrate that participants had put effort in ensuring daily intake of antihypertensive medication. Poor compliance to antihypertensive medication is likely to be one of the factors contributing to the high prevalence of suboptimal blood pressure.

However, the findings revealed that 0.8% of the participants who missed or skipped medication indicated taking double dose next day. Federman (2014) recommended that when a dose is missed, one does not want to double his/her dose. He further reported that the way the drugs are metabolized (absorbed in the body), taking a larger dose will not make up for a missed dose. In a study of 205 people, 90% rated having information on 'what to do if a dose is missed' as very important or important and only 1.5% did not want information on this topic. A USA study found that less than 50% of patients received this information. Health practitioners ought to plan with their patients what to do if a dose is missed. Teaching a patient what to do if a dose is missed and providing strategies to minimise the number of missed doses appears a sensible approach.

On the other hand, Woolston (2015) who observed that every day, millions of people with chronic diseases miss their best chance to control their conditions and improve their health. They may see their doctor regularly, eat right, and exercise, but they skip one of the most important parts of their health plan: their medicine. Overall, 30 to 50 percent of all people with chronic diseases fail to take their medicines as prescribed. Good information can be both an aid and a powerful motivator for patients who want to get the most out of their medications. Patients need to know the real benefits and risks of every medication.

Lifestyle and dietary habits

The results indicated that most participants with controlled blood pressure did not consume alcohol. The average number of drinks consumed per day was 2. The findings are in agreement with Mandal (2009) who observed that moderate amounts of alcohol, two drinks daily for men and one drink daily for women, may not significantly increase

blood pressure and, compared to nondrinkers, may actually decrease blood pressure in women. Moreover, moderate consumption of alcohol has been associated with significant reductions in the risk of coronary heart disease, ischemic stroke, and overall mortality.

Participants who consumed fruits and vegetables for over 5 days a week in this study had more controlled blood pressure. More participants consumed fruit and vegetables than fatty and salty food. The reason might be their awareness regarding dietary habits following advice from health workers. However, a majority reported the adding salt and fats to cooked food. Participants were asked about their dietary habits in terms of types of food and frequency of consumption. World Health Organisation (2011) have recommended fat diets , sodium consumption not more than 2300gm per day , and fruit and vegetable consumption 400 to 800gm per day in hypertensive patients. However, participants' consumption of fat, salt, fruit and vegetables were not calculated in terms of amount or quantity as recommended by World Health Organisation. It was therefore very difficult to establish a cut-off point to classify them according to amounts consumed. This causes difficulty in assessing the actual amount of food consumption. A diet rich in fruits and vegetable has a potent antihypertensive effect (Edo, 2007). On the other hand, Lee, Park and Kwon (2010) proposed the following lifestyle and dietary habit changes: consume a diet rich in fruit and vegetables at least five servings per day. Combining a diet rich in fruits and vegetables (and hence potassium) according to Greene (2009) has been shown to decrease blood pressure.

In this study, participants who were doing physical activities or exercises for more than 4 days a week were among the participants with more controlled blood pressure. In the same line, a pooled analysis of controlled trials by Agudo (2005) showed that

participants who did exercises had significantly reduced blood pressure by an average of 3.8 mm Hg for systolic blood pressure and 2.6 mm Hg for diastolic blood pressure. In fact, experts recommend the performance of exercises for 30-60 minutes at least 3 times a week in order to lower blood pressure (Mandal, 2009). A study in Sweden according to Elhadi (2007) affirmed that increasing exercise was found to be associated with hypertension control while a sedentary life style is associated with poor blood pressure control. World Health Organisation (2010) proposed the following lifestyle and dietary habit changes: engage in regular physical activity 30 or more minutes per day for most of the days per week. Thus this study has shown that effective lifestyle modification is associated with hypertension control.

However, salt intake and physical exercises were the only lifestyle factors which were found statistically significant with blood pressure control in the study.

Limitations of the study

This study was conducted in government owned health facility at Mwanza District Hospital and did not include patients who attended private clinics and health centres. It cannot be assumed that the responses expressed by participants in this study would be similar to those attending private clinics and health centres. The small sample size and the research settings, limits the generalizability of the study findings beyond the study population such as whole country of Malawi. Moreover, only diagnosed hypertensive patients who were registered at the clinic participated in the study. Thus patients who were not registered or are yet to be diagnosed were excluded in this study. However, the sample was representative of the clinic attendees with regards to the general characteristics assessed in this study.

Conclusion

The main objective of this study was to assess the factors that significantly affect tha blood pressure control among hypertensive patients attending outpatient hypertension clinic. Hypertension and its consequent complications are currently the growing disease in the world. Atleast, 33% of adult Malawians (18 years and above) suffer from hypertension or 8.9% its consequent complications. The control rate of hypertension in Mwanza is low at 37.3%.

The results from the study show that statistically significant variations exist in most of the variables selected for the study. Results suggest it is difficult to control hypertension as people age and with gender difference. Occupation, salt intake and physical exercises had effects on hypertension. The findings of the study emphasised the importance of maintaining the care and control of blood pressure among hypertensive patients and suggest reducing occupational stress, reducing salt intake and regular physical exercises may help reduce blood pressure among hypertensive patients.

Recommendations

Based on the results of the study, recommendations have been made to help improve patient care and management. Recommendations have been made to strengthen community health nursing / clinical practice, education, management and future research.

Practice

The findings of the study revealed that age, sex, occupation, salt intake and exercises were the factors affecting blood pressure control in the the study participants. Therefore:

- Community health workers and other stakeholders should use the findings to promote information, education and communication campaign for raising comprehensive knowledge on factors affecting blood pressure control in hypertensive patients. Emphasis needs to be on the identified factors and this should include education of the patients about hypertension in general and on the importance of blood pressure control

- Community health nurses, health workers and all stakeholders need to stress that hypertension is lifelong medical condition and that the drug treatment is for life.
- Community health nurses should be able to provide services in a patient-oriented manner taking into account the identified factors presented and discussed above.
- Community health volunteers with the appropriate training can be trained and mobilized to reach out to clients in the community.

Education

- The content of both pre-service and in-service community health nursing education should be strengthened based on the Malawi Standard Treatment Guidelines and evidence based knowledge, skills and appropriate attitudes on importance of having comprehensive knowledge of hypertension for quality management of hypertension.

Management

- Community health practitioners should have access to the guidelines which can assist them in the provisional of optimal evidence based hypertension information, education and communication on hypertensive patient's management.

- Communication materials on the identified factors such as age, occupation, knowledge of hypertension symptoms and importance of attaining the goal of blood pressure control that can be displayed and provided to the patients and community population should be developed from the guidelines to ensure that hypertensive patients have easy access to information about the evidence based practices.
- The decision or policy makers should use the findings to effectively plan and develop the best evidence-based policies and strategies for improving hypertension health care, empowering hypertensive patients and communities.

Research

Improving blood pressure control is essential to achieving the goal of blood pressure target. The following aspects require further research:

- Community health workers, researchers and other stakeholders should lobby for funds to conduct surveys of population-based on hypertension in the communities and the country at large. Such surveys would provide useful information for policy makers to evaluate trends over time.
- Qualitative research should be conducted to obtain much more detailed information about factors that affect blood pressure control; it is presumed that not all factors that affect blood pressure control were studies.

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APPENDICES

Appendix 1: Questionnaire – English Version

Participant No. ---------Facility name: ----------Date of Interview----------

Section A : Socio-Demographic Information **Last blood pressure check-up readings……**			
QUESTIONS		**RESPONSE**	**COMMENT**
S1	Gender of the participant	Male ……1 Female……...2	Record as observed
S2	How old are you? (Years)	18-29…….……...1 30-44…….....2 45-54…….....3 55-64…….4 65-74…….5 75 and above…….6	
S3	What is your marital status?	Married ……...1 Widowed ……2 Divorced …….....3 Single ……..……4	
S4	What is the highest level of education you have	None ----------1 Std 1-5 ----------2	

	completed?=	Std 6-8----------3	
		Secondary and above ----------4	
S5	What is your occupation?	Farmer----------1	
		Retired without occupation-----2	
		Small scale business----------3	
		Unemployed ----------4	
		Employed----------5	
S6	What is your average income? (Malawi Kwacha MK)	0-50,000.00----------1	Indicate amount and circle one among the amount
		51,000.00-100,000.00…….2	
		Above 100,000.00----------2	
S7	Where is your place of residence?	Urban……..…….1	
		Rural ……..……...2	
Section B: Knowledge on Hypertension			
K1	Are you aware that you have hypertension?	Yes…….……..1	
		No……2	
K2	When were you told that you have hypertension?	Over 5 years ago…….1	
		Less than 5 years ago…..2	
K3	What are the complications of hypertension?	Breathing problems…….1	Mention all you know
		Heart attack leading to death……..2	

		Visual problems……3 Paralysis of limb……..4 Kidney problems…….5 Others……..6	
K4	Mention important factors for your BP control	Reduce fat intake……..1 Resttrict salt intake…….2 High vegetable and fruit intake…….……...3 Engage in physical activity/exercise……4 Avoid tobacco smoking....5 Avoid excessive intake of Alcohol ……6 Avoid psychological stress……7 Comply with antihypertensive medication……8 Change of diet……..…9 Do not know……..….10 Others…….11	Mention all you know
K5	What are the symptoms of hypertension?	Headache……..1 Blurred vision……...2 Shortness of breath……...3	Mention all you know

		Dizziness……...4 Excessive sweating……..5 Chest pains…….....6 Asymptomatic……...7	
K6	Hypertension is a lifelong disease?	Yes……...1 No……2	
K7	Antihypertensives have to be taken for life	Yes……1 No……2	
K8	Do you know the importance of blood pressure control?	Yes……1 No……2	
K9	Mention any presence of other conditions	None……1 Heart disease……2 Diabetes mellitus……3 Others……..4	
K10	Who in your family has raised blood pressure?	None …….1 Siblings (sisters, brothers, aunt, cousin, grandparents)……2 Parents (father, mother)…3 Don't know……..…..…4 Paralysis of a limb……2	

		Sudden death due to Heart attack…….3 Breathlessness……4 Visual problems……5 Don't know……...6 Others (specify)……....7	
K11	When did you last have your BP checked?	Within 3 months ago……1 3 months ago…….....2 Don't know……...3 Do not remember.……..…4 Have never been checked.5	
SECTION C: **Medication Compliance**			
C1	Do you comply with your antihypertensive medication as prescribed?	Yes……...1 No……2	If no, go to C4
C2	How many times per day do you take your BP medication?	Once ……...1 Two times …….…….2 More than two times ……...3 Zero……..4	
C3	How many tablets do you take specific to your	One …….1 Two ……2	

	hypertensive condition?	More than two……..…3 Other (specify)…….4 Don't know……..5	
C4	Give reasons why you do not complying with your antihypertensive medication.	The nature/schedule of your work makes it impossible…...2	
		Cannot swallow medications..3	
		Medications you are taking are too many…….4	
		Fear of side effects……5	
		Fear of addiction……..6	
		Religious beliefs……7	
		The doctor changes the type of medicine frequently……8	
		The doctor changes the dosage frequently……9	
		Want to try out alternative remedies…….10	
		I stop when I feel better…….11	
		I stop when I feel worse……12	
		Forget to take medications….13 Others (specify)…..……14	
		Two…….……...2	

		Three…….....3	
		Others specify)…..……....4	
		Don't know.....… 5	
C5	What do you do when you miss a dose of medication	Take it as soon as you remember/skip it if the time is close to the next dose……..…..1	
		Forget it completely……2	
		Take a double dose the following day…….……....3	
		Others (Specify)…….....4	
		Don't know……..5	
C6	Do you attend your clinic appointment days as scheduled?	Yes……1	If yes, go to T1
		No……...…..2	
		If no, why? Far from my home……1	
		Lack of transport……..…2	
		Forgetfulness……..…3	
		Other (Specify)…….....4	
SECTION D:**Lifestyle Behaviuor**			

Tobacco Use			
T1	Do you currently smoke or use smokeless (snuff, chewing) tobacco products?	Yes……1 No…….2	If no, go to A1
T2	**If Yes**, Do you currently smoke, snuff or chew tobacco products daily?	Yes…….1 No……..2	If no, go toT4
T3	On average, how many of the following do you smoke, chew, snuff each day?	Manufactured cigarette……1 Hand- rolled cigarettes…..…2 Pipes full of tobacco……..3 Others (specify……..4 Don't remember…….5 Smokeless tobacco……6	Record for each type
T4	How **long ago** did you stop smoking, snuff, chew daily?	Years ago…….1 OR Months ago…..……..2 ORWeeks ago……..…….3 Don't know……..……..…4	(Record only 1 not all 3)
Alcohol Consumption:			
A1	Did you consume alcohol	Yes……....1	If no, go to DI

	last three months?	No……..2	
A2	What is the type of beer do you drink?	Kachasu…….....1 Masese ……..2 Chibuku …….....3 Bottled beer e.g Carlsberg…….4 Others (specify)…….5	
A2	**How frequently** have you had at least one drink?	Daily……..1	
		5-6 days per week…….2	
		3-4 days per week…….3	
		1-2 days per month……...4	
		Less than once a month……5	
		Others(specify)……..…..6	
A4	How many drinks do you	Number……..…1	

	have in a day? Glass/ bottle	Don't know……..….2	
A5	During each of the **past 7 days,** how many standard drinks of any alcoholic drink did you have each day?	Monday……...1 Tuesday……...2 Wednesday……..…3 Thursday……..4. Friday……..….5 Saturday……..….6 Sunday……..…7 Don't know----------9	
A6	In the past 3 months, what was the **largest number** of drinks you had on a single occasion, counting all types of standard drinks together?	Largest number----------1 Don't know----------2	

A7	In the past 3 months, on how many days did you have **2 or more** standard drinks in a single day?	Men Number of days…1	Female	
		Don't know…….2		
Diet:				
D1	In a week, on how many days did you **eat fruit**?	Number of days----------1	If zero days, go to D3	
		Don't know----------2		
D2	How many **servings** of fruit do you eat on **one** of those days?	Number of servings----------1		
		Don't know----------2		
D3	In a week, on how many days did you **eat vegetables?**	Number of days----------1	If zero days, go to D5	
		Don't know----------2		

D4	How many **servings** of vegetables did you eat on one of those days?	Number of servings----------1 Don't know----------2	
D5	What type of **oil or fat is most often** used for meal preparation in your household?	Vegetable oil----------1 Animal fat----------2 Margarine----------3 Other (specify)----------4 None in particular----------5 None used----------6 Don't know……...….**...**7	Select only one
D6	Do you add / sprinkle salt to cooked food?	Yes……1 No……..2	
Physical Activity:			
P1	Does your work involve vigorous-intensity activity for 20-30 minutes continuously a day?	Yes----------1 No----------2	If no, go to P4
P2	In a week, on how many days did you do vigorous-intensity activities as part of your work for over 4	Number of days……..….1	

	days in a week?		
P3	How much time do you spend doing vigorous-intensity activities at work on a normal day?	Hours----------1 Minutes----------2 Do not know……3	
P4	Does your work involve moderate-intensity activity for 20-30 minutes continuously a day?	Yes----------1 No----------2	If no, go to P7
P5	In a week, on how many days do you do moderate-intensity activities as part of your work?	Number of days----------1	
P6	How much time do you spend doing moderate-intensity activities at work on a typical day?	Hours----------1 Minutes----------2 Minutes……2	

Physical exercises			
P7	Do you do any vigorous-intensity sports, fitness or recreational (Leisure) activities that cause large increases in breathing or heart rate like [running or football,] for at least 20-30 minutes continuously a day?	Yes----------1 No----------2	If no, go to P13
P8	In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational (leisure) activities?	Number of days----------1	
P9	How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?	Hours----------1 Minutes----------2	

P10	Do you do any moderate-intensity sports, fitness or recreational (leisure) activities that causes a small increase in breathing or heart rate such as brisk walking,(cycling, swimming, volleyball)for at least 20-30 minutes continuously?	Yes----------1 No----------2	If no, go to P16
P11	In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational (leisure) activities?	Number of days----------1	
P12	How much time do you spend doing moderate-intensity sports, fitness or recreational (leisure) activities on a typical day?	Hours----------1 Minutes----------2	

Sedentary behavior			
P13	How much time do you usually spend sitting or resting on a typical day?	Hours----------.-1 Minutes----------2	

THANK YOU FOR TAKING PART IN THIS STUDY

Appendix 2: Questionnaiire ya Chichewa

Gawo loyamba : Mbiri ya otenga nawo mbali pakafukufuku (Socio-demographic)			
Funso		**Yankho**	**Ndemanga**
S1	Oyankhayo ndi Mwamuna kapena mkazi	Mwamuna……..……..1 Mkazi……..2	Yang'anani ndipo lembani
S2	Kodi muli ndi zaka zingati?	18-29 ……....……..……1 30-44……...……..2 45-54…….....…….….3 55-64……...……..4 65-74……..……...5 75 komanso kuposa…….…6	
S4	Kodi muli pabanja?	Apabanja…….....……1 Wamasiye.…….……..2 Unatha…….……3 Sindinakwatiwe……..4	
S3	Kodi sukulu munasiyira kalasi iti?	Sindinaphunzire……..…...1 Std 1-5…….....2 Std 6-8…….....….3 Sekondale kapena kuposa…….4	

S4	Kodi mumagwira ntchito yanji?	Mlimi----------1	
		Ndinapuma sindiri pantchito----2	
		Buzinezi----------3	
		Sindili pa ntchito----------4	
		Ndili pantchito----------5	
S5	Kodi mumapeza ndalama zochuluka bwanji? (Malawi Kwacha MK)	0-50,000.00……..1 51,000.00-100,000.00…….2 Kuposera 100,000.00……..3	
S7	Mumakhala kuti?	Mutauni----------1 Kumudzi ----------2	
SECTION B: Zodziwika za matenda othamanga magazi (Knowledge)			
K1	Kodi mumadziwa kuti muli ndi nthenda yothamanga magazi?	Eya……..……..1 Ayi……..2	
K2	Chiuzidwile za nthendayi, mwakhala nayo zaka zingati?	Kuposera zaka zisanu zapitazo.1 Kuchepera zaka zisanu zapitazo…….2	
K3	Zobvuta/zotsatila za	Kupuma mobvutika……..1	

	matenda othamanga magazi ndi ziti? Tchulani zones zomwe mukudziwa.	Matenda a mtima…….….2 Maso saona bwino……....3 Kupuwala miyendo…….…..4 Matenda a impsyo…….…5 Zina Itchulani)……6	
K4	Mungapange bwanji kuti muteteze kuthamanga kwa magazi anu kusapose muyezo?	Kuchepetsa kudya za mafuta…1 Kuchepetsa kudya za mchere…2 Kudya ndiwo zamasamba ndi zipatso zambiri……..3 Kuchita masewere olimbitsa thupi…….…….4 Kupewa kusuta fodya……....5 Kupewa kumwa mowa kwambiri…….….6 Kupewa kukhala ndi nkhawa…7 Kutsata ndondomeko yakamwedwe ka mankhwala oteteza kuthamanga kwa magazi……...8 Kusintha kadyedwe ka zakudya…….9 Sindikudziwa……10	
K5	Tchulani zizindikiro za	Kupweteka kwa mutu……...1	Tchulani zones zomwe

	kuthamanga kwa magazi	Kusaona bwino……..2 Kubanika popuma……...…..3 Chizungulire……..4 Kuhita thukuta kwambiri…..…5 Kupweteka pa chifuwa……..6 Kulibe zizindikiro……..…...…7 Zina tchulani…...……..8	mukudziwa
K6	Matenda othamanga magazi ndi matenda omwe munthu amakhala nawo moyo wake wonse	Ey……..1 Ayi…..……..2	
K7	Mankhwala ochidzira matenda othamanga magazi amamwedwa moyo wonse	Eya……..……...……..1 Ayi…….2	
K8	Kuchinjiriza kuthamanga kwa magazi nkofunika pa umoyo wabwino	Eya……...……1 Ayi…….2	
K9	Kodi munauzidwapo kuti muli ndi matenda ena kupatula matenda othamanga magazi? tchulani	Ndilibe m……..…1 Matenda a mtima……...2 Matenda a shuga…...……3 Ena tchulani……..……...4	Ngatie eya, tchulani. Ngati ayi pitani funso K10

K10	Ndani mubanja lanu amadwala matenda othamanga magazi?	Palibe….....1 Achibale (abale , alongo, azakhali, asuwani, agogo, amalume)…….2 Makolo (bambo, mai)……. ….3 Sindikudziwa ……4	
K11	Kodi mukuona kuti chimapangitsa kukwera kwa kuthamanga magazi anu ndichiyani?	Kusazindikira……1 Kusatsatira ndondomeko ya malangizo ndi kamwedwe ka mankhwala……2 Zochitikachitika zatsiku ndi tsiku za moyo monga zakudya ngati zochuluka mafuta, mchere, kuchepetsa kudya zipatso komanso ndiwo za masamba……..3 Kusuta fodya …..……4 Kumwa mowa mowirikiza…..5 Kusatakataka kapena kusachita masewera olimbitsa thupi…..6 Zina (tchulani)…….……7	
K12	Kodi ndi liti mwayezetsa	Mkatikati mwa miyezi itatu	

	kuthamanga kwa magazi anu komaliza?	yapitayo……..….1 Papita miyezi itatu itatu yapitayo…….2 Sindikudziwa/sindikukumbukira ……3 Sindinayezedwepo ……..….4	
SECTION C: **Ndondomeko yakamwedwe ka mankhwala**			
C1	Kodi mumamwa mankhwala anu othamanga magazi kangati patsiku?	Kamodzi. ……..……....1 Kawiri.……...…..….2 Kupitilira kawiri ……..3 Ena (Tchulani)……..……4	
C2	Mumamwa mankhwala angati a matenda anu othamanga magazi?	Amodzi. ……. ..1 Awiri. …….…....2 Opitilira awiri…….……....3 Ena (tchulani))……..…….4 Sindikudziwa…..……..5	
C3	Kodi mumamwa mankhwala anu m'mene mumauzidwira?	Eya……...……1 Ayi……..……...2 Ngati ayi, chifukwa chiyani?	Ngati eya, pitani pa C4

		Sindimakonda kumwa mankhwala……1 Ntchito imandisokoneza ndondomeko yakamwedwe kamankhwala ……...2 Ndimalephera kumeza mankhwala……3 Mankhwala omwe ndimamwa ndi ambiri……..…4 Ndimaopa zotsatira zosakhala bwino za mankhwala…….5 Ndimaopa kuzoloweza thupi....6 Chikhulupiriro cha chipembedzo …….……7 Adokotala amasithasitha mtundu wa mankhwalawo pafupipafupi …….…….8 Adokotala amasitha-sitha kuchuluka kwa kamwedwe kamankhwala……9 Ndikufuna kuyesera njira zina……..……10 Ndimasiya ndikona kuti	

		ndikupeza bwino……..11 Ndimasiya ndikaona kuti sindikupeza nawo bwino.....…….12 Ndimaiwala kumwa……13 Zina (tchulani) ……14	
C4	Kodi mwaduphitsako mankhwala kangati osamwa mulungu umodzi wapitawo?	Kamodzi ……..……1 Kawiri ……..…..…….2 Katatu……...3 Kena (tchulani) ……..... 4 Sindikudziwa ……..… 5	
C5	Mumatani mukakhala kuti munaiwala kumwa mankhwala anu?	Ndimamwa ndikangokumbukira/ kapena ndimangosiya ndikaona kuti nthawi yomwa mankhwala ena ili pafupi …….1 Ndimangosiya samwanso…….2 Ndimamwa mankhwala amasiku	

		awiri tsiku lotsatira……..…….3 Zina (Tchulani)…….4 Sindikudziwa…..……....5	
C6	Mankhwala anu atsala angati omwe munaladira oti mumwe a mwezi wantha?	Amodzi ……...…..1 Awiri……..2 Atatu. …….3 Kupitilira atatu……4 Zero……....5 Sindikudziwa ……..……..6	
C7	Kodi mumatsatira masiku omwe amakupatsani obwerera ku kiliniki?	Eya……1 Ayi……..…..….2 Ngati Ayi, chifukwa? Kutalikira ndikomwe dimakhala……1 Kusowa mayendedwe…….…2 Ndimaiwala……...3 Zina (tchulani)……...4	Ngati eya, pitani pa T1
SECTION D: **Zamoyo watsiku ndi tsiku** **Kusuta fodya**			
T1	Kodi mumasuta fodya/ kapena opera?	Eya……1 Ayi……2	Ngati ayi, pitani ku A1

T2	Kodi mumasuta fodya tsiku lililonse?	Eya……1 Ayi……2	Ngati ayi, pitani pa T4
T3	Kodi mumasuta ndudu zingati za fodya patsiku?	Fodya wogula…….....1 Wopota pamanja…….…….....2 Fodya wa mupaipi……..3 Wopera……4 Wina (tchulani)…….....5 Sindikukumbukira……....6 Sindikudziwa…….....7	Lembani pawina aliyense
T4	Munasiya liti kusuta fodya tsiku lililonse?	Papita zaka……1 Kapena miyezi yapita…….2 Kapena milungu yapita...……..3 Sindikudziwa ……..…….4.	(lembani pamodzi pokha osati monse mutatu)
Za kumwa mowa			
A1	Kodi, munamwa mowa miyezi itatu yapitayo ?	Eya ……1 Ayi ……...2	Ngati ayi, pitani pa DI
A2	Munamwa mowa wamtudu wanji?	Kachasu……1 Masese…….……..2	

		Chibuku…….3	
		Kazibeki……4	
		Wina (tchulani)……..5	
A2	Kodi miyezi itatu yapitayi mumamwa mowa mowilikiza bwanji?	Tsiku lililonse ……..……....1	
		Masiku 5-6 pamulungu…….2	
		Masiku 3-4 pa mulungu…….3	
		Masiku 1-2 pa mwezi……..…..4	
		Kuchepera kamodzi pa mwezi..5	
A3	Kodi mumamwa **mowa wochuluka bwanji pa tsiku** (mabotolo, mapaketi, zipanda)?	Nambala……1	Ngati nambala ikudziwika, pitani pa A6
		Sindikudziwa …..……..2	
A4	**Mulungu wapitawo**, munamwapo mowa wochuluka bwanji?	Lolemba …..…….……1	
		Lachiwiri…..……2	
		Lachitatu……..……....3	

		Lachinayi…….……..……...4 Lachisanu…….....5 Loweluka..……..……...6 Lamulungu…...……..7 Sindikudziwa..……8	
A5	Kodi miyezi itatu yapitayi tsiku lomwe mudamwa mowa kwambiri **mudamwa mowa wochuluka** bwanji? (mabotolo, mapaketi, zipanda…)	Nambala yokulitsitsa…….1 Sindikudziwa…….....2	
A6	**Kwa Abambo okha:** Mwezi wapitawo, ndi masiku angati omwe mudamwa mowa wochuluka mabotolo, mapaketi, zipanda **zokwana ziwiri kapena kupitilirapo**?	Abambo Nambala yamasiku	Amayi
Za zakudya.			

D1	Ndimasiku angati pamulungu amene **mumadya zipatso**?	Nambala ya masiku……..1 Sindikudziwa…….2	ngati paliba masiku, pitani pa D3
D2	Pamasiku amenewa **mumadya zipatso kangati patsiku?**	Nambala ya nthawi zakadyedwe……..…1 Sindikudziwa…….2	
D3	Ndimasiku angati pamulungu amene mumadya **ndiwo Zamasamba?**	Nambala ya masiku……..…1 Sindikudziwa----------2	Ngati palibe masiku, pitani pa D5
D4	Pamasiku amenewa mumadya ndiwo zamasamba kangati patsiku?	Nambala ya nthawi zakadyedwe……..1 Sindikudziwa……2	
D5	Mumagwiritsa ntchito mafuta ophikila a	Mafuta a masamba----------1 Mafuta amunyama----------2	Sankhani chimodzi

	antundu wanji?	Magalini----------3 Ena (tchulani)----------4 Palibe enieni----------5 Palibe omwe timagwiritsa ntchito----------6 Sindikudziwa…….……7	
D6	Kodi mumaonjezera mchere muchakudya chophikaphika?	Eya…….1 Ayi……..2	
D7	Kodi kawirikawiri mumadya chakudya chotani?	Ndiwo za masamba……1 Zipatso …….…..2 Chakudya cha mafuta……3 Chakudya chomwe chiri ndi mchere ……..…...…4 Zina (tchulani)……...5	
Za ntchito zimene mumagwira:			
P1	Kodi ntchito yomwe mumagwira ndiyokhetsa thukuta ?	Eya----------1 Ayi----------2	Ngati ayi, pitani pa P4
P2	Pamulungu, ndi masiku angati amene	Nambala ya masiku…….1	

	munagwira ntchito yokhetsa thukutayi phindi 20 kapena 30?		
P3	Pa tsiku, kodi mumagwira ntchito yo khetsa thukutayi phindi zochuluka zingzti?	Maora----------1 Maminitsi/mphindi----------2	
P4	Kodi ntchito imene mumagwira ndi yopepukirapo Zotero yomwe imatengapo mphindi 20 kapena 30?	Eya----------1 Ayi----------2	Ngati ayi, pitani pa P7
P5	Pamulungu, ndi masiku angati amene mumagwira ntchito yopepukirapo?	Nambala ya masiku----------1	
P6	Pa tsiku, kodi mumagwira ntchito yopepukirapo nthawi yochuluka bwanji?	Ma ora----------1 Maminitsi/mphindi----------2	

P7	Kodi mumayenda pansi kapena pa njinga ya kapalasa popita monga kuntchito, kutchalitchi, kumsika ndi kwina kotero nthawi yokwanira mphindi 20 kapena 30??	Eya----------1 Ayi----------2	Ngati ayi, pitani pa P10
P8	Pamulungu, kodi ndi masiku angati amene mumayenda pansi kapena pa njinga ya kapalasa kokwanira mphindi 20 kapena 30?	Nambala ya masiku----------1	
P9	Pa tsiku, kodi ndi nthawi yotalika bwanji yimene mumayenda pansi kapena pa njinga ya kapalasa?	Ma ora----------1 Maminitsi/mphindi----------2	
za masewero olimbitsa thupi zomwe timachita panthawi yosangalala.			
P10	Kodi mumapanga		Ngati ayi, pitani pa P13

	masewera olimbitsa thupi kwa mphindi 20 kapena 30 mwakathithi patsiku?	Eya----------1 Ayi----------2	
P11	Pa mulungu, kodi ndi masiku angati amene mumapanga masewera olimbitsa thupi kwa nthawi yokwanira mphindi 20 kapena 30 patsiku?	Nambala ya masiku----------1	
P12	Pa tsiku, kodi ndi nthawi yo chuluka bwanji imene mumatenga kupanga masewera olimbitsa thupi?	Ma ora----------1 Maminitsi/mphindi----------2	
P13	Kodi mumachita masewela olimbitsa thupi opepukilako monga kupalasa njinga, kusambila, kusewela volleyball pa	Eya----------1 Ayi----------2	Ngati ayi, pitani pa P16

	nthawi yopitilila mphindi 20 kapena 30 osapuma pa tsiku?		
P14	Pamulungu mumachita masewela olimbitsa nthupi opepukilako?	Nambala ya masiku----------1	
P15	Pa tsiku, kodi mumatenga nthawi yaitali bwanji mukuchita masewelawa?	Ma ora----------1 Maminitsi/mphindi----------2	
Nthawi yokhala pansi kupuma			
P16	Patsiku ndi nthawi yaitali bwanji mumangokhala pansi osachita china chilichonse mutakhala pampando (kumawelenga, kuonela ma filimu, kusewela bawo)	Ma ora----------1 Maminitsi/mphindi----------2	

Nambala ya oyankha ----------Dzina la chipatala: ----------Tsiku-----

Xxxxxxxxxxxxxxxxx KUMALIZA KWA MAFUNSO xxxxxxxxx

ZIKOMO POTENGA MBALI

Appendix 3: Participant information sheet and Consent form (English)

PART 1: Information sheet

A study on factors affecting blood pressure control in patients attending outpatient hypertension clinic, Mwanza District Hospital

Greetings and welcome! My name is Gertrude Masinga. I am a student at the Kamuzu College of Nursing. As part of the academic requirements, I am conducting this study and will ask questions to patients attending hypertensive clinic. It is important for you to understand why the research is being done and what it will involve before you decide to participate in the study.

Introduction

Brief description of hypertension and complications of uncontrolled hypertension.

Hypertension is a medical condition in which blood pressure is chronically elevated. To consider a person as hypertensive the blood pressure should be equal to or more than 140/90 mmHg. Complications of uncontrolled hypertension are kidney problems, paralysis of a limb, breathlessness on exertion or at rest, sudden death due to heart attack, heart palpitations and many more.

Purpose of the study

The aim of this study is to assess factors affecting blood pressure control in patients attending hypertension clinic at this health facility, as a partial fulfillment of my Master's

degree qualification. This survey involves answering some questions related to your socio-demographic characteristics, your knowledge on hypertension, your compliance to antihypertensive treatment, and your lifestyle factors to blood pressure control. As patient with hypertension, your opinion may therefore help the researcher to make recommendations to Ministry of Health and other stakeholders that will improve the practice and guidelines of care for patients with hypertension here in Mwanza and Malawi as a whole, and ultimately improve your quality of life.

Risk-The researcher will use questionnaire to ask you about factors affecting blood pressure control among patients attending hypertension outpatient clinic. The questions will last 20 to 30 minutes and will not cause you any physiological, financial or psychological harm.

Convenience selection-You have been conveniently selected to be part of this survey and this is why I would like to interview you. The survey is currently taking place in Mwanza district only in the country.

Rights-May I also stress that participation in the study is entirely voluntary and you may decide not to participate or to withdraw from the study. Should you withdraw from the study, be assured that this will not affect the services you normally receive at this healthy facility. If you agree to take part you will be asked to sign a consent form.

Confidentiality – The information you provide is totally confidential and will not be disclosed to anyone. It will only be used for purposes of the study. Your name, address,

and other personal information will be removed from the questionnaire, and only a code will be used to connect your name and your answers without identifying you.

Voluntary participation- Your participation is voluntary and you can withdraw from the survey after having agreed to participate. You are free to refuse to answer any question that is asked in the questionnaire.

Benefits- Although you may not obtain immediate direct benefit by participating in this study, it is anticipated that the outcome of this study will influence policy makers and practice designing interventions that will improve the hypertension program. This will help to promote quality of life of those affected with hypertension.

Who to contact for further information: If you have any questions about this study you may ask me (Gertrude Masinga Cell 0888102128 or contact Dr Ezereth Kabuluzi (Cell 0995 984 612) both from Kamuzu College of Nursing, Private Bag 1, Lilongwe or College of Medicine Research and Ethics Committee (COMREC) Secretariat, Private Bag 360, Blantyre. The questionnaire and responses will be destroyed at the end of the study.

PART 2: Consent Form (English)

PLEASE READ AND SIGN THIS FORM IF YOU ARE TAKING PART IN THIS STUDY

1. I have read and (or have been read to me) the attached information sheet for this study and have understood the purpose of the study and the problem involved.
2. I agree to voluntarily participate in the study, be questioned and provide answers to the best of my knowledge. I understand that I am free to withdraw any time without giving reasons and be assured that this will not affect the services I normally receive at this healthy facility.
3. I know that I do not have to suffer any injury or harm during the research process. The information that I will give to the researcher should not be used against me in future.
4. I understand that my information will be kept confidentially and will only be accessed by the researcher or those people directly concerned with this study
5. I understand that I will not benefit financially
6. I know how to contact the researcher if I need to.
7. I hereby provide INFORMED CONSENT to take part in the study.

Participant name:		Signature:		Date:
Witness:		Signature:		Date:

THANK YOU FOR TAKING PART IN THIS STUDY

Appendix 4: Participant information sheet and consent form (Chichewa)

GAWO 1: Information sheet

Kafukufuku wa za umoyo wokhudza matenda othamanga magazi pa chipatala chachikulu m'boma la Mwanza

Moni ndipo mwaladiridwa. Dzina langa ndi Gertrude Masinga. Ndine wophunzira pa sukulu ya ukachenjede ya a namwino ya Kamuzu College of Nursing, ku Lilongwe. Mwazofunikira zina pa maphunziro anga a anamwino azaumoyo a anthu a ku mudzi ndikuchita kafukufuku. Ndikofunika mubvetse bwino chifukwa chomwe ndikuchitira kafukufukuyu ndi zomwe zingafunike musanatenge nawo gawo mukafukufukuyu.

Mau oyamba:

Mwachidule tanthauzo la matenda othamanga magazi amgonagona ndi zobvuta zomwe zingadze chifukwa cha matendawa .

Nthenda yothamanga magazi ndi nthenda yomwe kathamangidwe kamagazi kamakhala kochuluka kapena kokwera kwa nthawi yaitali kapena kwa mgonagona. Kuti munthu apezedwe kuti ali ndi nthendayi, magazi ake amayenera kukhala okwera pa mulingo kapena kuposera 140/90.

Zobvuta zomwe zingadze chifukwa cholephera kubwezeretsa kathamangidwe ka magazi muyezo obvomerezeka ndi monga kupezeka ndi mabvuto a ipsyo, kulumala mwendo kapena mkono, kubanika kapena kubvutika ndi kupuma nthawi yogwira ntchito kapena ayi, kuthamanga mtima, kumwalira mwadzidzidzi ndi mabvuto a mtima, ndi zina zambiri

Cholinga cha kafukufukuyu: Cholinga cha kafukufukuyu ndikufuna kudziwa zinthu zomwe zimalepheretsa kutsitsa kuthamanga magazi mwa anthu omwe amayendera kiliniki ya anthu odwala kuthamanga magazi pa chipatala chino cha Mwanza boma, monga gawo limodzi la maphunziro a ukachenjede wanga. Mukafukufukuyi mufunsidwa mafunso okhudzana ndi za inu eni, zomwe mukudziwa za matendawa, m'mene mumamwera mankhwala anu oteteza kukwera kuthamanga magazi, komanso za moyo wanu watsiku ndi tsiku pofuna kuteteza kuthamange kwa magazi anu. Monga inuyo odwala matenda othamanga magazi, maganizo anu athandizila kuthekera kupeleka mfundo ku unduna wa zaumoyo ndi ena okhudzidwa womwe angathandize kupeza njila zoyenela zothandizila anthu odwala matendawa kuno ku Mwanza komanso dziko lino la Malawi, ndikuti munthe kukhala ndimoyo wabwino.

Kasankhidwe ka anthu olowa nkafukufuku- Si anthu onse odwala matendawa m'boma muno kapena kuchipatala kwanu kuno amene alowe nkafukufukuyu ayi. Ndachita maula kwa anthu opezeka panthawi yomwe ndiri panoyi kuti ndisankhe anthu oti alowe. Inu ndi amodzi amene mwasankhidwa kuchita nawo kafukufukuyi.

Ndondomeko ya kafukufuku: Ngati inu mulorera kutenga nawo mbali m'kafukufuku amaneyu, mudzafunsidwa mafunso okhudza moyo wanu ndi matenda othamanga magazi

Zovuta-Mufusidwa mafunso ochokela pachipepala kukufunsani Kafukufuku okhudzana ndi zinthu zomwe zimalepheretsa kutsitsa kuthamanga magazi mwa anthu omwe amayendera kiliniki ya anthu odwala kuthamanga magazi pa chipatala chino cha pa boma la Mwanza. Zitha mphindi 20 kapena 30 tikufunsana mafunsowa.

Ufulu otengapo mbali pakafukufuku ameneyu- Kafukufuku ameneyu ngosakakamiza. Muli ndi ufulu onse obvomela kapena kukana kulowa nkafukufukuyu. Mulinso ndi ufulu okana kuyankha funso lirilonse limene simukufuna kuyankha. Kafukufukuyu ndiosakakamiza ndipo ngati simukufuna kulowa nawo, palibe vuto lililonse ndipo muzapitiliza kulandila chithandizo kwa a zaumoyo kuno kuchipatala

Chinsinsi –mukavomela kutenga nawo mbali mukafukufukuyu, mayankho amene mutapeleke ndi achinsinsi ndipo sadzapelekedwa kwa wina aliyense. Adzagwiritsidwa ntchito ya kafukufukuyu basi. Dzina lanu, malo okhala ndi zina zonse zokhudza inu zidzafufutidwa pa chipepala cha mafunso.

Phindu lakafukufuku- zosatila zakafukufuku ameneyu zithandiza kulimbikitsa anthu amene akulandila chithandizo chamatenda othamanga magazi kuti athandidzidwe moyenela. Komanso zizathandiza boma kupeza njila zoyenela zoyendesela ndondomeko yoyenela yoyendesela pulogalamu ya anthu odwala matenda othamanga magazi.

Ngati muli ndi mafunso alionse mukhoza kufunsa ineyo Gertrude Masinga (Cell 0888 102 128) kapena Dr E. Kabuluzi (Cell 0995 984 612) ochokera Kamuzu College of Nursing, Private Bag 1, Lilongwe kapenanso Ofesi ya College of Medicine Research and Ethics Committee (COMREC), Private Bag 360, Blantyre 3.

GAWO 2: Kalata ya chilolezo kwa anthu otenganawo mbali mukafukufuku

Mutu wa kafukufuku: Kafukufuku wa za umoyo wokhudza matenda othamanga magazi pa chipatala chachikulu m'boma la Mwanza

1. Ndawerenga/ andiwerengera ndipo ndamvetsetsa cholinga ndi mabvuto a kafukufuku ameneyu.

2. Ndamvomereza mwaine ndekha kutenga nawo mbali pa kafukufukuyi, ndipereka mayankho okhaokha omwe ine ndikuwadziwa kumafunso omwe ndingafunsidwe.
3. Ndamvetsetsa kuti ndiri ndi ufulu kuleka kutenga mbali nthawi iriyonse popanda kupeleka zifukwa ndipo izi ndiri ndi umboni kuti sizikhudzana ndi m'mene ndimalandirira chithandizo cha zaumoyo kuno kuchipatala
4. Ndikudziwa kuti sindiyenera kukumana ndi mabvuto panthawi yakafukufukuyi.
5. Zomwe ndiganene zokhudzana ndi kafukufukuyi sizidzagwiritsidwa ntchito pofuna kuononga mbiri yanga mtsogolo
6. Ndamvetsetsa kuti zonse zokhudzana ndi ine zidzasungidwa mwa chinsinsi ndipo omwe angathe kuziona ndi okhawo akuchita kafukufukuyi kapena omwe akukhudzidwa ndi kafukufukuyi.
7. Ndamvetsetsa kuti sindipeza mphoto ya ndalama chifukwa chotenga mbali mu kafukufukuyi. Ndikudziwa m'mene ndingapezere omwe akuchita kafukufukuyi ngati ndingafune kutero.

Kusayina kapena kudinda

Ndabvomera mwakufuna kwanga, mosakakamizidwa kutenga nawo mbali pa kafukufukuyu.

Dzina:		Siginecha:		Tsiku:
Mboni:		Siginecha:		Tsiku:

ZIKOMO KWAMBIRI POTENGA MBALI MUKAFUKUFUKUYI

Appendix 5: Approval letter from COMREC



UNIVERSITY OF MALAWI

CERTIFICATE OF ETHICS APPROVAL

This is to certify that the College of Medicine Research and Ethics Committee (COMREC) has reviewed and approved a study entitled:

P.12/13/1505 – Assessment of factors affecting blood pressure control in patients attending hypertension clinic at Mwanza district Hospital version 2 dated 5/03/2014 by Getrude Masinga

On 29th April 2014

As you proceed with the implementation of your study, we would like you to adhere to international ethical guidelines, national guidelines and all requirements by COMREC as indicated on the next page

Dr. V. Mwapasa- Chairperson (COMREC)

Approved by
College of Medicine
29 APR 2014
(COMREC)
arch and Ethics Committee

29/04/2014
Date

Appendix 6: Approval letter from Mwanza District Health Office

University of Malawi
Kamuzu College of Nursing
Private Bag 1
Lilongwe

13th May, 2014

District Medical Officer
Mwanza District Hospital
P.O. Box 80
Mwanza

The District Health Officer
P.O.Box 80
Mwanza

Dear Sir/ Madam,

PERMISSION TO CONDUCT A RESEARCH STUDY AT YOUR HEALTH FACILITY

I write to request for your permission to carry out a study at hypertension outpatient clinic at your hospital.

I am a student currently studying a Master of Science degree programme in Community Health Nursing.

In partial fulfillment of this programme, I am required to carry out a research study on the topic that is related to field of my specialization. The title of my research study is **"Assessment of Factors Affecting Blood Pressure Control in Patients Attending Hypertension Clinic at Mwanza District Hospital, Malawi."**

Looking forward to your favourable response.

Yours faithfully,

GERTRUDE TISSIE MASINGA (MRS)