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COMREC = College of Medicine Research and Ethics Committee

HBM = Health Belief Model

Htn = Hypertension

ICC = Intra-class correlation coefficient

KCN = Kamuzu College of Nursing

MNDL = Malawi National Drug List

MSTG = Malawi Standard Treatment Guidelines

MDHS = Malawi Demographic Health Survey

MMAS-8 = Morisky Medication Adherence Scale-8 items

MNTG = Malawi National Treatment Guidelines

MOH = Ministry of Health (of Malawi)

QECH = Queen Elizabeth Central Hospital

SSA = Sub Saharan Africa

SPSS = Statistical Package for Social Science

Stata = Statistical Package for Analysis of Data

UNISA = University of South Africa

UK = United Kingdom

USA = United States of America

WHO = World Health Organization

CHAPTER 1

INTRODUCTION AND BACKGROUND INFORMATION

1.1 INTRODUCTION

Blood pressure is defined as the force exerted by the blood against the inner walls of the arteries, during the different phases of the contraction of the heart (World Health Organization [WHO] - International Society of Hypertension [ISH] 2003:1988). It is a product of cardiac output and systemic vascular resistance that is generated by cardiac contraction against vascular resistance according to Ohms' Law (Gilbert 2009:2; Lewis, Dirksen, Heitkemper, Bucher & Camera 2011:739; Lilley, Collins, Harrington & Snyder 2011:383; Smeltzer, Bare, Hinkle & Cheever 2008:1021). Ohm's Law states that the electric current flowing in a conductor is directly proportional to the potential difference between its ends. The blood pressure has to be maintained within normal limits for healthy homeostasis, usually accepted to be 120/80 mmHg, considering specific factors such as age and lifestyle (Lilley et al 2011:384).

Hypertension poses global, regional and national health challenges. Globally, one in three adults and an estimated one billion people live with hypertension. It is a leading risk factor of 80.0% of the global cardiovascular disease mortality. Hypertension is globally one of the major non-communicable diseases including cancer and diabetes that cause deaths in both developed and developing countries, among males and females (Gerin, Tobin, Schwartz, Chaplin, Rieckmann, Davidson, Goyal, Jhalani, Cassells, Feliz, Khalida, Diaz-Gloster & Ogedegbe 2007:460; Mensah 2008b:698). It is accountable for more than 5.8% of deaths worldwide, in both men and women, but especially among black persons (Hussain, Boonshuyar & Ekram 2011:9; Mahawish & Heikinheimo 2011:9; Mensah 2008b:836; Middleton 2009:13). In Sub Saharan Africa (SSA), hypertension is a public health epidemic for both men and women, amongst the upper and lower socio-economic income groups (Addo, Smeeth & Leon 2007:1012). In

Malawi, hypertension is a public health problem with a prevalence rate of 32.9% (Msyamboza, Ngwira, Dzowela, Mvula, Kathyola, Harries & Bowie 2011:20316:3).

Hypertension, a common chronic condition, is defined as the persistently increased systemic vascular resistance against the cardiac output (Lewis et al 2011:742) and is also referred to as high blood pressure. Hypertension can be controlled by adopting a healthy lifestyle and taking prescribed medication regularly (Lewis et al 2011:741). It is classified in three categories based on the level of blood pressure reading. Pre-hypertension (mild) if the blood pressure level is 120/80-139/89 mmHg; stage1 (moderate) if the blood pressure level is 140/90-159/99 mmHg and stage 2 (severe or crisis) if the blood pressure level is more than 160/100 mmHg (Woodrow, Colbert & Smith 2011:470).

In some patients with mild and moderate hypertension, only lifestyle modifications are required to control their blood pressure. But in patients with severe hypertension, both lifestyle modifications and medicines are required to control it. When patients follow the lifestyle modifications and take prescribed medicines everyday of their lives, hypertension might be controlled and the benefits of a controlled blood pressure might be experienced (Adams, Holland & Urban 2011:300,304; Addo et al 2007:1013; Hussain et al 2011:9; Mahawish & Heikinheimo 2010:25; Mweene, Banda, Andrews, Mweene & Lakhi 2010:254; Osterberg & Blaschke 2005:488; Pires, Sebastiao, Langa & Nery 2013:95; Spratto & Woods 2012:2010; Sulaiman et al 2009:39; WHO-ISH 1999:151).

Some patients get tired of taking medicines, a problem that has been attributed to a lack of knowledge about the complications of hypertension (Weber 2012:738). When treatment is stopped, the blood pressure might be raised to dangerous levels and can cause complications to the brain, eyes, heart and kidneys (Lewis et al 2011:743). Hence, there is a dire need for patients with hypertension to adhere to lifestyle modifications and anti-hypertensive medications consistently for life. The patients need to understand that lifestyle modifications and anti-hypertension drugs do not cure

hypertension, but maintain the blood pressure within the normal range as long as the patient adheres to the prescribed treatment (Lilley et al 2011:384; Smeltzer et al 2008:1022)

The nurses also need to understand hypertension, its control mechanisms, complications, and the importance of treatment adherence. They need to provide specific health education to the patients which will help these patients to perceive their susceptibility to complications of hypertension, perceive their benefits of treatment adherence and motivate the patients to adhere to their treatment regimens (Mahawish & Heikinheimo 2010:25; Metcalfe 2005:59).

On the other hand, if patients adhere to their prescribed anti-hypertensive treatment regimens daily, blood pressure might be controlled and these patients could lead relatively normal lives. Cardiovascular and renal disease and strokes (cerebrovascular incidents) could be prevented if hypertensive patients' blood pressure levels are controlled. Nurses could play a major part in helping patients to attain and maintain hypertension control through providing effective health education (Aminoff & Kjellgren 2001:582; Chang, Fritschi & Kim 2012:127; DeCola, Benton, Peterson & Matebeni 2012:323).

The importance of health education cannot be overemphasised as even in developed countries people seem to need health education to combat hypertension-causing conditions (Cohen & Townsend 2012:143). Reportedly. "… 122 million people in America are overweight or obese, consume large amount of dietary sodium and alcohol and do not eat adequate amounts of fruits and vegetables, less than 20% exercise regularly… Direct and indirect costs for stroke management and ongoing care are estimated at $56.8 billion [in the USA]" (Monahan, Sands, Neighbors, Marek & Green 2007:858). Unfortunately similar statistics could not be obtained for Malawi, but similar factors might also influence hypertension patients' treatment adherence levels in this country, and might be identified during the data collection phase of this study.

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1.2 BACKGROUND INFORMATION ABOUT HYPERTENSION AND PATIENTS' ADHERENCE TO THEIR ANTI-HYPERTENSIVE TREATMENT REGIMENS

Hypertension patients' blood pressure can be controlled by adhering consistently to their prescribed lifestyle changes and the anti-hypertension medications, jointly referred to as anti-hypertension regimens.

1.2.1 Hypertension as a health problem

At the general assembly of 2011, countries committed themselves, that they would take action by developing Health Sector Strategic Plans for the Management of Non-communicable Diseases from 2011 till 2020 (WHO 2011). The World Health Assembly (WHA) and WHO Regional Committee for Africa (RCA) (2003:1983), in the seventh report, requested the countries in SSA to develop country specific guidelines for the management of hypertension. These should include the prevention of complications such as strokes, eye problems, heart failure, renal failure and peripheral vascular diseases. In addition, countries were requested to identify hypertension patients who do not adhere to prescribed treatment, the leading factor underlying uncontrolled hypertension, and intervene accordingly to prevent complications (Addo et al 2007 1012; Krousel-Wood, Thomas, Muntner & Morisky 2004:357; Lemogoum, Seedat, Mabadeje, Mendis, Bovet, Onwubere, Blackett, Lenfant, Kabangu, Block, Belhocine & Degaute 2003:1993; Mufunda, Chatola & Ndambakuwa 2006:52).

Previously, hypertension was viewed as a disease of rich people but now it affects the rich medium and low income groups of people. The main factors behind the epidemic in lower income communities include that these people follow lifestyles similar to those of the Western world, such as the increased use of salt in their food, excessive tobacco smoking, higher intake of calories, low potassium intake, a sedentary lifestyle, poverty and stress (Addo et al 2007:1012; Smeeth & Leon 2007:1012, 1015). Hypertension's associated risk factors are tobacco smoking (14.1%), alcohol consumption (16.9%), overweight (21.9%) and physical inactivity (9.2%). Alcohol consumption and cigarette

smoking are more common in males than females (Mahawish & Heikinheimo 2010:25). Grodensky, Golin, Ochtera and Turner (2012:899) conducted a systematic review on the effect of alcohol intake on adherence to outpatient medication regimens for four chronic diseases, namely: diabetes, hypertension, depression and HIV/AIDS. Out of 60 eligible studies on hypertension, only 3% addressed hypertension medication adherence. The mean number of subjects was 245 (range: 5761, 511). Six out of the seven high quality studies reported significant associations between alcohol taking and outpatient treatment regimen adherence.

At Queen Elizabeth Central Hospital (QECH), where the study was conducted, in 2005 to 2008 the number of patients registered with hypertension increased from a total of 3 291 to 3 899 implying an increase of 18.5% (n=608). From 2005 to 2010 the number of patients treated for hypertension increased by 4 979 from 3 291 to 8 270, implying an increase of 151.3% (n=1 688).

Patients who were admitted to the QECH due to hypertension increased markedly by 882 from 1 887 to 2 769 implying an increase of 46.7% from 2005 to 2008. Furthermore, the number of deaths resulting from complications attributable to hypertension at QECH increased by 40 from 54 to 95 or by 74.1% from 2005 to 2008. From 2008 to 2010 it increased from 95 to 97 deaths, an increase of only 2.1% (QECH Hypertension Annual Reports 2008:13; 2010:15).

Hypertension can occur at any age, in young, middle aged and old persons. Some patients experience symptoms such as headaches, dizziness and heart palpitations. Other patients might not experience any symptoms. Due to the absence of symptoms, patients might not seek medical help until they experience complications which could cause disability and sudden death, explaining why hypertension is referred to as a " silent killer" (Hussain et al 2011:9; Nelms, Sucher, Lacey & Roth 2011:289).

A population-based study (Herttua, Tabak, Martikainen, Vahtera & Kivimaki 2013:2933) estimated the risk of strokes associated with non-adherence to

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antihypertensive drug therapy prior to the first stroke encounters in hypertensive adults. Out of 73 527 hypertensive patients, those who did not adhere to their medication had a nearly four-fold increased risk of dying from strokes during the second year after their initial anti-hypertensive drug prescriptions to control their blood pressure, and a three-fold increased risk in the tenth year, compared with adherent patients. The patients who didn't take their medication correctly had a higher risk of hospitalisation. The findings suggested that poor adherence to antihypertensive therapy increased the patients' risk of strokes.

1.2.2 Systems and factors that regulate the blood pressure

Several mechanisms interact to regulate blood pressure (Lilley et al 2011:383). These mechanisms include cardiac output (vascular volume) and peripheral resistance (systemic vascular resistance) peripheral sympathetic and autonomic nervous system. They work in co-ordination through the autonomic nervous system, the sympathetic vasomotor centre, located in the brain to maintain normal blood pressure under various conditions (Lewis et al 2011:740). Any alteration, in any of these conditions, may cause the blood pressure to rise.

The renin-angiotensin system in the kidneys plays a major role in the regulation of blood pressure, by controlling the sodium excretion rate. Any disturbance of this system produces impaired sodium excretion and hypertension results due to salt retention which results in fluid retention. Rennin is a glycoprotein enzyme produced by the juxtaglomerular apparatus of the kidneys. It converts angiotensinogen to angiotensin I. This is further converted by angiotensin converting enzyme in the lungs to angiotensin II. This is a vasoconstrictor, and it increases the peripheral resistance causing hypertension. Angiotensin II also stimulates the release of aldosterone from the adrenal cortex. Aldosterone causes retention of sodium ions in the extracellular fluid compartment, leading to fluid overload causing hypertension (Lewis et al 2011:742).

1.2.3 Technique for the measurement of blood pressure

Blood pressure is measured with the right size cuff covering 80.0% of the upper arm, using manual mercury in a glass rode or the manual aneroid sphygmomanometer. Both of these require a stethoscope to read the blood pressure and a health worker who has been trained to measure blood pressure. The patient should have rested for 10 minutes and be relaxed, not anxious or apprehensive. These might cause transient elevation of blood pressure. The cuff is inflated 20-30 mmHg above the point of disappearance of the KorotKoff sounds, seen as oscillations in the mercury column of the sphygmomanometer. The brachial artery is located and a stethoscope's diaphragm is placed on the brachial artery to read the blood pressure. The pressure in the heart chambers is measured against the pressure in the sphygmomanometer.

There is another type of a sphygmomanometer that is digital and uses battery or electric power. It does not require a stethoscope nor input from a health care worker, and can be easily operated by any person. It is worn on the wrist or upper arm. It has an on/off button and a screen. At the touch of the button it starts recording the blood pressure, pulse rate and respirations which are automatically displayed on the machine's screen (Lewis et al 2011:745). The digital sphygmomanometer has the potential to increase patients' responsibility for monitoring their condition and actively participating in the management of their hypertension. Measurement should be done on both arms initially, noting any difference. The arm with the higher reading should be the one used for subsequent measurements, usually the right one (Chobanian, Bakris, Black, Cushman, Green, Izzo, Jones, Materson, Oparil, Wright & Rocella 2003:1213).

1.2.4 The five phases of blood pressure readings and their sounds

The phases are heard only when the mercury manual sphygmomanometer is being used. (Chobanian et al 2003:1213). When the blood pressure cuff of the mercury

sphygmomanometer is inflated, there are different pressures within the heart chambers. The pressures are recorded in five phases, designated as K1 to K5.

- Phase 1 (K1) is the onset of the pressure level at which the first faint consistent tapping, KorotKoff sounds, are heard and are reported as the systolic blood pressure. The sounds gradually increase in intensity as the cuff is deflated. This occurs as a result of the cardiac contraction forcing the blood volume out of the heart's left ventricle into the aorta and arterial system.
- Phase 2 (K2) is when the cuff is rapidly deflated when a murmur of swishing sounds is heard until the palpable pulse disappears at 6 mm Hg, then increased by 10 mm Hg.
- Phase 3 (K3) is the period when the sounds are crisper and increase in intensity as the cuff is slowly deflated at 2mm per second noting the time at which the palpable pulse reappears.
- Phase 4 (K4) is when distinct abrupt, muffling of sounds, with a soft blowing quality, continues up to zero without disappearing in some people and is reported as a diastolic blood pressure.
- Phase 5 (K5) is the point at which the last regular sound is heard before zero and is reported as the diastolic blood pressure. Phases 4 and 5 are both accurate diastolic blood pressures reported as the cardiac relaxation and the filling of the right atrium of the heart with systemic blood. The blood pressure is recorded as K1/K4 or K1/K5, systolic number/diastolic number (Izzo & Black 2003:346).

1.2.5 Variations in blood pressure readings

Blood pressure readings vary according to the time of the day (Chobanian et al 2003:1213). The readings are higher during the day when a person is awake, active and exposed to stimulations. The readings are lower at night when a person is asleep and. There is a drop of 10-20% in blood pressure at night. Patients who do not have such drops at night are at geater risk of developing cardiovascular complications

because the pressures remain high. In the early hours of morning, while waking up, there is a sharp increase of blood pressure. Blood pressure readings vary according to posture. The standing blood pressure reading is higher than the sitting one, and the sitting one is higher than the lying one, and it is higher in a doctor's office and lower at home. This is a result of the influence of the environment called “white coat hypertension”.

There are also variations in the blood pressure readings, according to the sphygmomanometer that is used. The electronic digital ones give higher readings than the mercury ones. It also varies according to the arm that has been used. The right arm usually registers a higher reading than the left one (Chobanian et al 2003:1213).

The brachial artery blood pressure is highest when the patient is sitting upright, intermediate in the supine position, and lowest in the left lateral position (Khatib & ElGuindy 2005:18). Therefore, for consistency in interpreting the patient's blood pressure readings, the same sphygmomanometer should be use at the same time of the day, putting the patient in the same posture and applying the cuff to the same arm.

The diagnosis of hypertension is confirmed by two or three elevated blood pressure readings on different occasions (Nelms et al 2011:288,289). The WHO-ISH (2003:1983) listed two types of hypertension. These are primary and secondary hypertension, based on the cause (Lewis et al 2011:741; Mancia, De Backer & Dominiczak 2007:88).

1.2.6 Primary hypertension

Primary hypertension is also called essential or idiopathic hypertension. It has no identifiable aetiology, with onset in the 40 to 50 year age group. It has a genetic predisposition or a family history and racial patterns in 70-80% of hypertensive patients, accounting for 90-95% of all hypertension patients (Gilbert, 2009:2). There are certain risk factors associated with primary hypertension which can be modified

hence referred to as modifiable risk factors (Lewis et al 2011:742). These risks include cigarette smoking (Talukder, Johnson, Varadharaj, Lian, Kearns, El-Mahdy, Liu, & Zweier 2011:388), excessive dietary sodium, elevated serum lipids, excess alcohol intake, diets low in calcium and potassium, overweight, stress and sedentary lifestyles (Addo et al 2007:1016). This is how these risk factors trigger hypertension:

- **Cigarette smoking**

Cigarette smoking causes hypertension from the nicotine that is contained in cigarettes. Smoking is a major risk factor for cardiovascular diseases Worldwide, it is estimated that more than five million people die yearly from tobacco smoke related illnesses (Talukder et al 2011:388). Nicotine is a stimulant that releases adrenaline from the adrenergic fibres of the adrenal glands. The adrenaline will cause persistent stimulation of the sympathetic nervous system leading to peripheral vasoconstriction, which will result in the elevation of blood pressure (Kaplan 2005:29). The sympathetic nervous system plays a role in acute changes in blood pressure (McCance, Huether, Brashers, & Rote 2010:467). Renin is released, an angiotensinogen I converting enzyme, to angiotensinogen II, to aldosterone then increase in the circulatory volume resulting in raised blood pressure.

A study was conducted by Li, Tong, Wang, Lin, and Zhang (2010:93) in China, to investigate the effects of cigarette smoking on blood pressure, stratified by basal metabolic index in a Mongolian population in two adjacent townships. There was a total of 2 589 Mongolian people who signed consent to participate in the study. A standard questionnaire was used to collect data. The findings showed that those who smoked 1-9 and 10-19 cigarettes per day were more likely to have lower prevalence of hypertension compared with non-smokers, but there was no significant difference between smokers who smoked more than 20 and non-smokers. The data did not provide support that smoking was a risk factor of hypertension. Gu, Kelly, Wu, Chen Samet, Huang and Zhu (2009:155) published their findings regarding the relationship of smoking with death in China, a large prospective cohort study in a nationally

representative sample of 169 871. Their baseline data showed that male smokers had a lower prevalence rate of hypertension than male non-smokers. There was no significant positive association or there was a negative association between smoking and hypertension.

- **Excessive salt consumption**

Consumption of large amounts of salt is a risk factor for hypertension physiologically, biologically and genetically. Physiologically, salt has properties that retain fluids in the body. The retained fluids increase the circulatory volume which raises the blood pressure (Addo et al 2007:1016; Lewis et al 2011:746; Smeltzer et al 2008:1021). Biologically and genetically, Gibbs, Beevers and Lip (1999:188) reported that individuals with hypertension possess a "salt sensitive gene", which occurs more frequently among black than among white people. This explains why hypertension is more common and challenging to control in black people than in whites.

Kuller (2007:1004) reported that the hypertension epidemic in SSA is driven by the greater use of processed canned foods which contain a lot of salt. There is also an increased use of cars which has led to a more sedentary lifestyle for many people. The epidemic started in the urban areas but now occurs in the rural areas as well. Healthy adults' salt intake should be restricted to less than 1 500mgs a day. In addition, patients should not add raw salt in their cooked food, as it is more harmful than cooked salt (Addo et al 2007:1016; Thrift, Srikant, Fitzgerald, Kalyanram, Kartik, Hoppe, Walker & Evans 2010:80).

- **Elevated serum lipids**

High serum lipids accumulate as fat deposits in the vessel lumen which leads to the thickening and hardening of the vessels, referred to as atherosclerosis. This interferes

with the contractility of the smooth muscles which increases the peripheral resistance, and cause a raised blood pressure. People who eat lots of animal meat and fat are more prone to develop atherosclerosis than people who eat less animal protein and fat and more fruit, vegetables, fish and chicken (Addo et al 2007:1016; WHO 2003:107).

- **Excessive alcohol consumption**

Excess alcohol intake is a risk factor associated with hypertension and its complications (Manandhar, Koju, Sinha & Humagain 2012:36; Hillbom, Saloheimo & Juvela, 2011:209). Alcohol consumption leads to generalised excitement and increased activity including renal activity. Rennin is released, an angiotensinogen I converting enzyme, to angiotensinogen II to aldosterone which increases the circulatory volume resulting in raised blood pressure. Wang Lee, Fabsitz, Devereux, Best, Welty and Howard (2006:408) conducted a study, which revealed that alcohol consumers were 1.22 times more likely to develop hypertension than non-consumers. It was noted that for men, consuming more than 20g and women 10g of ethanol per day was sufficient to cause a rise in blood pressure. This is because alcohol contains a stimulant that leads to the release of adrenaline (Miller, Anton, Egan, Basile & Nguyen 2007:347), a peripheral vasoconstrictor, from the adrenergic fibres of the adrenal glands. Grodensky, Golin, Ochtera and Turner (2012:899) found that alcohol intake had an effect on adherence to outpatient medication regimens for chronic diseases.

- **Sedentary lifestyle**

Sedentary lifestyle has a close relationship with hypertension. Lack of physical exercise poses a risk of fat deposits in the arteries. As a result the arteries become thick and hard losing their elasticity. This condition is referred to as atherosclerosis. The vascular lumen narrows with increased peripheral resistance which raises the blood pressure (Addo et al 2007:1016; Smeltzer et al 2008:1021).

Obesity

Obesity is associated with hypertension, because weight gain comes with fat deposits in all body structures including the blood vessels. These result in narrowing of the lumen causing atherosclerosis. This increases the peripheral resistance causing hypertension (Lewis et al 2011:742).

- **Stress and environment**

Stress is believed to be a risk factor for hypertension through the sympathetic nervous system's stress reactions. Gianaros, Jennings, Sheu, Derbyshire and Matthews (2007:134) reported that when an individual stresses and/or worries persistently, there is a release of adrenaline from the adrenergic fibres of the adrenal glands. This is a stimulant and a vasoconstrictor, which increases peripheral resistance resulting in raised blood pressure. A strange environment is a good example of a stressor that can raise blood pressure. Some patients have registered a raise in blood pressure in the doctor's office, but a normal blood pressure in the home environment (Lilley et al 2011:383). The doctor in a white coat, in the office, might present a fearful environment to the patients. This is the reason that diagnosis of hypertension is not made from one reading only, but with two or more readings, on different occasions in different environments with additional laboratory diagnostic results, such as blood urea and electrolytes (Ester, Schwarz & Alvarenga 2008:178; Lewis et al 2011:744). In primary hypertension, patients require a change in their lifestyle, referred to as, lifestyle modification, to combat the risks of developing complications as a result of persistent hypertension.

Knowledge of the risk factors of primary hypertension might help patients to acquire the ability to perceive themselves as being at risk of developping the condition and the consequent complications and their severity. The ability to perceive the potential risks of hypertension might motivate them to follow a healthy lifestyle, to prevent the dangerous complications (Hussain et al 2011:12).

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1.2.7 Secondary hypertension

Secondary hypertension is a raised blood pressure that has resulted from a specific cause with an identifiable aetiology. This type of hypertension accounts for 5-10% of all hypertensive patients (Dao, Essalihi, Bouvet & Moreau 2005:307).

There are disease processes and conditions that affect factors which regulate cardiac output and peripheral resistance, which get disrupted causing hypertension (Lilley et al 2011:383; Smeltzer et al 2008:1022). Once the diseases and conditions are treated, the blood pressure is reduced. Examples of such diseases are:

Renal diseases

The kidney is a major organ in the body. One of its functions is regulation of normal blood pressure through the renin-angiotensin mechanism (Thrift et al 2010:80). When there is kidney disease, the renal functions will be impaired. This process is explained in section 1.2.8.4.

- **Other conditions**

Some of the conditions that may cause secondary hypertension include: pre-eclampsia and eclampsia in pregnancy, liver cirrhosis and kidney failure. For example, the kidney plays an important role in the control of arterial pressure and in the pathogenesis of hypertension. In addition, contraceptive pill use, in some individuals might raise the blood pressure through physiological fluid retention. This occurs as a result of hormonal changes, which influence physiological changes that cause retention of fluids. This increases the circulatory volume which increases the blood pressure (Thrift et al 2010:80).

- **Age**

Age is a risk factor for secondary hypertension. The older patient might have a greater risk for developing hypertension. This occurs as a result of the large arteries which thicken and stiffen, with fat deposits, narrowing the vessel lumen and reducing its elasticity. This is atherosclerosis, which reduces arterial capacity, increasing the peripheral resistance causing hypertension (Lilley et al 2011:383).

Knowledge of the risk factors for primary and secondary hypertension is essential. Such knowledge might help patients to perceive that they are susceptible to the condition hence take responsibility to participate in prevention efforts and treatment which might keep the condition controlled and prevent complications. This is vital for older people as 88% of all people suffering from strokes in the USA were 65 or older (Monahan et al 2007:1423).

1.2.8 Complications of hypertension

Hypertension on its own is an innocent condition. When death occurs in an individual with hypertension it is not from hypertension. Death would be from its complications that lead to failure in organ function. According to Lewis et al (2011:743) this is referred to as "end organ damage". Cerebral, ocular, cardio-vascular and/or renal complications can result from uncontrolled hypertension.

1.2.8.1 Cerebral complications

Hypertension increases the risk of a stroke, defined by Monahan et al (2007:1422) as "… a focal neurologic deficit that has a sudden onset as a consequence of a disturbance in circulation or cerebral ischemia that lasts for more than 24 hours, it may cause irreversible brain damage". Hypertension causes the development of atherosclerotic plaques in the cerebral vascular system. This eventually occludes a cerebral vessel causing an ischaemic stroke due to anoxia. This also facilitates the development of an aneurysm, which could rupture causing haemorrhagic stroke and even death depending on the extent of the haemorrhage (Kaplan 2005:152; Monahan

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et al 2007:1422). Brain injury occurs when persistant hypertension causes rupture of a blood vessel that supplies the brain. The blood forms a clot (lesion) which occupies a space in the brain. In the brain every space has a functional area. The left brain controls the right body and vice-versa. If the lesion is on the left side of the brain, there would be weakness on the right side of the body and vise versa (McCance et al 2010:1155). The lesion impairs the function. Hemiplegia means weakness of one side of the body. Weakness might be either on the left side or the right side depending on the location of the lesion in the brain. This would lead to left or right hemiplegia.

The individual who experiences this is said to have sufferred a stroke. When the lesion is on the left side of the brain the person will have right sided weakness and loss of speech because the speech centre is on the left side of the brain. When the lesion is on the right side of the brain the person will have left sided weakness and loss of swallowing reflex because the swallowing centre is on the right side of the brain. Depending on the size of the lesion and site of occupacy the person will manifest the loss like memory, coordination of vision and thinking. If no treatment is provided these complications could cause disability or actual death. This has direct and indirect costs for the individual, the family and community as a whole as well as to the health care system in managing the disability (Monahan et al 2007:1422).

1.2.8.2 Ocular complications

Hypertension causes rupture of the ocular vessels resulting in haemorrhage in the retina. This causes clot formation which leads to inflammation and retinopathy. This might further lead to partial or even total blindness (Kaplan 2005:164). The eye is an organ of sight. Eye injury occurs when there is persistant hypertension causing rupture of a blood vessel supplying the eye. The blood leaks out and forms a clot which occupies a space on the optic area or retina or the fundus. This area is responsible for reception of light and interpretation and registers visual images and the individual sees. Pressure on this area by the lesion would impair its function. The individual who experiences this is referred to as having suffered blurred or total loss of vision,

blindness, depending on the size of the lesion (Lewis et al 2011:1409; McCance et al 2010:1155).

1.2.8.3 Cardiovascular complications

The heart is a major organ which supplies oxygen and nutrients to all parts of the body. When the blood pressure gets persistantly high, the heart becomes overworked, and there is reduced blood supply through the coronary arteries to supply the cardiac muscles. This overwork initially results in hypertrophy of the myocardial fibres of the left ventricle as a compensatory effort. The hypertrophy leads to left sided congestive cardiac failure, the coronary arteries become sclerotic, diminishing blood supply to the heart resulting in ischemic heart disease, myocardial infarction occurs, leading to poor oxygenation to all the major organs, the brain, lungs, liver and kidneys will fail and finally death may occur (Lewis et al 2011:765; McCance et al 2010:1155; Vlasnik, Alliotta & DeLor 2005:47; Zhang 2013:291).

1.2.8.4 Renal complications

Kidneys are major organs modulating systemic blood pressure by adjusting the sodium excretion rate. When there is hypertension, the mechanism of modulation is impaired resulting in impaired sodium excretion. This sodium accumulation further retains and increases the circulatory volume, raising the blood pressure. In addition, the accumulated sodium contributes to the development of atherosclerotic plagues in the lumen of the arteries supplying the kidneys, resulting in poor oxygenation to the kidney, impaired function, with consequent renal failure (Gilbert 2009:12). The failing kidneys release rennin which converts angiotensin I to angiotensin II, to aldosterone which retains fluids raising the blood pressure. It is therefore, important for hypertensive patients to adhere to their anti-hypertensive treatment to prevent these complications (Smeltzer et al 2008:1024).

An elevation of plasma creatinine and blood urea nitrogen is referred to as azotemia (retension of toxic wastes) which is accompanied by fatigue, anorexia, nausea, vomiting, pruritus and neurologic changes (McCance et al 2010:1386). Kidney failure may be acute or chronic. In the acute phase, there is a rapid progression within hours, and the process may be reversible. While as, in the chronic phase, there is slow progression over a period of months or years and the process is irreversible. The common cause is hypertension (McCance et al 2010:1389).

This will stimulate renin hormone release. Renin will convert angiotensinogen I to angiotensinogen II, with the converting enzyme, to aldosterone which increases the circulatory volume resulting in raised blood pressure (Lewis et al 2011:746). The examples of these diseases are glomerulo-nephritis, renal artery stenosis, renal failure and kidney tumours.

The same mechanism occurs, in congestive heart disease, anaemia, intestinal worms, liver cirrhosis, cancer, diabetes mellitus, and malnutrition including the use of contraceptives. After a period of time, these conditions, might eventually cause the heart to become congested with a consequent impaired function. This will lead to impaired blood circulation to the kidneys and renin will be released and the same process of angiotensin conversion will raise the blood pressure. This is true for diabetes mellitus. In addition, in older patients there is increased collagen content and stiffening of the myocardium, decreased adrenergic receptor sensitivity; baroreceptors reflex blunting, decreased renal function. This releases renin and the renin angiotensin mechanism takes over and the blood pressure is raised. However, in contraceptive pill use, the risk could be reduced with the use of low dose hormonal contraceptives. but can be compounded by the use of antiretroviral drugs (ARVs), alcohol and anti-parasitic drugs such as anti-malarias, anti-bilharzias, cytotoxic drugs and steroids because all these drugs are detoxicated by the liver and excreted by the kidneys. With continued use of these cytotoxic drugs, the kidneys become overworked and release rennin which raises the blood pressure (Lewis 2011:746; Mancia, De Backer & Dominiczak 2007:88).

1.2.9 The management of hypertension

Hypertension can be managed with non-pharmacological (lifestyle modification) and pharmacological approaches (drugs) depending on whether hypertension is classified as being pre, mild, moderate or severe hypertension. The goal of management, lifestyle modification and prescribed drugs, is to control the blood pressure to prevent complications that might occur due to uncontrolled hypertension, like strokes and heart conditions (Andrade 2004:484; Clifford-Middel 2004:11; MoH 2010:1; Monahan et al 2007:858).

The mechanism of action of all anti-hypertension drugs is on the blood pressure regulators to inhibit or block their regulation to control the blood pressure, but no drugs can cure hypertension (Adams et al 2011:301). Therefore, the doctors prescribe treatment and give the patients review appointments in Malawi (MoH 2010:10). The review visits give the doctor a chance to assess the patient's responce to the treatment. Based on the patient's response, treatment is continued or changed. Good responses to treatment usually depend on adherence to the treatment regimen.

1.2.9.1 Non-pharmacological approach to the management of hypertension

The non-pharmacological approach to the management of hypertension involves interventions, such as actions and behaviours prescribed to modify risky behaviour that expose a person to hypertension (Adams et al 2011:300; Bosworth 2008:345). These include: limiting alcohol, reducing sodium and cholesterol intake, stopping cigarette smoking, increasing aerobic exercise and reducing weight. Once the risk factors have been modified, the blood pressure might reduce (Kastarinen, Puska, Korhonen, Mustonen, Salomaa, Sundvall, Tuomilehto, Uusitupa & Nissinen 2002:2505; Smeltzer et al 2008:1025; Weber, Schiffrin, White, Mann, Lindholm, Kenerson, Flack, Carter,

Materson, Ram, Cohen, Cadet, Jean-Charles, Taler, Kountz, Townsend, Chalmers, Ramirez, Bakris, Wang, Schutte, Bisognano, Touyz, Sica, Harrap 2014:3).

Lifestyle modification

There is another group of patients who can be managed by lifestyle modifications and anti-hypertensive medicines, although they had persistent hypertension. They require behaviour change, and taking prescribed anti-hypertensive medicines every day, for the rest of their lives (Addo et al 2007:1016; Jallinoja, Absetz, Kuronen, Nissine, Talja, Uutela & Patja 2007:127; Lewis et al 2011:765). Therefore, health workers should provide health education to the patients regarding the condition, the cause, pathophysiology, signs and symptoms treatment and complications. When patients understand this, their knowledge base could help them to accept the condition and perceive the benefits of treament, severity of the potential dangers of complications of the condition. If patients understand the potential complications of hypertension and the dire necessity for adhering to their prescribes medications and lifestyle changes,it will help them to actively participate in the management of their condition, and will create a good patient/health care provider relationship. As such the goal of hypertension management, which is to control hypertension and minimise the occurrence of complications, could be achieved. Hypertension can be managed with non-pharmacological and pharmacological approaches, depending on whether it is classified as being pre, mild, moderate or severe hypertension (Adams et al 2011:300; Drevenhorn, Bengtson & Kjellgren 2009:350; Spratto & Woods 2012:2010).

Lifestyle modification programmes include interventions that provide strategies to help the patients develop self motivation, dedication and self determination to change the risky predisposing lifestyle such as reduction of cigarrette smoking, alcohol intake, sodium consumption, and the intake of saturated fat. The increase of fresh fruits and vegetables consumption and aerobic physical activity could be beneficial. Furthermore, the application of coping strategies to reduce the effects of stress, and to maintain optimum weight will be beneficial for reducing hypertension in some persons

(Adams et al 2011:300). Once the risk factors have been modified, the blood pressure might reduce (Adams et al 2011:301; Brobeck, Odencrants, Bergh & Hildingh 2013:375; Smeltzer et al 2008:1025; WHO-ISH 2003:107). It is also referred to as the first line of hypertension management.

In primary hypertension all the risk factors are associated with behaviour and lifestyle. This is why they are referred to as modifiable risk factors; because individuals can modify their behaviour and lifestyle to reduce the risk of developing hypertensions (Lewis et al (2011:742). Lifestyle modification, is a behaviour, and an attitude that requires self motivation, self determination and dedication in order to achieve the goal (Adams et al 2011:300). Lifestyle modification for a patient with hypertension requires behaviour changes, life habits or practices from predisposers to new ones, that reduce the risk (Iyalomhe & Iyalomhe 2010:71). This helps to achieve the goal of hypertension control. Some patients with hypertension have been controlled without anti-hypertension drugs but by adhering to healthy behaviours (Ham & Bong 2011:1252; Qvarnström, Wettermark, Ljungman, Zarrinkoub, Hasselström, Manhem, Sundström & Kahan 2011:488).

There are some patients who have had their blood pressure controlled with lifestyle modification and prescribed anti-hypertensive medicines. With time, they no longer required anti-hypertensive medicines. However, they are required to check their blood pressures regularly to ensure that it remains controlled.

The anti-hypertension drugs should not be taken together with anti-inflammatory agents, including Brufen, Indocid and Diclofenac because they could cause bleeding in all people, but in patients that are taking anti-hypertension drugs, the risk of bleeding is greater because anti-hypertension drugs could make the blood thin and dilate the blood vessels. Therefore, these effects combined with those of anti-inflammatory drugs erode the gastrointestinal lining increasing the bleeding tendency. In addition to the bleeding, there are many other problems such as kidney failure when anti-inflammatory drugs are combined with ACE inhibitors and diuretics. The anti-inflammatory drugs

oppose the effects of medicines for hypertension and stop them working effectively, including ACE inhibitors, beta blockers and diuretics.

Low-dose aspirin or corticosteroid medicines, such as predinisorone, increase the risk of gastrointestinal ulceration or bleeding. As an additional caution, patients on anti-hypertension drugs should stop consuming alcohol because it irritates the stomach lining therefore regular drinking of alcohol while taking anti-inflammatory and/or anti-hypertension drugs may increase the risk of gastrointestinal damage and bleeding (Woodrow et al 2011:173).

1.2.9.2 Pharmacological approach to the management of hypertension

The pharmacological approach to the management hypertension refers to the use of prescribed anti-hypertension drugs by a physician based on the blood pressure reading using the stepwise approach. This approach starts with those drugs that produce few and minor side effects ending with those that might produce more and serious side effects (WHO-ISH 2003:1983).

1.2.9.2.1 The WHO approach to hypertension management

The anti-hypertension drugs are grouped according to their mechanisms of action in reducing blood pressure. These are diuretics, calcium channel blockers, and angiotensin converting enzyme inhibitors, beta and alpha adrenergic blockers, angiotensin II receptor blockers and centrally acting drugs; targeting the blood pressure regulators, to reduce the blood pressure (Adams et al 2011:304; Gibbs et al 1999:189; Smeltzer et al 2008:1026; Spratto & Woods 2012: 2014). The WHO classification of these drugs is useful for guiding health workers to identify the right treatment combination for specific patients based on every individual patient's assessment data. This also requires that the patients' blood pressure be classified as being mild, moderate or severe and the patient is informed about the required lifestyle modifications.

Stage 1 implies that the blood pressure is mild. In stage 4 if the patient has severe hypertension. This classification guides countries to identify drugs that the specific country can manage to provide since countries are at different economic levels. In addition drugs are classified according to those with few side effects which should be prescribed initially, followed by drugs with more side effects, and the same is the case for the cost of drugs and accessibility and patients' treatment tolerance levels (WHO 2003:107).

1.2.9.2.2 The United Kingdom's ABCD approach to hypertension management

In United Kingdom (UK) more than 65.0% of people with moderate to severe hypertension were treated with a single blood-pressure-lowering drug (monotherapy) but their blood pressures were poorly controlled (William 2003:521). Clinical trials were done which demonstrated that moderate and severe hypertensive patients require more than one drug to achieve blood pressure control.

Brown, Cruickshank, Dominiczak, MacGregor, Poulter, Russell, Thom and Williams (2003:82) advocated that better blood pressure control requires drug combinations. The ABCD algorithm was suggested based on the trial results and simple principles representing the groups of anti-hypertension drugs and their mechanisms of actions which have achieved better blood-pressure control than monotherapy. William (2003:522) launched the ABCD algorithm to provide advice on the combinations and sequencing of anti-hypertension drugs:-

- 'A' drugs are the angiotensin converting-enzyme inhibitors or angiotensin receptor blockers
- 'B' drugs are the beta blockers.
- 'C' drugs are the calcium channel blockers.
- 'D' drugs are the diuretics.

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This is not a restrictive template but it offers some choice within a structured framework according to specific countries' policies. The principles underlying this approach are that:

- younger people below 55 respond better to drugs that block the renin system which include 'A' drugs, and 'B' drugs
- black people older than 55 respond better initially to 'C' drugs or 'D' drugs
- the majority of people will require more than one drug, and it is logical to combine A or B with C or D; it is not logical at step 2 to combine A with B or C with D
- triple therapy with A+C+D or B+C+D
- where there is no cost disadvantage, at step 2 fixed-dose combinations are appropriate to reduce the number of medications
- the patient can be offered an individual treatment plan that sets out the objectives and the strategy required to reduce his or her blood pressure.

However, it was clarified that improvement of blood-pressure control would not come from the ABCD algorithm approach but the process of implementation (Brown et al 2003:82). In SSA, the WHO-ISH 2003:107), requested the countries to commit themselves to address vascular diseases. They were requested to engage population-based non-pharmacological interventions against the growing hypertension epidemic. This would assist patients to modify their behaviour, such as, reduction of weight, alcohol, sodium and cholesterol, increase aerobic exercises and quite cigarette smoking. The benefits to the patients would be that the increase in physical exercises would burn fats and carbohydrates, thereby removing fat deposits from the vessel lumen, reducing the peripheral resistance, reducing the blood pressure. The countries were given liberty on pharmacological management; according to the WHO (2003:107) treatment guidelines or The UKs ABCD approach based on the countries' economic realities (Brown et al 2003:82).

In Malawi, the “Malawi Standard Treatment Guideline” (MSTG), of Ministry of Health (MOH) (MSTG, MOH 2008:16) adopted from the WHO (2003:107) guidelines is currently in use. The following are some of the drugs used to treat hypertension in Malawi: Hydrochlorothiazide (HCT), Propranolol, Nifedipine, Lisinopril and Methyldopa and are free in government facilities and are for sale in private health facilities and pharmacies.

Bendrofluazide: a thiazide diuretic, it inhibits sodium reabsorption at the distal convoluted renal tubes increasing fluid loss thereby reducing the circulatory volume, reducing the blood pressure. The side effects are hyperuricaemia, hyponatraemia, postural hypotension and impotence (Spratto & Woods 2012:2014; Woodrow et al 2011:234).

Hydrochlorothiazide (HCT): a thiazide diuretic, sensitive sodium chloride human inhibitor, which inhibits sodium reabsorption in the renal tubules; allowing lots of water loss decreasing the circulatory volume, reducing the blood pressure. The dose is 12.5 mgs orally daily. The side effects are hypokalaemia, hyponatraemia and hypochloraemic alkalosis. All diuretics target the kidney for circulatory volume reduction (Imming, Sinning & Meyer 2006: 828; Spratto & Woods 2012:2014).

Flusemide: is a potassium human inhibitor, it inhibits potassium re-absorption at the ascending limb of the loop of Henle in the renal tubules; the dose is 40 mgs orally. The side effects are thirst, weakness, dry mouth, fatigue, hypokalaemia, hyponatraemia, hypochloraemic alkalosis and hypomagnesaemia (Smeltzer et al 2008:1026; Spratto & Woods 2012:2011).

Spironolactone: is an aldosterone antagonist, and a potassium sparing diuretic, the dose is 25mg daily, orally. The side effects are insomnia, weakness, fatigue, hyponatraemia, hypokalaemia, gastro-intestinal tract disturbances, impotence and menstrual irregularities (Imming et al 2006:826; Smeltzer et al 2008:1027).

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Lisinopril*:* is an angiotensin converting enzyme inhibitor; it blocks the conversion of angiotensin I to angiotensin II, a potent vasodilator which decreases the vascular resistance reducing the blood pressure. The side effects are hypotension, persistent dry cough, angioedema, alopecia, and impotence (Imming et al 2006:826; Petkow-Dimitrow 2007:5; Spratto & Woods 2012:1928).

Ateneral: is a beta adrenoreceptor blocker. It blocks the beta-adrenoreceptor in the heart, peripheral bloodvessels of the pancreas, liver and the bronchi leading to vasodilatation, decreasing the blood pressure. The side effects are gastro-intestinal tract disturbances, bradycardia, hypotension and bronchospasm. This reduces peripheral resistance reducing the blood pressure (Imming et al 2006:826).

Propranolol: is a beta-adrenergic blocking agent, receptor antagonists and adrenoceptors. The mechanism of action is that it blocks the effects of epinephrine and nor-epinephrine, thereby a decreasing the myocardial response, decreasing the heart rate and the blood pressure. The dose is 40-80mg twice a day. The side effects are headaches and dizziness and bradycardia and hypotension (Imming et al 2006:826).

Amlodipine: is a calcium channel blocker, which blocks the inward flow of calcium ions through active cell membranes. It is an angiotensin receptor blocker. Angiotensin attachment to the receptors causes the blood vessels to constrict which leads to an increase in blood pressure and a raise in blood pressure. Amlodipine blocks the angiotensin receptors, dilates the blood vessels thereby reducing the blood pressure. The dose is 5-10mgs orally daily and the side effects are bradycardia, A-V block, hypotension, sleep disturbances and pedal oedema, dizziness fatigue, and headache (Imming et al 2006:826; Woodrow et al 2011:4).

Methyldopa: Adams et al (2011:314) define methyldopa as a centrally acting agent, an alpha-adrenergic receptor stimulant. It stimulates the alpha adrenergic receptors in the brain thus inhibiting the sympathetic nervous system thereby reducing the peripheral resistance and reduces the blood pressure**.** The dose is 250-500mgs orally three times

a day. The side effects are gastrointestinal disturbances, dry mouth, nasal congestion, stomatitis, hypersensitivity reactions, impotence, failure to ejaculate, drowsiness and decreased libido (Woodrow et al 2011:473).

The list of drugs presented is only a few of the many anti-hypertension drugs. They are of different groups, mechanisms of action, side effects, price with different types of responses of patients to the drugs. Different patients will respond differently to the same drugs in terms of blood pressure control and type or severity of side effects. Hence the dire need for nurses and doctors to be knowledgeable about the different groups of drugs their mechanisms of action, side effects and cost price. They also need to have adequate time to assess each patient, to get a thorough history and to determine the patients' educational level, possibly influencing the level of health education required, and his/her ability to pay for the anti-hypertension drugs for the rest of his/her life. Once the anti-hypertensive drug has been initiated there should be regular interactions between the health worker and the patient to assess the patients' response to the anti-hypertension drugs. The reason is that different people respond differently to the same drug. For example, a drug that may be tolerated very well by one patient may not be tolerated at all by another person. If the patient has not responded favourably to one drug, he/she should be changed to another one until a patient feels better and the blood pressure is controlled.

1.2.10. Adherence to anti-hypertension treatment regimens

Treatment adherence is a complex and dynamic behavioural process (Osterberg & Blaschke 2005:487; Saleem, Hassali, Shafie, Award & Bashir 2010:126). It is strongly influenced by each patient's characteristics, the patients' support system, the environment, the practices of health care providers, and the characteristics and processes of the health care delivery system (Kulger, Vlaminck, Haverich & Maes 2005:28; Higgins 2006:28; Ramli, Ahmad & Paraidathathu 2011:614). The most common barriers to adherence are under each patient's control. Therefore, there is a

need to focus attention on each individual patient's circumstance and to be actively involved in his/her treatment adherence.

Adherence to medication regimens predicts a better outcome for patients. Treating hypertension with medication, combined with lifestyle modifications can substantially reduce the risk of complications, hence the dire need for treatment adherence in patients with hypertension. When there is treatment adherence, there is proper control of hypertension. There is also a better quality of life with reduced risks of complications. Yet, treatment adherence in patients with hypertension remains a major public health challenge in many developing countries. The health professionals should help patients with hypertension, to adhere to their anti-hypertension treatment regimens (Osterberg & Blaschke 2005:488; Vlasnik et al 2005:47)**.**

1.2.10.1 Non-Adherence to anti-hypertension treatment regimens

Non-adherence to prescribed treatment regimens (including life style changes and taking medicines) is associated with uncontrolled hypertension. The consequences are the increased risks of developing complications (Campbell, Petrella & Kaczorowskis 2006:599). The management of these complications is very expensive for the individual, family, community and the nation as a whole (Osterberg & Blaschke 2005:488). This is why it is important for hypertension patients to adhere to treatment regimens to have healthy and productive lives. To combat the problem of non-adherence the WHO (2003:107) published evidence-based guidelines on treatment adherence. The countries were requested to develop country standardised guidelines for hypertension management. These guidelines were developed for use by clinicians, health care managers, policy makers and hypertensive patients with emphasis on prevention, early diagnosis, treatment and treatment adherence (Chobanian et al 2003:1990). Treatment non-adherence might cause many complications. These include strokes, vision impairment, heart attack, kidney disease, disability and morbidity and mortality. The factors influencing non-adherence may be patient-related. These may include level of education and knowledge, family income, cultural beliefs

and understanding regarding hypertension and its consequences, side effects of the drugs, inability to perceive the benefits of controlling their blood pressure, no escort to go to the hospital, no patient education regarding complications by the health care providers. It is necessary to identify such factors from the hypertensive patients' perspectives and develop strategies to improve their adherence levels to limit complications (Krousel-Wood, Thomas, Muntner & Morisky 2004:357).

However, treatment adherence levels and the influencing factors among hypertensive patients, at the QECH hypertension clinic in Blantyre, are not known. This study investigated treatment adherence and the factors influencing such adherence levels in patients with hypertension at QECH.

1.2.11 Malawi's attempts to diagnose and treat hypertension through its health services delivery system

The discussion in this section focuses on the diagnosis and treatment of hypertension in Malawi as attempted by Malawi's MoH. Private health care practices fall beyond the scope of the current study.

1.2.11.1 Health services delivery in Malawi

Malawi's MoH has the overall responsibility of providing leadership, co-ordination of policy development and provision of health services in Malawi. It is the largest provider of health services and covers 60.0% of all health services. The health care delivery system is organised at three levels, which are primary, secondary and tertiary, linked through a referral system, according to the Malawi National STEPS Survey (MoH/WHO 2010:9).

The primary level of health care provision is where a patient makes an initial contact with the health care provider at the nearest health facility, provided through outreach

programmes, dispensaries/health posts, health centres as well as community hospitals. The health care provider is a medical assistant, who undergoes a two year clinical learning programme. The services mostly focus on the prevention of diseases with prescription of basic drugs. There is also a nurse technician with a certificate or diploma, health surveillance assistant and an attendant. If there is no improvement, the patient is referred to the secondary level care (MoH/WHO 2010:9).

Secondary level care is offered at a district hospital. The health care provider is a clinical officer, who undergoes a three year clinical learning program. The services are mostly curative, following a detailed assessment and laboratory investigations. There is a wider range of drugs for the diseases and conditions. If there is no improvement, the patient is referred to a tertiary level of health care. Secondary level health care is provided through the district and Christian Health Association of Malawi (CHAM) hospitals. The provider of care is the clinical officers who undergo three year training programmes. The services are mostly curative with a moderate level of prescribed drugs (MoH/WHO 2010:9).

Tertiary level health care is provided at referral hospitals and at four central hospitals, one in the north, one in the centre and two in the south. The services provided at central and referral hospitals are mostly curative following assessments using modern technology including laboratory investigations and radiography. The health care providers are doctors and/or specialists.

However, this categorisation of health care levels of services is a guide but due to the unavailability of alternative facilities within the catchment areas, the district, CHAM hospitals and central hospitals also provide primary level care step (MoH/WHO 2010:9). Hypertension is managed at primary level where prevention messages are given to people. It is managed at secondary level, where (once diagnosed with hypertension), lifestyle modification and anti-hypertension drugs are prescribed. Patients who have experienced complications of hypertension such as strokes, heart

attack, vision impairment and kidney failure are referred to the tertiary level for specialist management and rehabilitation.

1.2.11.2 *Malawi's geographic location*

Malawi is a land locked country in the Southern-Central Africa. Its land area comprises about 118 484 square kilometres. It is 901kilometers long and 180 kilometers wide. One third of the land is occupied by Lake Malawi. The 2010 Populations and Housing Census estimated Malawi's population to be about 13 million (MDHS 2010:2). Of this population, 85.0% live in rural areas. Malawi shares boundaries with Tanzania to the north and northeast, Zambia to the west, Mozambique to the southeast, south and south west. Malawi is divided into three regions, northern, central and southern. The regions are further divided into 28 districts. One of the districts in the southern region is Blantyre where the study was conducted (Report of Malawi National/WHO STEPS Survey 2010:7).

1.3 STATEMENT OF THE PROBLEM

In Blantyre at QECH, the adult medical wards reported 55 admissions due to strokes between January and March 2007, 58.0% were females, and 42.0% were males with an inpatient mortality rate of 23.0% (Mahawish & Heikinheimo 2010:25). Hypertension can have potentially life-threatening complications which can be avoided if hypertension is treated successfully, provided that patients adhere to their prescribed treatment regimens. Non-adherence to prescribed treatment increases the patient's risk for complications secondary to uncontrolled hypertension. Despite these statistics, no study had been done at QECH, Blantyre, to establish hypertensive patients' levels of treatment adherence and the factors influencing patients adherence levels to their anti-hypertensive treatment regimens. The principal questions that needed to be answered were: "What are hypertension patients' treatment adherence levels? What factors influence hypertension patients' treatment adherence at QECH hypertension clinic?"

1.3.1 Purpose of the study

The principal questions that needed to be answered were: “What are hypertension patients’ treatment adherence levels? What factors influence hypertension patients’ treatment adherence at QECH hypertension clinic?" The purpose of the study was to investigate levels of adherence to anti-hypertensive treatment regimens, and to identify the factors influencing hypertension patients’ adherence levels at QECH in Blantyre.

The research findings could help policy-makers and health care providers to address factors influencing hypertensive patients’ low levels of adherence to their treatment regimens. Enhanced adherence levels to anti-hypertensive treatment regimens could help to reduce patients’ blood pressure levels, and reduce their risks of hypertension-related complications, including strokes.

1.3.2. Specific objectives

The first objective of this study was to establish hypertensive patients’ levels of adherence to their treatment regimes. The other objectives attempted to provide a factual basis for determining the potential influence of specific factors on the hypertensive patients’ treatment adherence levels, by calculating correlations of specific variables. These objectives aimed to:

- identify hypertensive patients’ knowledge of hypertension and of, non-pharmacological and pharmacological management of hypertension
- identify hypertensive patients' perceived susceptibility to potential complications attributable to hypertension
- identify hypertensive patients’ perceptions of the severity of hypertension complications

- determine hypertensive patients' understanding of benefits of treatment adherence
- describe hypertensive patients' perceived barriers to treatment adherence
- describe hypertensive patients' cues to action and self-efficacy for treatment adherence

1.3.3 Significance of the study

The findings from this study might:

- reveal treatment adherence levels among patients suffering from hypertension at QECH and shortcomings in the Malawi's current hypertension management guidelines, strategies and education interventions and their evaluation plans. These revelations might inform policy, which might improve treatment adherence, knowledge of perceived susceptibility, and severity of complications, and perceived treatment benefits amongst patients with hypertension at QECH in Blantyre as a follow-up activity after the current study.
- expose motivators and barriers affecting patients' treatment adherence which might inform interventions at QECH
- provide research-based inputs to the national policy-makers concerned with non-communicable diseases.
- generate topics for future research.

By using the HBM (developed in the USA) to contextualise this study's findings, the usefulness of the HBM for enhancing the understanding of hypertensive patients' adherence behaviours has been demonstrated. The use of the MMAS-8 scale (also developed in the USA), translated into the local language, demonstrated that similar factors influence patients' adherence behaviours in different parts of the world. Hypertensive patients had the opportunity to voice their opinions about the

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management of their treatment and these findings could help health care providers to prescribed appropriate anti-hypertensive regimens.

The significance of enhancing the adherence of hypertensive patients to their treatment regimens cannot be overemphasised. Reductions in hypertension have been correlated with reductions in the incidence and recurrence of strokes (Monahan et al 2007:1422). In the USA approximately 500 000 first time stroke episodes are reported annually. Although the mortality rate is 15%, "…stroke leaves about 30% of its victims with mental and physical disabilities that require ongoing assistance with activities of daily living… This leaves a pool of more than 1 million people who are currently partially or totally disabled from stroke [in the USA]…" (Monahan et al 2007:1422).

1.4 THEORETICAL FRAMEWORK: THE HEALTH BELIEF MODEL

The Health Belief Model (HBM) was used as a theoretical framework that guided the study. It guided the development of the research objectives, the development of the structured interview schedule, the organisation of the literature, the presentation and discussion of the results.

1.4.1 The importance of a theoretical framework

Burns and Grove (2011:239) stated that every quantitative study has a framework. In this study the HBM provided the theoretical framework (Glanz, Rimer & Lewis 2002:42). The importance of a theoretical framework is that it guides the research process. According to Polit and Beck (2010:209) the theoretical framework guides the formulation of study objectives, the search and presentation of literature, the development of the data collection instrument, presentation of results, and discussion. Burns and Grove (2011: 238) state that the framework enables the linkage of the findings of the study to nursing's existing body of knowledge. The framework is also an indication that the quantitative study was well-developed.

This thesis was guided by the HBM because it states that health behaviour is influenced by a person's perception that a health problem poses a threat. It has a systematic method to explain and predict preventive health behaviours (Glanz et al 2002:44). It was relevant and applicable and guided the study about patients' hypertension treatment adherence levels and factors influencing such treatment adherence levels. To meet these objectives it was necessary to identify patients' knowledge of hypertension, non-pharmacological and pharmacological management; identify patients' perceived susceptibility for complications; identify patients' perceptions of severity of hypertension; determine patients' perceptions of benefits of treatment adherence; describe patients' perceived barriers to adhering to treatment and describe the relationship between patients' treatment adherence levels and hypertension control.

1.4.2 Origin and contributions of the Health Belief Model

The Health Belief Model (HBM) was developed by three social psychologists, namely, Hochbaum, Rosenstock, and Kegel who were working in the United States Public Health Service. These social psychologists developed the HBM to learn how individuals make decisions about health-related behaviours. The authors wanted to understand: why some people take specific actions to avoid illness, while others fail, what determines health behaviour, why they do not adhere to other kinds of health care regimens; and finding ways to stimulate positive behaviour changes (Glanz et al 2002:42). They wanted to understand the people's failure to engage in preventive health measures and the minimal connection between patients' symptoms and their adherence to medical regimens.

The theory was developed with a philosophical basis that health related-behaviour is influenced by a person's perception that a health problem poses a threat, thus a value attached to actions aimed at reducing the threat, a value-expectancy theory. The value expectancy theory concepts were reformulated in the context of health behaviours. The interpretations were that, the desire to avoid illness or to get well is a value. While as,

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the belief that a specific health action available to a person would prevent illness is an expectation. This implies that in a patient with hypertension, the desire to prevent complications is a value. While as, the belief that adhering to a treatment regimen would prevent complications is an expectation. The expectation was further broken down and described as the individuals' estimation of personal susceptibility to and the severity of an illness, and the likelihood of being able to reduce or prevent the threat through a sustained activity (such as, taking anti-hypertensive medications as prescribed). The model development was also influenced by Lewin's theory which states that it is the world of the perceiver that determines what an individual will and will not do; the individual is the locus of change (Janz, Champion & Strecher in Glanz, Rimer & Lewis 2002:47).

1.4.3 Components of the Health Belief Model

The major components of the HBM are displayed in figure 1.2 and will be discussed in the following sections.

1.4.3.1 Perceived susceptibility

This is one's belief, and /or one's assessment regarding the risk of contracting a health condition or problem (Glanz et al 2002:48). In case of medically established illness, it includes the individual's acceptance of the diagnosis, complications and individual estimates of re-susceptibility to the illness.

1.4.3.2 Perceived severity

This HBM component refers to one's belief of how severe a condition and its consequences are (Glanz et al 2002:48). People tend to act when they are afraid of a pending consequence.

1.4.3.3 Perceived benefit

This HBM component implies one's belief that a given treatment will cure the illness or help to prevent it. A belief that the advised behaviour will reduce the risk or seriousness of impact (Glanz et al 2002:48), will help people to remain motivated to adhere to the advised behaviour(s).

1.4.3.4 Perceived barriers

These aspects are potential negative aspects to undertaking the recommended behaviour. This means that an individual undergoes an unconscious cost benefit analysis whereby, these actions' expected effectiveness are weighed against the perceived cost and/or unpleasantness; then behaviour might be omitted to avoid the current unpleasant experience (Glanz et al 2002:48). Thus if an individual's own analysis makes him feel that there is a current hindrance or a potential negative aspect to following the behaviour, he/she will avoid the potential negative consequences and will not adhere to the recommended health behaviour.

1.4.3.5 Cues to action

Cues to action refer to one's readiness, motivation and courage to change behaviour based on external influences that are available to promote the desired behaviour(s) (Glanz et al 2002:48).

1.4.3.6 Likelihood to taking recommended treatment

This aspect imply the motivation and self-confidence to change the habitual behaviours and to trust one's ability to do something (Glanz et al 2002:48).

1.4.3.7 Modifying factors

Modifying factors are the demographic variables, age sex religion ethnic group and psychosocial variables, educational level occupation and marital status

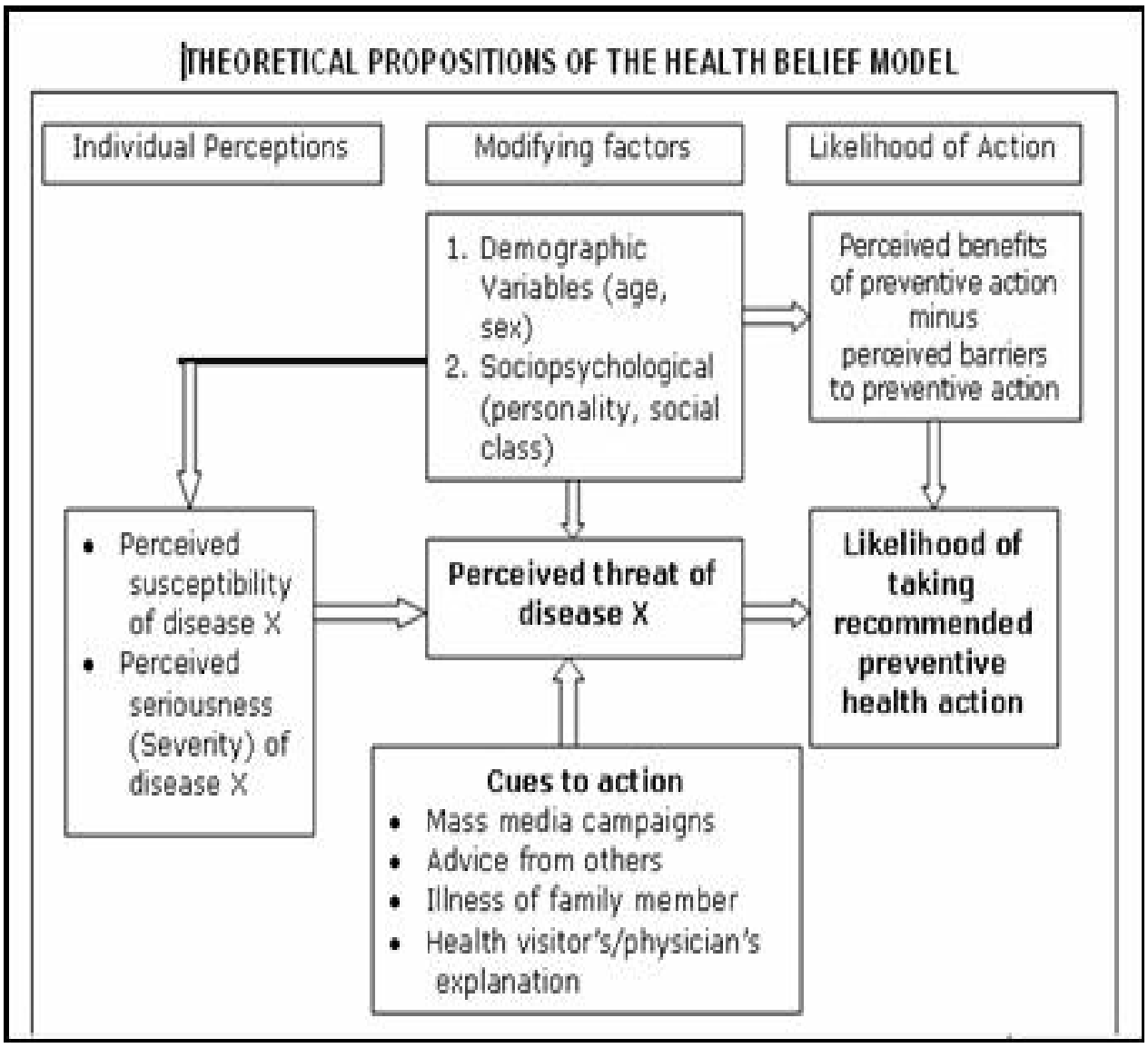

Figure 1.1: The Health Belief Model (Source: Janz et al in Glanz et al 2002:45)

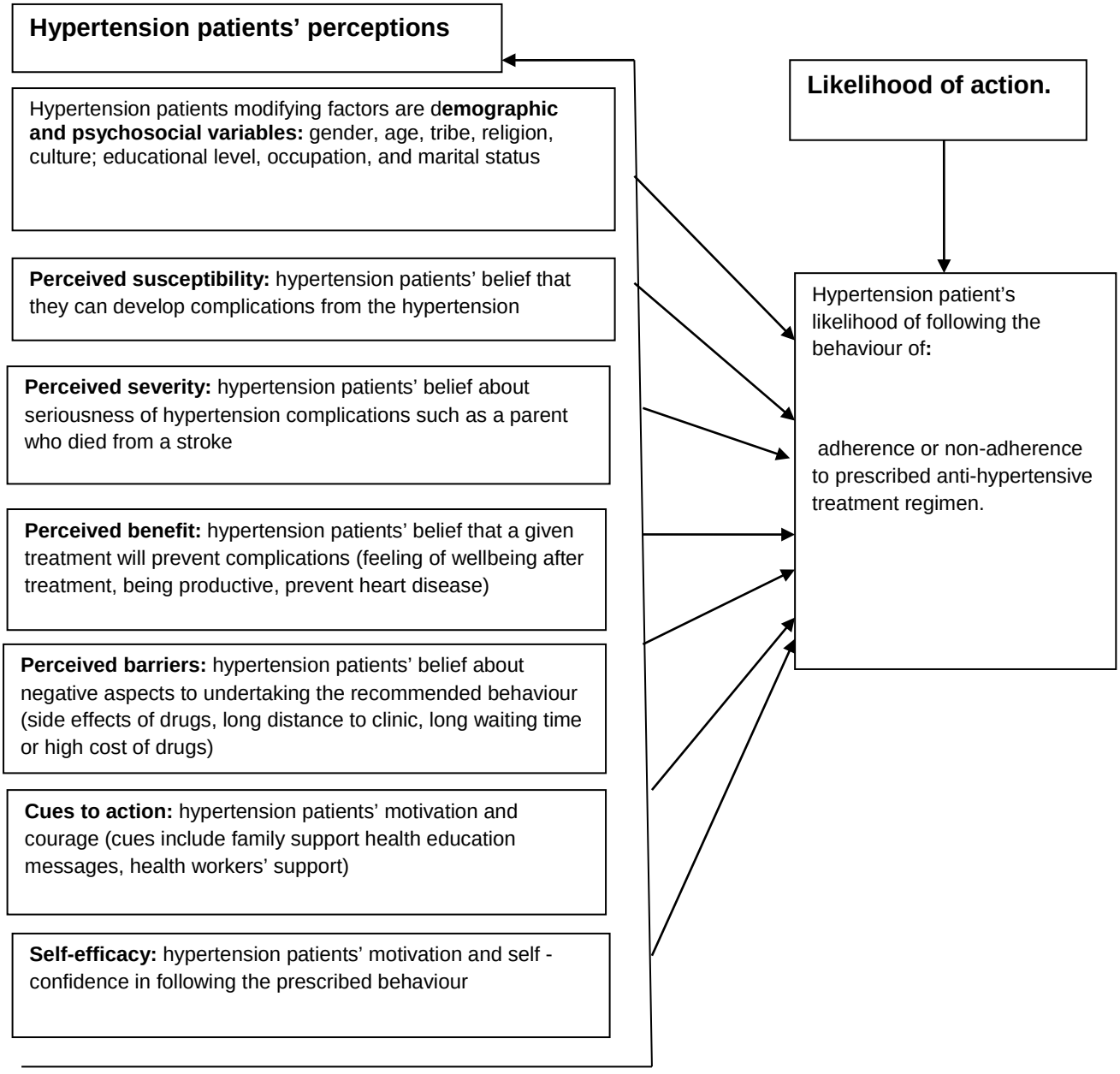

Figure 1.2: The adapted Health Belief Model (from Janz et al in Glanz et al 2002:45).

1.4.4. The adapted Health Belief Model and operational concepts' definitions

In the following sections, the HBM's major components will be operationalised and applied to the current study.

1.4.4.1 Modifying factors that could influence patients adherence to anti-hypertension treatment

In this study, the modifying factors for the patients suffering from hypertension include the demographic factors such as gender, age, tribe, religion, educational level, occupation and marital status and beliefs about the seriousness of potential complications of suffering from hypertension. Modifying factors include the patients psychosocial factors such as educational level, occupation and marital status of the patients suffering from hypertension (see figure 1.2).

1.4.4.2 Patients' perceived susceptibility to complications of hypertension

The patients' perceived susceptibility referred to their acceptance of the condition of hypertension and risk of ensuing potential complications. If patients suffering from hypertension do not perceive and believe that the condition has a risk of complications, they might not adhere to the treatment. But if risk is perceived as potential, the patient might engage in certain behaviours to reduce the risk of complications (Chen, Tsai & Lee 2009:2234).

Therefore, the study investigated patients' acceptance of the condition, knowledge of its symptoms, the diagnosis and management, and risks of complications; how the knowledge influenced their adherence to the prescribed lifestyle modifications, and anti-hypertensive treatment regimens for controlling their blood pressure levels (see figures1.1 and 1.2).

1.4.4.3 Patients' perceived severity of complications of hypertension

If patients with hypertension perceive the complications of hypertension to be severe, fear might influence their adherence to preventive behaviours. On the contrary if patients do not perceive the complications of hypertension to be severe (including death from strokes), they will probably not engage in preventive behaviours and might not adhere to their treatment. Therefore, this study investigated whether patients believed that complications from hypertension were perceived to be severe and how that influenced their likelihood of adherence to their prescribed treatment.

1.4.4.4 Patients' perceived benefits of adhering to their anti-hypertension treatment regimens

If the patients suffering from hypertension believed that there was a benefit in taking the drugs, and in acting as advised, they might adhere to treatment and to the advice given to them. Therefore, this study investigated what patients perceived to be benefits of adhering to prescribed treatment, and how these benefits influenced their adherence behaviours (see figure 1.2).

1.4.4.5 Patients' perceived barriers to adhering to anti-hypertension treatment regimens

If the patients with hypertension perceived negative aspects of treatment, for example the side effects or the cost of the drugs, then they might choose the action of being non-adherent. Therefore, the study investigated the patients' perceived barriers (negative aspects) to adhering to the recommended behaviours and how they influenced patients' adherence behaviours.

1.4.4.6 Patients' cues to action to adhere to their prescribed anti-hypertension treatment regimens

Family support and health care workers' support, education messages on hypertension, its treatment and complications are some cues to action. Therefore, this study investigated hypertensive patients' cues to action, and whether the cues influenced them to adhere to their prescribed treatment regimens (see figure 1.2).

1.4.4.7 Patients' intentions to adhere to their anti-hypertensive treatment regimens

The hypertensive patients' motivation, self confidence and trust in their ability to change negative to positive behaviours comprise the self-efficacy to adhere to their prescribed anti-hypertension treatment regimens. Therefore, the study investigated hypertensive patients' self-confidence and ability to adhere to their prescribed treatment regimens (see figure 1.2). The six concepts (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy) guided the development of the study's objectives, organisation of the literature review and development of the structured interview schedule (see C & D). They also guided the presentation of study results and the discussion of the findings.

1.5 RESEARCH METHODOLOGY

The research methodology will be discussed in detail in chapter 3 of this thesis. Only the major aspects will be summarised in the following sections of this chapter.

1.5.1 Quantitative descriptive research design

A quantitative descriptive research design refers to the measurement in quantitative ways; the information is collected in quantities/numbers (Maltby, Williams, McGarry & Day 2010:22; Polit & Beck 2008:248; Polit & Beck 2010:235; Schmidt & Brown

2012:147). This study used a quantitative descriptive design to identify factors that influence treatment adherence in patients with hypertension at the QECH hypertension clinic. A structured interview schedule comprising 101 questions was used for data collection and is discussed in Chapter 3.

1.5.2 Ethical considerations

The main ethical considerations in this study included voluntary participation, reduction of risks, avoiding harm, obtaining informed consent and ensuring privacy and confidentiality of respondents. The ethical considerations, as applied to this study, are discussed in detail in chapter 3.

1.6 STRUCTURE OF THE THESIS

The thesis has the following structure:

Chapter 1: Introduction and background information.This chapter provides the introduction to and background information about hypertension and treatment adherence, problem statement, and significance of the study. This is followed by a presentation of the purpose of the study, objectives guiding the study, an explanation of the HBM, definitions of terms used in the thesis, research methodology and ethical considerations.

Chapter 2: Literature review. This chapter presents information that is already known about hypertension problems, aetiology and impact, treatment adherence, tools for measuring adherence, models of adherence, factors influencing adherence, modifying factors, demographic and psychosocial variables and treatment adherence, cigarette smoking and hypertension, stress and hypertension, treatment adherence in patients with hypertension, hypertension patients' perceived susceptibility to potential complications of hypertension, perceived severity of complications of hypertension, perceived benefits of treatment adherence, perceived barriers to treatment adherence

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and patients cues for adherence to treatment, patients self-efficacy and likelihood of adherence and contextualising the literature within the HBM.

Chapter 3: Research Methodology. The chapter presents the research design: the study setting, study population, sample, sampling design, sampling frame, selection and calculation of sample size, sampling, sample selection procedure, research instrument, data collection procedure, pre-testing the research instrument, refinement of the instrument, data collection technique, validity and reliability, data analysis dissemination of findings, ethical considerations and limitations of the study.

Chapter 4: Analysis, presentation and description of the research findings. The chapter presents data analysis, the computer programme that was used, presentation of results in tables, figures, bar graphs, discussion of results in relation to similarities and/or differences with those reported in the literature review; including the patients' adherence, factors that influence adherence as per concepts of the HBM. Unexpected results are also discussed.

Chapter 5: Conclusions and recommendations. The chapter presents the synthesis of the research findings in relation to the research problem and objectives, the HBM, limitations of the study, recommendations and suggestions for future studies.

1.7 SUMMARY

This chapter has provided a general background to blood pressure and the problem of hypertension, its prevalence, complications, treatment and treatment adherence and its importance. It has given an overview of the study on treatment adherence amongst patients with hypertension using the HBM as a framework. The aim and objectives of the study are stated. The significance of the study to global health is stated, as well as the needs of Malawi have been provided. The quantitative descriptive research design and method have been summarised. The HBM's concepts of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-

efficacy have been explained. A structure of the thesis has been presented. The next chapter will present an overview of literature reviewed concerning patients' adherence to anti-hypertension treatment

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CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents the review of literature on hypertension and about patients' treatment adherence, measurement and models of adherence, demographic and psychosocial variables and their influence on adherence, individual perceptions and other factors that influence adherence, barriers to treatment adherence, analysis, synthesis and conceptualisation of the literature. Studies done globally, regionally and locally in Malawi will be reviewed.

The search terms included: hypertension, OR hypertension OR contributing factors; OR factors AND compliance OR adherence OR drug adherence; AND Malawi; OR adherence AND Africa OR Sub Saharan Africa OR adherence AND globally; perceptions OR knowledge of drugs AND adherence; AND culture AND adherence OR contributing factors AND adherence.

The search engines were used for the literature search to access research articles related to treatment adherence and the influencing factors in hypertensive patients. These were PubMed Open Access through Google, Google Scholar, Hindawi and Google databases. In addition, the medical, surgical, community nursing books and journals' articles from the libraries at the University of South Africa (Unisa) and the Kamuzu College of Nursing (in Blantyre, Malawi) and the College of Medicine (of Malawi) were used.

2.1.1 The purpose of the literature review

The review of literature available internationally and nationally provided the context for the intendend study. It gave insight into the depth of the existing body of knowledge about hypertension, treatment and adherence to treatment, measurement of adherence, adherence levels and factors influencing treatment adherence. In addition it showed how the area and topic have been previously researched. Furthemore, it helped to identify a gap in the findings of similar studies that were conducted previously elsewhere. The search for literature focussed on articles which were published in English between 2003-2013.

2.2 HYPERTENSION

Hypertension as a global health problem is increasing rapidly. It has been researched widely by the WHO (1999:151), and by the World Health Assembly (WHA) and the WHO Regional Committee for Africa (RCA 2003:1983). Worldwide, the WHO (2011:207) reported that over 80.0% of deaths were caused by non-communicable diseases and hypertension was one of the major causes of these deaths. Hypertension may be prevented because its risk factors are known. The risk factors include tobacco smoking, harmful use of alcohol, physical inactivity, obesity, diets high in saturated fats and sodium, low intake of fruits and vegetables (Addo et al 2007:1012; Middleton 2009:15; WHO 2003:1983; Msyamboza et al 2010:87; Msyamboza et al 2011:3; Maher, Waswa, Baisley, Karabarinde & Unwin 2011:1061). Hypertension occurs in low and middle income countries (Holmes Jr., Hossain, Ward, & Opara 2013:5).

During 2003, the WHO indicated that even in the developing countries of the world, hypertension and its risk factors were causing a rise in untimely deaths (WHO 2003:1983). More deaths might be due to hypertension than in the developed countries (Addo et al 2007:1015).

Previously, hypertension was considered to be a health problem of the developed countries. This might explain why many developing countries did not list hypertension as a priority health problem and did not devote the attention hypertention required in their health departments (Hareri & Abebe 2013:6). Hypertension remains a neglected health problem because acute conditions get more attention with the largest portion of the budgets in health departments and hypertension continues to be neglected while it continues to kill people silently (Addo et al 2007:1012; Middleton 2009:13).

In SSA hypertension has been more prevalent in urban than in rural populations (Addo et al 2007:1012). The hypertension prevalence rate in SSA remains high with a rate of 5-20%. In many African countries, basic information regarding the condition of hypertension is lacking, because of the lack of policy and/or the lack of the implementation of existing policies at the health care delivery sites (Addo et al 2007:1014; Ambaw, Alemie, W/Yohannes, Mengasha 2012:282; (Hareri and Abebe 2013:5; Kusuma 2009:267; Msyamboza et al 2011:6; Mweene et al 2010:252; Mufunda, et al 2006:521; Saleem et al 2011: 834). It was believed that hypertension was a condition of the wealthy and the elderly acquired from risks which are expensive to control. Therefore, priority was given to interventions for infectious diseases which are more easily controlled than the chronic condition of hypertension (Holmes Jr et al 2013:1)**.** In south west Uganda the prevalence of hypertension was reportedly 22% both in men and women (Maher et al 2011:106).

In Malawi, hypertension is a public health problem with a prevalence rate of 32.9% with no national policy on hypertension management (Msyamboza et al 2010:88). The QECH, in Blantyre, reported a range of patient admissions with hypertension from 2 769 in 2008 to 2 817 in 2010; and a range of deaths from hypertension complications from 95 in 2008 to 97 in 2010 with no national policy on hypertension (Mahawish & Heikinheimo 2010:25, QECH Report 2008:13; QECH Report 2010:14). At the QECH hypertension clinic, a nurse led intervention study was conducted in 2010 (Starichi, Dreyer & Allain 2011:24). The objective of the intervention study was to examine the effect of an education intervention to patients taking treatment for hypertension control.

Thirty seven hypertension patients were invited to attend a mean of 3.5 individual one-to-one counselling sessions on hypertension, its treatment, and the importance of adhering to treatment. The patients attended counselling sessions over a mean of 118.5 days. The results showed that the proportion of patients reporting that they took their medication on the day of their clinic visit increased from 47% to 86%.

2.2.1 The aetiology and impact of hypertension on patients' quality of life

The aetiology of hypertension is unknown. However, there are factors that predispose a person to hypertension. These are referred to as risk factors. For primary hypertension the risk factors are stress, excessive cigarrette smoking, consumption of alcohol, sodium and saturated fat, obesity and lack of excercise (Addo et al 2007:1012; Halanych, Safford, Kertesz, Pletcher, Kim, Person, Lewis & Kiefe 2010:532; Maher et al 2011:1061. The risk factors for secondary hypertension are diseases and conditions, such as, age and race (Lewis et al 2011:741).

Worldwide, almost 6.0% of deaths are caused by complications of hypertension and it also impacts physically, socially, financially and psychologically on patients' quality of life (Saleem et al 2011:834). Physically the condition causes a reduction in the ability to carry out their activities of daily living due to heart palpitations, weakness, dizziness and headaches. Socially and financially, the impacts are on patients' inability to socialise as the patients lose income because they have to quit their current jobs due to weakness when they suffer a complication such as a stroke, heart attack or kidney disease. In addition, life adjustment is done to accommodate costs of physicians, diagnostic tests and medicines which could make life more difficult for the patient and his/her family. Psychologically, the patient feels disturbed and isolated, because of the negative impacts of the condition limiting her/his ability to work, to socialise and incurring costs on the family members. But when patients adhere to their treatment the negative impacts could be minimised.

2.2.2 Treatment adherence

The WHO defines treatment adherence as the extent to which a patient's behaviour of taking medications, following a diet and/or executing lifestyle changes, corresponds with the recommendations of the health care provider (Chobanian et al 2003:1213; Lilley et al 2011:386). Generally, treatment adherence is higher among patients with acute conditions. This is because the treatment is taken for a short period of time and the patient expects the acute condition to be cured after a limited period of adhering to his/her treatment regimens. However, in patients with chronic conditions, such as hypertension, adherence is lower because the treatment has to be taken every day for the duration of the patient's life. Therefore, patients could discontinue their medication within six months of taking them as they might regard swallowing drugs to be tiresome.

In some trials there have been adherence rates of 43.0-78.0% among patients receiving treatment for chronic conditions.

The mean adherence rate for anti-hypertensive patients in developping countries is low and it ranges from 50.0-70.0%. Adherence to lifestyle modifications has been reported to be as low as 10.0% which is inadequate to cause any blood pressure reduction (Osterberg & Blaschke 2005:487). A WHO report estimates that adherence to anti-hypertensive medications ranges from 52.0%-74.0% when adherence is defined as possession of a medication at least 80.0% of the time (Sabate 2003:207). The following are the rates of adherence that have been reported for other countries; 53.0% in Atlanta (Gatti, Jacobson, Gazmararian, Schmotzer & Kripalani 2009:659); 74.0% in Egypt (Mweene et al 2010:259), 49.0% in Malaysia (Sulaiman et al 2009:38). In Pakistan it was reportedly 77.0% (Hashmi, Afridi, Abbas, Sajwani, Saleheen, Frossard, Ishaq, Ambreen & Ahmad 2007:1315), 69.2% in Addis Ababa, 75.0% in Nigeria, 73.0% in India, 72.0% in Turkey (Hareri & Abebe 2013:5), 46.0% in the Seychelles, Praslin Island (Edo & De Villiers 2012:4), and 76.0% in Zambia, Lusaka (Mweene et al (2010:259).

These reported rates of adherence in most of these countries are inadequate to effect blood pressure control (Osterberg & Blaschke 2005:488). However, other studies, that focused on anti-hypertensive drug adherence have reported that there is no standard for what constitutes adequate adherence, but an adherence rate of 80.0% to 95.0% is considered adequate to control hypertension (Higgins 2006:28; Osterberg & Blaschke 2005:490; Ramli et al 2010:214; WHO 2003:1983). In Scotland the adherence rate was reported to be 91.0% (Inkster, Donnan, MacDonald, Sullivan & Fahey 2006:295), and 88.6% in Kuwait (Hareri & Abebe 2013:5). According to the WHO (2003:488), an adherence rate of more than 90.0% is desirable for effective control of hypertension and for the prevention of complications.

2.2.3 Tools for the measurement of patients' adherence to anti-hypertension treatment

Different tools have been used to measure patients' adherence to anti-hypertension medication. The methods of measuring adherence can be divided into direct (objective) and indirect (subjective) ones. Adherence to medication, pertains to records indicating whether the patient had taken the prescribed doses at the correct times or not. The challenge is that it is difficult to measure adherence accurately because there is no best measuring tool for medication adherence as each one has its advantages and disadvantages (Osterberg & Blaschke 2005:488). The following are some of the measuring instruments that were used in this study: the 8-item Morisky Medication Adherence Scale, fivepoint Likert scale and retrospective medication record reviews.

2.2.3.1 The 8-item Morisky Medication Adherence Scale (MMAS-8)

The MMAS-8 is an adherence measuring tool. It was originally a four-item self-reported questionnaire to assess medication adherence. Through research it was later improved to eight-items (Morisky, Ang, Krousel-Wood, & Ward 2008:348). It is a structured, self-reported scale. The instrument comprises closed-ended questions. The closed-ended questions require the patient to tick from the predetermined response options of No=1

or Yes=0 for 7 items. The last item is a five point Likert scale. The items, once scored by the patient, are coded in reverse response in a positive direction for item number 5, and according to the standardised code for item 8 (0-4) resulting in a scale from low adherence to high adherence. The total scale has a range of 0 to 8.0. If a patient scores <6, it indicates low adherence, 6 to <8 indicates medium adherence, =8 indicates high adherence.

2.2.3.2 Five point Likert scales

In a five point Likert scale, the patient must rate him/herself on a scale of 0-5 for each item. The scores are, strongly agree-5, moderately agree-4, agree-3, strongly disagee-2, moderately disagree-1, disagree-0. The same is done for all the items and then the total score is obtained by adding all the scores selected by the patient. It is objective, simple and easy to score if the participants are literate. But if the patient is illiterate the five points might be difficult to differentiate the parameter of agree and moderately agree, strongly agree. For illiterate persons, the three point scale is easier to rate, agree-3, disagree-2 and don't know-1.

2.2.3.3 Retrospective medication record reviews

This method makes use of the patients' diaries where all previous records regarding prescribed treatments are recorded. Therefore, the patients' adherence is measured against the duration of time when the patient comes for review versus the number of tablets supplied to the patient. It is objective, simple and easy. However the argument remains that the previous medication in the patient's record does not guarantee that the drugs were actually taken.

2.2.4 Models of adherence

According to Osterberg and Blaschke (2005:490) there are two models of adherence, guiding the description of factors that influence treatment adherence in patients with

chronic conditions and diseases (Kalogianni 2011:157; Mweene et al 2010:253). There is a chronic care model that describes the provider factors affecting adherence (Barksdale 2009:53). The model is subjective in that it only focuses on the provider factors. Barksdale (2009:55) described the model with emphasis on cultural competency, sensitivity, awareness, knowledge, skill, encounters, desire, barriers, and cultural context as characteristics a provider should possess to achieve treatment adherence. Culture means a group of people who share beliefs, values, and customs, practices or behaviours (Wild, Grove, Martin, Eremenco, McElroy & Verjee-Lorenzo 2005:96).

There is a three-factor model of adherence in the SSA region. It refers to the three factors that influence treatment adherence that focuses on the patient/family factors, disease factors and treatment regimen factors. The model is subjective in that it only focuses on the three factors when there are more players involved in treatment adherence in chronic patients. In addition to this there is a six factor model that focuses on the patient/family, health care system, health care provider, medication-related issues, disease-related issues and the nature and availability of services. In this thesis the six model factor was adopted to describe factors that influence treatment adherence in patients suffering from hypertension (Ambaw et al 2012:285; Kalogianni 2011:157; Mazzaglia, Ambrosioni, Alacqua, Filippi, Sessa, Immordino, Borghi, Brignoli, Caputi, Cricelli & Mantovani 2009:1598; Mweene et al 2010:252; Osterberg & Blaschke 2005:487; WHO-ISH (2003:1988). The six factor model of adherence is objective in that it focuses on six factors of treatment adherence which is a behaviour, an attitude and a practice issue.

The process of achieving high treatment adherence rates requires efforts from all multi-fasceted factors. The patient and the doctor should develop a mutual relationship of trust and openness, the health care system and nature of service, should be patient-centred by responding to the needs of the patients timely. This would help nurses and other health care providers to understand the determinants of adherence to prescribed

anti-hypertensive treatments in patients with hypertension. The facility should allocate a budget that enables patients to get their anti-hypertensive drugs throughout the year.

2.2.5 Factors influencing patients' anti-hypertension treatment adherence contextualised within the major tenets of the HBM

The HBM has been adapted to describe characteristics and perceptions of patients with hypertension at QECH and how their perceptions influence their behaviour to adhere to the prescribed anti-hypertensive treatment regimens. Patients will follow a behaviour in fear of/or avoidance of the pending threat or for an expected benefit resulting from a specific behaviour. In the process of following the behaviour a benefit will follow, such as, a reduced blood pressure reading. This benefit will be perceived by the patient since there will be no dizziness, heart palpitations and headaches, associated with hypertension. With the patients' perceived susceptibility, regarding a chance of getting a condition, and/or complications, and the benefit he/she might be more likely to adopt a behaviour to minimise complications and get some expected benefits.

Perceived severity implies that a patient with hypertension, who believes in the seriousness of the complications of hypertension, might be more likely to change his/her behaviours to minimise the complications from occuring. The combination of susceptibility and severity has been termed perceived threat. A perceived benefit implies that if a patient perceives gain, or comfort he/she will be more likely to adhere to a health action, such as reducing salt intake and engaging in excercises and taking medications consistently to benefit from a reduction in hypertension. Patients who expect a benefit from an activity, for example, a reduction in hypertension following a reduction in weight, are more likely to change their risky behaviour for health actions without coercion (Farsi, Jabari- Morouei, Ebadi Abas & Asad Zandi 2009:61; Fingeld, Wongvatunyu, Conn, Grando & Russell 2003:288; Janz et al in Glanz, et al 2002:47).

The contribution of the HBM is that it has been previously used by other researchers to guide their research. Mei-Fang, Ruey-Hsia, Joanne, Chung-Ting, Donald Dah-Shyong Min-Nan and Li-Jen (2011:40), conducted a study in China to understand caregiver factors influencing childhood influenza immunisations. The results showed that those caregivers, who perceived their children to be at risk of contracting the disease took their children for immunisation, and those who did not, did not take their children for the immunisation. Rawlett (2011:18) conducted an analytical evaluation of the HBM and the vulnerable population's conceptual model applied to a medically underserved, rural population of Conowingo, Maryland in the USA. The results showed that even in the medically underserved rural populations, those who perceived a benefit of the service, used it but those who did not expect any benefits decided not to use the service. Glanz et al (2002:47) conducted a study to investigate the relationship between perceived susceptibility to tuberculosis and perceived benefits from obtaining a mobile x-ray screening.

It was discovered that amongst those who reported a perceived susceptibility to develop tuberculosis and a perceived benefit of x-ray screening, 82.0% had x-rays taken. But, amongst those who perceived the opposite, only 20.0% accepted to undergo the x-ray screening test. The model has since been used by various researchers conducting studies amongst various populations to explain the factors and the behaviours, thereby, intervene accordingly, to benefit the populations. Chen, Wang, Schnuder, Tsai, Jiang, Hung and Lin (2011:32) conducted a study that was guided by the HBM. The purpose of the study was to understand the factors that influenced the caregivers to take their under-five children for the childhood influenza vaccinations. This model was chosen as being suitable for this study because it consideres various individual perceptions that direct a person’s choice of behaviour (Janz et al 2002:45). Using this model might provide a more comprehensive approach to understanding patients with hypertension and their treatment adherence behaviours at QECH.

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Holt, Muntner, Joyce, Webber and Krousel-Wood (2010:482) conducted a study in South Eastern Louisiana in the USA, to examine the association between health-related quality of life and anti-hypertension medication adherence among older adults with hypertension. The results showed that those patients who perceived a benefit in taking anti-hypertension medication and experienced the quality of life adhered to their anti-hypertension drug regimens, while those who did not perceive the benefit did not adhere to their anti-hypertension drug regimens. The model is based on the idea that people behave according to what they feel will benefit them, make them feel comfortable and not threatened, will avoid any negative consequences. This model was chosen by the researcher as suitable for this study because it looks at various individual perceptions that direct a person's choice of behaviour (Janz et al in Glanz et al 2002:45). Using this model might provide a more comprehensive approach to understanding patients with hypertension and factors influencing their level of treatment adherence at QECH.

2.3 MODIFYING FACTORS INFLUENCING TREATMENT ADHERENCE; DEMOGRAPHIC AND PSYCHOSOCIAL VARIABLES

The patients with hypertension in developed and developing countries experience specific problems related to the nature of the disease and the patients' perceptions of the condition. Since they are centered on the patients' characteristics and individuals' perceptions, they are referred to as patient-centered factors that influence anti-hypertension treatment adherence. These characteristics and individuals' perceptions form a basis or a frame of reference upon which their life decisions, actions and/or behaviours are grounded, which might be associated with their intentions and behaviours to adhere to anti-hyertensive treatment regimen. The factors which influence treatment adherence are associated with demographic variables, such as gender, age, tribe, religion, and psychososiol variables such as educational level, occupational and marital status.

Patient/family-related factors

These demographic variables might influence patients' perceptions of the condition, its treatment, complications and benefits of treatment. For example, the patient's level of education might help him/her to perceive the benefits of treatment to reduce the risk of complications such as heart failure. The patient's education level could also assist him/her to understand the severity of potential complications of hypertension (Mweene et al 2010:253). Understanding patients' perceptions of hypertension treatment adherence requires a model that could explain why people behave the way they do (Glanz et al 2002:42). It is important for health workers to understand their patients' knowledge, educational level, strengths and weaknesses and use that to help them to perceive the benefit (importance) of treatment adherence to reduce the risk of complications from hypertension. Patients' knowledge levels about hypertension might improve their perceptions and their treatment adherence levels. This could be achieved through health education. Providing information is a health worker's responsibility, and a patient's human right because information empowers the patient to make informed decisions regarding their health and life (Schmidt & Brown 2012:26). However, Middletons' study (2009:12) reported that among African-Americans, factors related to uncontrolled hypertension did not include a lack of knowledge nor a lack of access to health care services due to costs. Although these persons were knowledgeable about hypertension and they had health insurance, their hypertension was not controlled. The factors that caused non-adherence to treatment regimens thus excluded a lack of knowledge and the inaccessibility of health care services. This is why it is important to involve the patients themselves in the management of their hypertension to understand their perceptions.

Socio-economic and structural factors also influence treatment adherence and requires social support and an environment conducive to treatment adherence. Most health facilities lack effective social support networks for chronic conditions such as hypertension. If the environment is intended for acute conditions, patients with chronic conditions might be ignored, because preference might be given to patients with acute

conditions. This creates an unfavourable environment that might negatively affect patients' adherence to treatment. Lack of effective social support networks and unstable living circumstances are additional factors that could create an unfavourable environment for ensuring adherence to treatment. People who are hard to reach such as the homeless, the unemployed and the poor and those who live far away from the health facilities might encounter more problems to adhere to their treatment than other persons (Mazzaglia et al; 2009:1598; Mweene et al 2010:252; Osterberg & Blaschke 2005:487).

Culture is referred to in various contexts pertaining to the anti-hypertension treatment adherence. The description of culture includes cultural knowledge, awareness, encounters, skills, desires, preferences and barriers (Barksdale 2009:55). Some patients might not be aware of or believe in the need and importance for treatment of an asymptomatic condition and culture might influence these patients' decisions and/or perceptions. Health workers need to be culturally sensitive, so that they provide culturally sensitive and competent services and advice to patients with hypertension to enhance these patients' treatment adherence levels. Cultural sensitivity refers to being receptive to differences between and among cultural groups and skilfully interacting with patients who have different cultures from their own. Cultural competency is a process of delivering health care within the context of patients' beliefs, values and customs. Patients suffering from hypertension might have their own beliefs about their condition and treatment. If health care providers are good listeners, they could learn much that could improve patients' treatment adherence levels.

Culture does not only have a group definition, it has an individual one. Culture plays an important role of shaping peoples' behaviour and practices (Kazembe 2007: 48). One of the cultural practices is the use of traditional medicines made from herbs as well as from plant and animal materials (Kazembe 2007:58; Robinson & Zhang 2011:2).

People with hypertension have their own way of describing their hypertension and its treatment and complications. There are some people within the communities who

assist others with traditional healing and are referred to as spiritualists (Kazembe 2007:59). The spiritualists specialise in diagnosing and prescribing traditional medicine based on beliefs and values.

In African cultures, many patients suffering from hypertension, would seek traditional counselling and medicines before they visit Western health care services. These two cultural beliefs might cause conflicts in the patient who could quit his/her prescribed Western anti-hypertension treatment. Some traditional dealers could advise their patients to take both traditional and Western medicine as they complement each other (Kazembe 2007:59). This might not be the case as very limited research has been done about cultural treatment. Some herbs might counteract the actions of anti-hypertension drug preventing any improvement in the condition. Others could increase the action of anti-hypertension drugs to the extent of causing life-threatening situations of hypotension. Other traditional healers would tell their patients to take their traditional medicines and stop the Western drugs as they counteract each other's mechanism of action. If patients stop taking their anti-hypertension drugs, they risk incurring the potential complications of hypertension.

Kazembe (2007:62) reported that there are five spirit mediums in Zimbabwe, ranked according to their power hierarchy. These are Gombwe, Sadunhu, Tateguru, N'anga and Shave.

- Gombwe is first level of spiritual power that practices through prayer, dreams divination and sacrificial activities as well as the use of herbs. It is considered to be the most successful cleansing act. It relies more on spiritual power than herbs.
- Sadunhu indicates the second level in spiritual power. Their power comes from the spirit of the original leaders of the clan (ancestors). They do not charge for their services.
- Tategulu is third in the spirit hierarchy. They practice to discover peoples' problems and solutions by working closely with sekulus (grandfathers) and ambuyas (grandmothers). The person with a problem is informed about the

diagnosis before it is presented to the Tategulu. They do spiritual cleansing producers for an illness that might have caused problems (Kazembe 2007:63). The family learns something from the experience of what they should do in future to avoid illnesses. After the cleansing the spirit disappears. It involves large payments to the parties concerned.

- N'anga implies the fourth level of spiritual power for diagnosis and for solving problems. They are the real herbal experts, and receive their powers from the maGombwe and maSadunhu. They rely on their divine gadgets to identify the problem and the type of medicine to prescribe for specific illnesses and problems. They receive some animals' power from maShave. Under N'anga are herbalists, they are not spirit mediums. They are people who have learnt about different herbs through their association with the Gombwe, Sadunhu and Tategulu (Kazembe 2007:64). They charge fees for their services and the herbs. The N'anga who becomes greedy and dishonest will be punished, his or her powers will decline, practices will falter, and patients will stop consulting him/her.
- Shave refers to the fifth level of spirits, associated with some animals and they behave likewise, as a baboon and a leopard. They do have bad spirits that include witching, theft and murder. They also have good spirits that include talent of healing diseases, recovering stolen property, or spirit of getting employment, to hunt and to lead others. A fee is charged for their services (Kazembe 2007:65).

In SSA, over 80.0% of people have reported that they utilised the services of traditional healers before visiting Western health care services/providers (Sato 2012:1). Traditonal medicines are defined as herbs, herbal materials, herbal preparations, finished herbal products, parts of plants or plant materials, and animal parts (Kazembe 2007:58; Robinson & Zhang 2011:2). To increase patients' treatment adherence, health care providers need to understand their patients' beliefs about medication taking. Medication adherence prediction is based on a specific patients' medication taking beliefs (Osterberg & Blaschke 2005:491). It is a belief and a practice that patients who go to Western medical practices will also visit the N'anga, even for the

same illness at the same time. The bond between patient and herbalist lasts even long after the illness has disappeared. The spirit mediums concurred that people visit traditional medical practitioners even during the time they are consulting Western medical practitioners, trying both systems simultaneously. Cultural factors also influence treatment adherence and require cultural understanding, support and an environment conducive to treatment adherence. Globally, individuals have culturally been using, are using and will continue to use traditional medicines, such as herbs. In some developing countries 70-95% of the population rely on traditional medicine for primary health care (WHO 2011:3).

A study at George Town University in Washington DC (Gatti, Jacobson, Gazmararian, Schmotze & Kripalani 2009:659) aimed at examining the relationship between beliefs about medications, health literacy and self-reported medication adherence. Two thousand participants were interviewed for 50 minutes. A baseline self-reported medication adherence was measured using the Morisky 8-item Medication Adherence Scale. The results showed that 53.0% reported low adherence, 53.1%, reported that they sometimes forgot to take their medications and 35.0% reported that they sometimes forgot to take their medication with them when they travelled or left home. About 25.0% reported discontinuing treatment when they experienced side effects. Patients who reported low adherence were younger than those who reported high adherence levels. The multivariate analysis indicated that several factors were associated with low self-reported adherence including negative beliefs about medication, younger age and low medication self-efficacy.

Health care system-related factors

The health care system-related factors influencing adherence include: inaccessibility or limited access to health care, expenses incurred to attend an appointment, long waiting times at health care facilities, unfriendly staff, lack of confidentiality, poor communication and culturally insensitive staff members, using a restricted formulary,

non-availability of drugs, switching to a different formulary when the usual one is unavailable, non-involvement of the patient, using expensive drugs, long distance from home to the health facility, number and spacing of reviews, unable to be seen due to being late for appointment, physicians' fees, diagnostic tests and the cost of the prescribed anti-hypertension drugs (Maghrabi 2013:120; Mazzaglia et al. 2009:1598; Mweene et al 2010:252; Osterberg & Blaschke 2005:487; Saleem et al 2011:836). Patients encountered difficulties to access the health care system because priority is given to those who are acutely sick (Turki & Sulaiman 2010:26). This is the reason why some patients just collapse and die from uncontrolled hypertension "the silent killer" (Osterberg & Blaschke 2005:497; Saleem et al, 2011:386).

In their systematic review Maimaris, Party, Perel, Legido-Quigly, Bulabanova, Nieuwlaat and McKee (2013:100) aimed to identify the health system factors influencing hypertension awareness, treatment and control. The reviewed studies were from low, medium and high income parts in the USA and Mexico. The results showed that physical location of the facility could positively influence patients' awareness, treatment and control when patients walked a short distance to reach the facility and the opposite happened when patients had to walk long distances to reach the facilities.

A Zambian study (Mweene et al 2010:252) at the Lusaka University Teaching Hospital, aimed to determine the prevalence of patients' drug adherence and factors associated with poor adherence to anti-hypertensive treatment. The focus was on patient and health care system-related factors. The design was quantitative, involving 237 patients aged 18 and older who filed self-reports and modified Hill-Bone adherence scales. The results showed an adherence rate of 70.0% using the modified Hill-Bone scale and 83.0% by self-reports. Patients on three anti-hypertension drugs had lower adherence rates (OR 0.21; 95% 95% CI 0.06-0.79) than patients taking only one drug, 60.0%. As many as 83.0% of the patients reported that the prescribed drugs were unavailable at the hospital pharmacy but 79.0% were able to buy these drugs elsewhere.

Health care provider-related factors

Patients with hypertension experience certain problems which are related to health care providers who interact with them. The factors are grouped as health care provider-related factors which improve or pose barriers to patients' adherence to their anti-hypertension treatment regimens. These factors may be related to providers' personal characteristics, attitudes practices and commitment problems (Edo 2009:62; Mazzaglia et al. 2009:1598; Osterberg & Blaschke 2005:487; Saleem et al 2011:836). The WHO guidelines on treatment regimens were developed based on treatment trial results. Therefore, the provider should follow the guidelines to increase adherence. A case report-based survey was conducted in Sweden, to investigate provider-related factors that hindered patients' adherence. Results obtained from 109 questionnaires completed by randomly selected general practitioners, indicated that they failed to adhere to guidelines for the treatment of hypertension. The results showed that general practitioners focused on the hypertension drugs without assessing the entire cardiovascular system profile. The reasons were related to lack of knowledge in assessing individual patients' cardiovascular disease. Patients with the highest risk of cardiovascular disease were not treated appropriately. Furthermore, the blood pressure levels for initiating pharmacological treatment varied widely. Patients were either under or over treated in relation to current guidelines for the treatment of hypertension. The health care providers did not adhere to the treatment guidelines. The patients did not derive the maximum benefits from their anti-hypertension treatment because the general practitioners failed to apply the guidelines recommended for treating hypertension. Charges for a physicians' fees, diagnostic tests and medicines as well as having to travel long distances to the hospital also influenced patients' adherence levels adversely (Ekesbo, Midlov, Gerward, Persson, Nerbrand & Johansson 2012:34; Mweene et al 2010:252). In addition, the Maimaris et al (2013:100), systematic review, identified other influencing factors which were the providers' qualifications and experiences. In countries where patients were treated by specialists, their blood pressures were better controlled than in those countries where patients were treated by generalists. The delivery approach and governance of the services was also listed as a factor influencing patients' awareness, treatment and control of hypertension.

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Maghrabi (2013:121), explored the profile of anti-hypertensive agents prescribed by physicians, investigated the extent of adherence to the national guidelines and detected prescription errors in treating hypertension patients. The results showed many deviations from the guidelines, which could seriously affect the patients' health and which could make patients quit their treatment. Some physicians prescribed direct vasodilators for angina patients – sometimes even for minor cases - and they prescribed non-recommended drugs. These drugs might not be tolerated by patients, who could eventually abandon their prescribed treatment. A study conducted on the Praslin Isalnd of Seychelles, indicated that provider-related factors contributed to patients' non-adherence to anti-hypertension treatment. The health care providers' characteristics included patients' lack of confidence in their health care providers' competence, providers' lack of patience and listening skills, being respectful, not being calm, and not explaining the condition clearly (Brobeck, Odencrants, Bergh & Hildingh 2013:374; Barnett, Vasileiou, Djemil, Brooks & Young 2011:342; Edo 2009:52). If the health care provider is patient, is a good listener, respectful, calm, confident, clearly explains the condition to the patients, the these patients might trust and feel safe in the hands of such a health care provider and might adhere to the prescribed treatment regimen. Schroeder, Fahey and Ebrahims' (2008:7) systematic review showed that physicians introduced complicated dosing regimens, prescribed complex treatment protocols without consideration of patients' lifestyles or the cost of treatment, maintained poor therapeutic relationship with their patients, were unaware of the various reasons that caused poor adherence, did not conduct interventions to address these factors, did not explain the condition, treatment, and/or benefits of treatment and complications to patients.

Medication-related factors

Hypertension is a condition that requires a patient to take drugs for a lifetime because they do not cure hypertension but regulate, inhibit or facilitate the body's mechanisms to control blood pressure levels (Lewis et al 2011:88). As patients take these drugs

they might experience many problems, referred to as medication-related factors. These problems include lifelong swallowing of drugs, large number of pills to swallow, side effects, disruption of activities of daily living, medication errors and the cost of drugs, taking three anti-hypertension drugs, the primary level of education and other diseases such as heart failure (Mweene et al 2010:253). For example patients who are taking one type of drug, once a day, monotherapy, tend to be more adherent than those who take multiple drugs per day. However, less than half of the patients will attain the recommended level of blood pressure targets using monotherapy as most people require at least two anti-hypertension drugs. On the other hand, patients who achieve low blood pressure readings, could see the achievements as a benefit. The benefits could further motivate them to be more adherent. Ramli et al (2012:613) reported that adherence levels decreased with an increase in the number of pills to be swallowed daily and with more complicated dosing regimens.

In, Heidelberg, Germany, a study aimed to evaluate patients' self-reported attitudes towards medication-related factors, known to impair adherence in 110 primary care patients. The results showed that tablets with a once-daily dosage and drugs taken in the morning and evening improved adherence, whereas drugs taken at 12 noon and drugs taken independently of meals were least preferred (Witticke, Seidling, Klimm & Haefeli 2012:679. That the number of tablets and when they needed to be swallowed has an influence on treatment adherence was also reported by Mweene et al (2010:253).

Maimaris et al's (2013:100) system review study showed that the health financing system was a factor that influenced adherence levels. Patients who were on health insurance had their blood pressures controlled more than those who were self-sponsored. In addition, in countries with adequate funding for health and available drugs, patients' blood pressures were consistently better controlled than in countries where drug supplies were irregular.

Disease-related factors

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Some patients with hypertension do not experience any symptoms relating to the condition because it is asymptomatic (Holt et al 2010:481). Therefore they might feel well and healthy they might not seek medical help due to the nature of the disease. Other diseases, such as, heart failure might necessitate treatment with Digoxin. This drug might cause weakness and lethargy to the extent that patient might not have the energy to swallow anti-hypertension drugs (Mweene et al 2010:253). These are referred to as disease-related factors (Turki & Sulaiman 2010:29) making it difficult to access a health facility. This is one of the possible reasons why patients with hypertension might collapse and die silently (Hussain et al 2011:9; Nelms et al 2011:289).

However, Hareri and Abebe (2013:5), at Tikur Hospital, Addis Ababa assessed patients' adherence to their anti-hypertension medications and associated factors. The 286 systematically sampled respondents completed structured interviews. An adherence rate of over 69.0% was reported. The report also indicated that 68.2% of those, regardless of gender, had a higher adherence rate of 50.7%. This could be attributed to the fact that married couples could remind each other about taking their drugs as scheduled. In addition, the current work status of the patients included government employment, unemployed persons, private business people, retirees and housewives. Of the 36.0% employed by government, 28.3% were adherent and 7.7% were non-adherent.

Another factor that influenced adherence was the type of health facility attended. These were government, private hospital and clinic. Those who attended the government hospitals (63.2%) had their adherence levels increased in comparison with those attending other facilities. Of these, 45.9% were adherent and 17.3% were non-adherent. This could be attributed to the type of services offered in government facilities and to available equipment, staff and drugs. Similarly, the duration of treatment influenced patients' adherence levels. The durations listed were less than 2 years, 2-4 years then five years and more. Of those who had been on treatment for five

years and more, 46.5% were adherent and 15.8% were non-adherent. The explanation could be that with time the patients had perceived the benefits of treatment.

Services factors

Patients who live with hypertension experience some problems related to the nature and availability of services. The factors are grouped according to the nature and availability of services factors that improve or decrease patients' adherence levels to their anti-hypertension treatment regimens.

The advantages of adequate adherence include the patients' feelings of wellbeing as the symptoms are allayed and the risk of developing complications is reduced. The individual is able to do activities of living for personal and family development (Saleem et al 2011:836).

To emphasise the importance of treatment adherence, the WHO published evidence-based guidelines for clinicians, health care managers, and policy makers for countries to improve strategies for achieving medication adherence (Sabate 2003:1987).

2.3.1 Cigarette smoking and hypertension

A study was conducted by Li et al (2010:93) in China among the Mongolian population. The background to the study was that the relationship between smoking and hypertension was still not known. The study aimed to examine the effects of smoking on blood pressure. A total of 2 589 people aged 20 were recruited. Demographic data, lifestyle factors, family history of hypertension and physical examinations were recorded and analysed. The results showed that blood pressures among non-smokers was lower than among smokers.

2.3.2 Stress and hypertension

Stress is defined as a response to environmental demands placed on one's body and mind. Stress can also be caused by a wide variety of emotional and psychologic events. The adrenaline causes stimulation of the sympathetic nervous system activity which leads to increased cardiac output and increased heart rate, peripheral vasoconstriction and this raises the blood pressure. The mind influences every part of the body. Hence, stress has significant effects on one's health and well-being. Stress is one of the leading factors of hypertension, cancer, suicide, accidents and deaths (Lewis et al 2011:742). A study, compared smokers with non-smokers in a population of employees of a large US institution. Multivariate regression models were used to compare data by active or never-smoker status for preventive care services; and medication adherence for chronic conditions. Adherence to chronic medications for hypertension was significantly lower among smokers. While not statistically significant, smokers were consistently less adherent to all other medications than non-smokers (Sherman & Lynch 2014:447).

2.4 TREATMENT ADHERENCE IN PATIENTS WITH HYPERTENSION

Treatment adherence is reported to be higher among patients with acute conditions such as malaria, pneumonia and flu than among patients suffering from any chronic condition, requiring daily lifelong treatment.. The pain perceived by the patients from the symptoms of acute conditions, prompts them to take the medication to get rid of the symptoms and feel better. The treatment for acute conditions is prescribed for a short period of time such as two, five, seven or fourteen days. On the contrary, adherence is reported to be lower among patients with chronic conditions, such as hypertension. The reasons are the assymptomatic nature of the chronic condition (Sulaiman et al 2009:43 and the taking of anti-hypertension drugs for a lifetime. Reportedly, many patients discontinue their medication within six months of commencing the treatment as they might experience swallowing of drugs to be tiresome (Osterberg & Blaschke 2005:487). In some trials there have been adherence rates of 43%-78% among patients who were receiving treatment for chronic conditions while adherence with lifestyle modifications was as low as 10% (Osterberg & Blaschke 2005:487). Many

studies focused on adherence issues related to patients' behaviours. However, the difficulty to measure adherence accurately, is another challenge because adherence measurement tools are not accurate because they have advantages and disadvantages. Some tools are expensive, such as collecting blood specimens, while others are cheap such as checking patient's records. The individual is able to do activities of living for personal and family development. The disadvantage of non-adherence is the persistent hypertension (Saleem et al 2011:836) with the risk of developing complications and consequencial death. Esler, Schwarz and Alvarenga (2008:175) reported that mental stress is a cause of hypertension and other cardiovascular disease.

The WHO (2003:107) defines non adherence as the extent to which a person's behaviour of taking medication and following a diet and/or executing lifestyle changes does not correspond with the regimen prescribed by the health care provider. The Seventh Joint National Committee guidelines reported that non-adherence to prescribed treatment is a major barrier to achieving adequate blood pressure control (Chobanian et al 2003:2560). Non-adherence compromises treatment effectiveness causing uncontrolled hypertension. In the United States of America the national health and nutrition examination survey revealed that non-adherence with non-pharmacological and pharmacological therapy was the cause of the limited blood pressure control (Gerin et al 2007: 460). There are several forms of non-adherence behaviours. These include ommisions or missed daily or weekly doses, delayed, early taking, halving doses, doubling doses and defaulting treatment (Osterberg & Blaschke 2005:487). Non-adherence is a major factor of uncontrolled hypertension in more than two thirds of hypertensive individuals (Bastos-Barbosa, Ferriolli, Moriguti, Nogueira, Nobre, Ueta & Lima 2012:636; Rachel, Bastos & Nereida Kilza da Costa 2006:36).

Globally 69.0% of the population on anti-hypertensive treatment have controlled blood pressures. Those with uncontrolled blood pressure have frequent hospital outpatient visits with symptoms (Saleem et al 2011:836). The persistant symptoms lead to the development of complications, injury and failure of the vital organs such as the brain,

eyes, heart and the kidneys. The failure of one organ leads to failure of other organs because they work in coordination under the autonomic nervous system (Lewis et al 2011:743). Organ injury increases the morbidity and mortality rates attributable to hypertension. This has direct and indirect costs to the individual, family and health care system (Osterberg & Blaschke 2005:487).

2.4.1 Patients' perceived susceptibility to complications of hypertension and their treatment adherence

Understanding patients' perceptions of hypertension and its complications is important for effective management. A study was conducted in Delhi, India to elicit perceptions of the settled migrants by Kusuma (2009:267). The results showed that migrants perceived hypertension as a common, symptomatic and serious health problem in the community. They identified city life of pollution, stress, high fat diet coupled with physical inactivity and some attitudes as contributing factors to the development of hypertension.

In the USA, a national health and nutrition examination survey found that 72.0% of patients with hypertension were being treated. Those who had their blood pressure well controlled below 140/90 mmHg were 69.0% of those being treated. The shortfall has been attributed to a lack of adherence to treatment regimens (Mazzaglia et al. 2009:1598). In a systematic review of 25 studies, the results showed a lack of convincing empirical evidence to support the hypothesis that inadequate control of blood pressure was attributed to poor treatment adherence (Schroeder et al 2008:7). However in a study by Hassan, Hasanah, Foong, Naing and Awang (2006:24) in Malaysia, the results showed that about 56.0% of drugs which were prescribed by the physicians were not taken as prescribed. The consequence was that there were frequent hospital admissions among patients suffering from hypertensions. Sulaiman et al (2006:38) reported that one third of patients with hypertension admitted to hospital had a history of poor adherence. Stafford, Jackson and Berk (2008:946) reported that poor adherence to medication was a factor contributing to hospital admissions. On

assessment of adherence by the Morisky scale, there was a statistically significant result that showed a much higher level of hospitalisation among patients who had poor adherence levels (M=4.50, SD = 0.384) compared with patients who were adherent (M=2.82, SD =1.486) which meant less frequent hospitalisations were more likely among adherent patients. Patients who maintained their adherence rate at 80-100% were less likely to be hospitalised as they had controlled blood pressures. In Scotland the treatment adherence rate was 91.0% while Pakistan's was 77.0% (Stafford, Jackson & Berk 2008:946).

A study in the USA (Epstein, Sherwood, Smith, Craighead, Caccia, Lin, Babyak, Johnson, Hinderliter and Blumenthal (2012:1764) aimed to determine factors that could predict adherence to dietary approaches to reduce hypertension (DASH). The results showed ethnicity to be a predictor of adherence to DASH and there was an increase in adherence to the DASH among African Americans less likely to be adherent to eating plans compared with those of whites. A dietary adherence of 95.0% showed a reduction in blood pressure.

Perceived susceptibility refers to patients views of the risk of having a condition such as hypertension or its complications such as a heart attack, kidney failure, or strokes (Glanz et al 2002:48). Hypertension is an asymptomatic condition and patients have to believe that they are susceptible to develop complications with or without experiencing symptoms. Such a perception can only be based on sound knowledge about the condition. Patients with knowledge of the nature and course of hypertension, the possible risks associated with treatment non-adherence would be more likely to perceive themselves as being susceptible to complications. According to the HBM, patients with hypertension who feel susceptible to complications would be more likely to adhere to treatment regimens than those who do not (Edo & De Villiers 2009:52; Glanz et al 2002: 48).

The likelihood of hypertensive patients' adherence to their treatment, depends on the degree to which they perceive themselves to be susceptible to complications. In

addition, their perceptions of the severity of the complications is weighed against the benefits expected from the adherence to the prescribed treatment regimen and the barriers they need to overcome. The HBM hypothesises that in a patient with hypertension, a high perceived threat; low perceived barriers and a high perceived benefit would result in the likelihood of exhibiting adherent behaviour. However, the final outcome of the decision would be determined by the patient's analysis of various factors.

Kusuma (2009:268) in New Delhi, India, aimed to understand perceptions of patients with hypertension among immigrants using a qualitative design. The results showed that the condition was perceived as being a condition that reduces physical activity. That it was a result of overweight and eventually it causes weakness and shortness of breath. The patients' perceptions of the condition were based on symptoms. The migrants would resort to bed rest which would not be addressing the condition but only relieving the symptoms temporarily. Patients lacked knowledge about hypertension, and could not understand its potential complications.

Kaplan's (2005:13) study showed that the lack of knowledge about the susceptibility for developing severe complications from hypertension, the severity of the complications, benefits of adhering to the prescribed lifestyle modification and medicines, barriers to treatment adversely influenced patients' treatment adherence levels.

2.4.2 Patients' perceived severity of complications of hypertension and their treatment adherence

Perceived severity refers to the extent to which persons judge a condition such as hypertension to be serious. Perceived severity is the judgement of the ability of a condition to cause morbidity, disability and mortality (Glanz et al 2002:48).

According to the HBM, patients who perceive the complications to be serious would be more adherent with medication and lifestyle modifications than those who do not hold

such perceptions. Under perceived severity, the patients were asked whether or not they perceived the complications of hypertension to be severe.

Daugherty et al (2012:303) in Colorado, conducted a study to examine the association between treatment adherence, intensification, and control of hypertension. These were patients who had uncontrolled hypertension.

The results showed that among the patients who enrolled in the study, and who recieved increased treatment intensity had their blood pressures under control after one year. There was an association between perceived severity of uncontrolled hypertension and treatment intensification but non-adherence was significantly associated with the absence of blood pressure control.

2.4.3 Patients' perceived benefits of adhering to anti-hypertensive treatment

Patients, who adhere to their prescribed antihypertension treatment regimens perceive more benefits of such adherence than those who do not hold such perceptions. Patient-related perceived benefits include the beliefs which hypertensive patients hold, that a proposed course of action would be effective in reducing the potential threats. Such perceptions are based on patients' knowledge about hypertension and its potential complications. Other benefits included relief from symptoms, enhanced wellbeing and an ability to do household chores.

Holt et al (2010:484) examined the association between health-related quality of life and anti-hypertensive treatment adherence in older adults. The MMAS-8 was used to assess anti-hypertensive treatment adherence. The results showed that the patients who scored high on the health-related quality of life had a higher adherence level to anti-hypertensive treatment. When a patient perceived a benefit, it motivated the patient to adhere to treatment; the greater the perceived benefit, the higher the adherence rate.

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Akazawa and Fukuoka (2012:124) investigated the economic benefit of switching to fixed dose anti-hypertension combination (FDC) therapy among Japanese patients in Tokyo. This was a retrospective cost analysis study. Data were collected from 64 community pharmacies located in Tokyo that were used to identify hypertensive patients under continuous treatment with angiotensin-receptor blockers (ARBs). Patients switching to FDC between December 2010 and April 2011 were compared to patients who did not switch treatment regimens (control group). Changes in annual anti-hypertensive drug costs were compared. Sub-population analyses were performed; pre-index treatment patterns and prescribers' characteristics were considered. The results showed a significant difference in anti-hypertensive drug use patterns before the combination and after. The switch to FDC was associated with an annual saving of 10 420 yen (US$112.0) in anti-hypertensive drug costs. Patients found a benefit in using the fixed dose combination therapy, because it was cheaper, and this improved its usage and controlled their hypertension. Thus, the benefit of reduced cost promoted patients' adherence behaviours.

2.4.4 Patients' perceived barriers to taking anti-hypertensive treatment and treatment adherence

Patients with hypertension might perceve barriers to taking treatment as being related to obstacles standing in the way of executing the required health bebaviour. These perceived barriers relate to patients, physicians, disease, and medications (Ramli et al 2012:614). Patients who perceive more barriers, are expected to be less likely to demonstrate adherence behaviour than those who perceive fewer barriers (Glanz et al 2002:48).

Patient-related barriers

Patient-related barriers are a result of patients' gender, beliefs, culture, religion and personal values, attitudes, feelings and economic status, educational level, occupation,

fear of pain or any discomfort. According to Osterberg and Blaschke (2005:491), when patients start treatment they tend to adhere during the first few weeks because they intend to get rid of the illness experiences of the hypertension, until they feel better. The good response patients get from treatment makes them feel “cured” and then they quit treatment without the doctor’s consent. In addition, some patients become complacent and they stop adhering to the treatment regimen. In a study by Mweene et al (2010:252), the patients reported the following barriers to anti-hypertension treatment adherence: lifelong duration of therapy, symptomless nature of the condition, side effects of the drugs. The examples of side effects included headaches, heart palpitations, dizziness, drowsiness forgetfulness, complicated drug regimens, lack of understanding about hypertension management, non-availability of drugs, and distance to the health facility, forgetting, lack of knowledge and information, omission and having other priorities. In studies (Ambaw et al 2012:282; Edo 2009:62; Munro, Lewin, Stewart & Volmink 2007:5; Mweene et al 2010:253) gender, distance from the hospital, number of co-morbidities, side effects of drugs, poverty, lack of resources and unemployment were reported as factors that barred patients from adhering to their treatment regimen.

Hussain et al (2011:10) conducted a study to determine the prevalence, awareness, treatment and control of hypertension in India’s Rajshahi and in Bangladesh during 2006-2007. The results showed these participants’ characteristics: 69.2% were males, 32.5% had no education, 19.2% had primary education, 29.2% had secondary education and 19.0% had bachelor’s degrees. The majority (77.5%) were poor farmers. As many as 85.0% were non-adherent, 75.0% knew that uncontrolled hypertension could cause strokes and heart disease, 15.0% knew that it could cause retinopathy and peripheral vascular disease.

The patient- related barriers to treatment included forgetfulness and missing drugs from one day to one week to the whole month. Meanwhile, one third, who were reportedly knowledgeable about hypertension perceived that it could lead to kidney injury; one third knew that exercises help to control blood pressure. However, such

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knowledge and perceptions did not help them to improve their adherence levels. Two thirds reported family members as providing support in reminding them about re-supplies, two thirds stated that they attended follow up clinics only when they felt symptoms of hypertension. Some patients (78.0%) never attended a follow up clinic. Reasons given for missing appointments included feeling well (37.0%), poverty (29.0%), visiting homeopaths (38.0%), and visiting traditional herbalists (25.0%).

Physician-related barriers

Patients might not go to see physicians because physicians might not be easy to reach, physicians might fail to explain the prescribed drugs actions, benefits and side effects to the patients (Hussain et al 2011: 10; Maghrabi, 2013:120; Osterberg & Blaschke 2005:489).

Disease-related barriers

Patients might experience problems related to the treatment regimens prescribed for them. The study findings of Edo and De Villiers (2012:5) in the Seychelles, showed that the patients' greatest disease-related barriers were the lack of discipline to stop smoking and to comply with the required dietary restrictions, lack of time to relax and sleeping problems, lack of motivation to continue swallowing drugs when they knew that the disease was incurable, the ineffectiveness of the medicine to stabilise the blood pressure, having no time to exercise and failure to see the value of exercise and hypertension control.

Medication-related barriers

The complexity of the treatment regimen, the number of tablets that need to be taken and the side-effects of the drugs might pose barriers to continuing treatment. Complex dosing schedules, frequent changes of medications and high costs of drugs aggravate

any perceived barriers. Providers did not explain to the patients how the drugs control the hypertension, and that patients believed that hypertension could be cured with local herbs (Edo 2009:123).

Health care systems, structures and process

The financial standing of the facility to buy drugs, the distance to the facility, the complicated structure of the facility where patients have trouble locating the various rooms for consultation or pharmacy or physiotherapy. When the patients perceive barriers to out-weigh the perceived benefits, then patients will be less likely to adopt and maintain the behaviour of adhering to anti-hypertension treatment.

The standard WHO regimen for treatment aims to achieve control of hypertension and it involves using a combination of drugs. The more pills that have to be swallowed, the greater the likelihood of non-adherence. However, perceived barriers imply that the patients who perceive that there are negative consequencie such as physical, psychological or financial costs, and that the costs out-weigh the expected benefits, might not adhere to the advised health actions. Osterberg and Blaschke (2005:490) identified the following barriers that influenced patients not to adhere to their anti-hypertensive treatment: forgetfulness (30.0%), other priorities (16.0%), decisions to omit doses (11.0%), lack of information (9.0%) and emotions (7.0%).

Health worker and family support

Patients require support from their health workers and family members to adhere to their anti-hypertensive treatment regimens. The patients accept that the condition was theirs, but they regarded the management of hypertension to be a shared responsibility (Edo 2009:124). The health workers are responsible for explaining how the drugs work. They must explain how the prescribed diet and exercise can help to reduce blood pressure.

Other barriers to treatment adherence included missed doses of the prescribed drugs as the other family members did not remind them since some medications cause drowsiness, missed appointments due to lack of transport and lack of family accompaniment; living at a distance of more than 10 kilometres from the hospital and taking three anti-hypertension drugs, illiteracy and other diseases such as heart failure. In addition, some patients reported that when they felt better, they decided to quit the anti-hypertension treatment (Mweene et al 2010:253).

Many patients with hypertension remain unaware of the condition and its complications in both developed and developing countries (Msyamboza et al 2011:4). In addition, some patients stop taking treatment because they say that, it makes them feel worse because of the side-effects, or their non-responsiveness/non-effectiveness to the prescribed treatment regimen. Some patients, reported mere carelessness with their lives by having negative attitudes towards life while other patients reported financial, cultural, and spiritual factors as well as poor patient-provider relationships (Edo 2009:62; Mazzaglia et al. 2009:1598; Osterberg & Blaschke 2005:487; Saleem et al 2011:126) .

Knowledge about hypertension and beliefs about medications might enhance or impair adherence to their treatment regimens. In addition culture, gender, age, health status and religion have been linked to adherence in health care settings. For example, cultural belief systems and religion of patients might support the use of traditional healers, thereby, causing conflict with Western medicine. Some patients older than 45 years of age might experience some altered mental states caused by hypo-perfusion and body weakness (Lewis et al 2011:743). This might also influence their adherence behaviour due to memory and energy loss. This is also true for patients who have heart disease as a complication of the hypertension.

Therefore, there are many patient-related factors that could influence them not to adhere to their treatment regimen. These include the patients' internal and external, emotional, attitudinal and demographic factors, such as, gender, age, educationan

level, occupation, religion and tribe or ethnic group. Osterberg and Blaschke (2005:487) reported that it is important for health care providers to involve patients with hypertension closely, in the management, to identify adherence barriers that patients might experience quickly and to intervene appropriately.

Kara, Caglar and Kilic (2007:243) correlated patients' non-adherence with diet, fluid restrictions and the level of perceived social support in haemodialysis patients. Data were obtained from 160 patients in three haemodialysis canters in Turkey between March and May 2006. The results showed that barriers to treatment adherence in most patients were age, marital status, mostly among younger married patients, lack of family and friends' support.

The study in Nigeria by Chiazor and Oparah (2011:139) aimed to describe and compare the treatment pattern of patients with hypertension and assessed patients' risk factors. A validated 9-item instrument was used over a period of four months. The results showed the following risk factors for hypertension patients, obesity (74.1%); stress (56.0%); overweight (37.5%); smoking (32.0%); salt intake (26.0%) and alcohol (24.0%). More than half (53.5%) had blood pressure readings exceeding 160/100 mm Hg, showing a relationship between obesity and hypertension. The hypertension readings provided an indication of the patients' non-adherence behaviours.

2.4.5 Patients' cues to action for adherence to anti-hypertension treatment

According to Glanz et al (2002:48), cues to action refer to factors that could drive, motivate or prompt an individual to feel the need to take an action. These drivers could be internal or external. Internal factors might be the manifestation of the condition while external factors are advice from friends, family members, books, media such as the radio and television.

In a study conducted by Chen et al (2011:32) in Taiwan, guided by the HBM, aimed to understand the factors that influenced the caregivers to take their underfive children for

the childhood influenza immunisations. The results showed that the caregivers' cues to action were the recommendations from the mass media, and also from nurses and doctors, which influenced them when they adhered to taking the chilren for influenza immunisations.

2.4.6 Patients' self efficacy and likelihood of adherence to their anti-hypertension treatment regimens

The HBM proposes that hypertensive patients with higher levels of perceived self-efficacy might be more adherent to medications and lifestyle modifications than those with lower levels of self-efficacy. Many patients know the type of anti-hypertension actions they need to take, such as weght loss, smoking cessation, and participating in exercises. However, knowledge only is insufficient to stimulate behaviour. Patients need to believe in their capability and have confidence to perform the expected behaviour. Health professionals might use verbal persuasion and expressive encouragement to stimulate self-efficacy in their patients (Glanz et al 2002:48).

2.5 CONTEXTUALISING THE LITERATURE REVIEWED WITHIN THE HEALTH BELIEF MODEL

The studies reviewed have highlighted various factors that affect patients' adherence. The main grouping of the factors were based on the six concepts of the HBM: patients' perceived susceptibility to potential complications of hypertension, patients' perceived severity of complications, preceived barriers to treatment adherence and cues to action.

The reviewed literature has exposed some factors which could influence patients from being adherent to their anti-hypertensive treatment. These barriers were further grouped according to the adherence model factors which are related to the following aspects: patient/family, health care system, health care provider, medication, disease

and the nature and availability of services. The patient-family related aspects were internal, such as, awareness, understanding of the condition and treatment, ability to control own hypertension, age, marital status, family and friends' support, being newly married, and the level of perceived social support (Kara et al 2007:213). Health care provider-related, and physician-related factors, included a lack of patience, not listening, not being respectful, providing no explainations of the condition, lack of experience and lack of confidence (Osterberg & Blaschke 2005:490). The provider-related factors included the expenses for physician's fees, diagnostic tests and medicines (Saleem et al, 2011:386).

Factors that barred patients from being adherent included health facility and family support, limited family income, low level of knowledge, conflict between cultural beliefs and Western medicines (Kazembe 2007:62; Gatti et al 2009:650). Understanding regarding the disease, its consequences, side effects of the drugs, benefits of controlling blood pressure levels, someone to accompany the patient to the hospital, lack of patient education regarding complications influenced patients' adherence behaviours adversely (Hussain, et al 2011:10). The other barriers listed in previous studies included patients' forgetfulness, being too busy, travels, hospitalisation and/or sickness, the inability to to get to the pharmacy, and events that interfered with the patients' daily routines. Some factors were related ot the clinic, physicians and nurses (Nair et al 2011:199).

The results showed that health care provider-related factors contributed to patients' non-adherence to their anti-hypertension treatment. The health care providers' characteristics included patients' lack of confidence in their health care providers' competence, providers' lack of patience and listening skills, being respectful, not being calm, and not explaining the condition clearly (Ambaw et al 2012:282; Barksdale 2009: 57; Edo & De Villiers 2009:52). If the health care provider is patient, is a good listener, respectful, calm, confident, clearly explains the condition to the patient, these patients might trust and feel safe in the hands of such a health care provider and might adhere to the prescribed treatment regimen. Schroeder et al's review (2008:7)

showed that physicians introduced complicated dosing regimens, prescribed complex treatment protocols without consideration of patients' lifestyle and cost of treatment, maintained poor therapeutic relationships with their patients, were unaware of the various reasons that caused poor adherence, did not conduct interventions to address these factors, did not explain the condition, treatment, and/or benefits of treatment and complications to patients. The prescribers did not follow the standard treatment guidelines contributing to patients' final abandonment of their treatment (Ekesbo et al 2012:35).

2.6 SUMMARY

This chapter presented a review of previous studies done in the area of hypertension treatment adherence, related literature and the HBM. The literature was mostly from elsewhere as minimal research has been conducted in Malawi. Most of the studies reviewed looked at adherence and non-adherence, none looked at levels of adherence. The literature review was contextualised within the major tenets of the HBM.

The next chapter will present the research design: the study setting, study population, sample, sampling design, sampling frame, selection and calculation of sample size, sampling, sample selection procedure, research instrument, data collection procedure, pre-testing the research instrument, refinement of instrument, data collection technique, validity and reliability, data analysis and the methods of statistics that were used; dissemination of findings, ethical considerations and limitations of the study.

CHAPTER 3

RESEARCH DESIGN AND METHOD

3.1 INTRODUCTION

This chapter presents the methodology of the study, the strategy used by the researcher to collect, analyse and interpret data in the course of the study (Leedy & Ormrod 2010:182). It covers the study design, setting, population, sample and calculation of the sample size, sampling design, sampling frame, selection and calculation of sample size, sampling method, sample selection and procedure, research instrument, data collection method, procedure, pre-test of instrument, recruitment of 10 research assistants, data collection technique, validity and reliability of the design, validity and reliability of the instrument, data analysis, dissemination of the findings, ethical considerations, study limitations and conclusion.

3. 2 RESEARCH DESIGN

According to Burns and Grove (2011:536) a research design is defined as, “a blueprint that is developed for conducting a study to answer a research problem". The main aim of the research design is to maximise control over factors that could interfere with the validity of the study findings. The researcher used a quantitative, descriptive design to quantify hypertension patients’ treatment adherence levels, using the Morisky Medication Adherence Scale.

A quantitative research design is defined as a positivist scientific method that uses numerical data, a set of orderly, disciplined procedures to obtain information. It maximises precision and validity by providing control mechanisms that eliminate or

minimise the researcher's and respondents' biases. The data collection is systematic, formal and it uses structured tools to gather empirical evidence directly or indirectly. Statistical packages are used for data analysis and the design allows for deductive reasoning, so that the findings can be generalised to individuals other than those who participated in the study, provided that a random sampling method had been used. In addition, it generates further topics for research. In this study, the researcher chose a quantitative design because it best suited the study's intention, which was to investigate the level of treatment adherence in patients with hypertension according to MMAS-8, quantify them as low, medium and high, identify and rank the factors that influence treatment adherence and describe these factors (Polit & Beck 2010:16; Gliner, Morgan & Leech 2009:7).

A descriptive study, according to Polit and Beck (2010:552) is defined as research that aims to accurately present the characteristics and frequencies of occurrence of a phenomenon of a person, groups or situation. In this study, the researcher chose a descriptive design because it best met the aim of the research which was to establish and describe, levels of adherence of patients to their anti-hypertensive treatment regimens, and rank their influencing factors. The design accurately described the characteristics of patients and factors that influenced their treatment adherence levels according to the MMAS-8, rank and describe the factors that influence adherence.

3.2.1 Study setting

Polit and Beck (2010:568) define the setting as," the physical location and conditions in which data collection takes place in a study". In this study, the site was QECH hypertension clinic in Blantyre. The clinic is located within the hospital's out-patient department. This is the only established hypertension clinic in the southern region of Malawi (at the OECH referral hospital). The clinic is managed by specialists from the College of Medicine who diagnose and treat patients with hypertension. These patients are referred from both urban and rural areas of the southern region of Malawi from government, CHAM and private hospitals for further management. The hypertension

clinic manages chronic and acute hypertension patients. The environment was not manipulated for the study. The researcher chose this site because the clients and potential respondents were patients with hypertension on treatment regimens.

3.2.2 Study population

Burns and Grove (2011:290) define a population as a particular group of individuals, which is the focus of the research. In the current study, the population which the researcher was interested to study comprised patients suffering from hypertension. The population could be further sub-divided into the target population, to which the study's findings could be generalised and the accessible population comprise those individuals who can be accessed to participate in the study. In the current study the target population comprised hypertensive patients who attended the QECH hypertension clinic to whom the researcher could generalise the study findings. The accessible population comprised the patients attending the hypertension clinic at the QECH on the Fridays when 10 research assistants conducted interviews at this clinic.

The hypertension clinic at the QECH was the only one in the southern part of Malawi (MDHS 2010), implying that patients were referred to this clinic from 18 hospitals and clinics throughout southern Malawi. The total population of patients served by all these clinics was unknown although the population of Blantyre was estimated to exceed 1 000 100 during 2010 (MDHS 2010).

The exact population of hypertensive patients being treated at this clinic was unknown, but it was estimated as follows:

- 100 appointments are made for patients on Fridays
- 400 patients receive treatment at the clinic per month
- most patients receive anti-hypertensive treatment for three months
- 1 200 (approximately) patients are therefore treated at the OECH hypertension clinic.

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3.2.3 Sample

A sample is defined as a group of people that is selected to represent the population (Burns & Grove 2011:290).

3.2.3.1 Sampling design

Sampling is defined as, a process which selects a representative portion of the entire population (Polit & Beck 2010:307). In this study, the researcher used probability sampling, the simple random sampling design to get the representative sample. According to Polit and Beck (2010:313) simple random sampling is considered as the most basic probability sampling design and is the most effective, in selecting a representative sample. The researcher chose it because it gave all patients with hypertension a known chance of being included in the study (Polit & Beck 2010:313), therefore it was best suited for the quantitative; descriptive research.

3.2.3.2 Sampling frame

According to Polit and Beck (2010:308), in simple random sampling the researcher establishes a sampling frame, which is a technical name for a list of the population. In this study, the practice at the QECH hypertension clinic was that 100 hypertensive patients were booked for the hypertensive clinic every Friday. This appointment booking list was used as a sampling frame fromh which the respondents were selected.

3.2.3.3 Selection and calculation of sample size

As a quantitative study, a large sample was required for representativeness and 80% power to detect the assured difference of 15% (Fox, Hunn & Mathers 2009:17) and to have a smaller sampling error (Polit & Beck 2010:316). The sample size was determined by using the EPI-Info version 3.5.1 and by using an estimation of the

educational level of patients with hypertension population. The researcher assumed that 75% of the hypertension population has primary education while 25% has secondary education, based on the information provided in the Malawi and Demographic Health Survey (2010).

If 50% of the patients with hypertension who have primary education have poor adherence, and if 35% of those patients who have secondary education have poor adherence, then there would be 80% chance of detecting the difference in adherence between hypertension patients who have primary and those who have secondary education.

Epi-Info version 3.5.1 calculated that 480 patients would be required for there to be 80% power to detect the assured difference of 15% (Fox et al 2009:17). Given specified values of p_1 and p_2, the standardised difference was calculated as follows.

$$\frac{P_1 - P_2}{\sqrt{p(1-p)}}$$

P1 = 0.5

P2 = 0.35

^

P = 0.425

d_S = Standardised difference

$$d_S = \frac{0.5 - 0.35}{\sqrt{0.425 \times (1-0.425)}}$$

$$= \frac{0.15}{\sqrt{0.244}}$$

$$= 0.303$$

N = 340 for equal group sizes

k = 3/1 =3

$$N' = \frac{N(1+k)^2}{} = \frac{112 \times 16}{} = \frac{4}{}$$

4k 12 3

The nomogram provided by Altman (1991:456) was used to find the sample size (N) assuming equal groups sizes. The adjustment provided by Altman (1991:459,460) was used to find the numbers with unequal group sizes (see Annexure O).

N = 480

3.2.3.4 Sampling

Sampling criteria imply a list of characteristics that the target population should possess to be included in the study (Burns & Grove 2011:548). In this study, the inclusion and exclusion criteria for respondents were:

Inclusion criteria

An individual with a blood pressure reading of at least 140/90mmHg at the commencement of treatment, male or female aged 18-90 years, on treatment for a minimum of one year, attending the hypertension clinic, in possession of a health passbook, able to understand and speak Chichewa or English or both and consenting to participate in the study.

Exclusion criteria

Individuals who had not received hypertension treatment for at least one year at the participating clinic could not participate in this study because they might have been unable to evaluate the treatment they had received and their treatment adherence levels might have been influenced by the short duration of their treatment. Those who were younger than 18 years were excluded from this study as they could not legally sign consent for participating in the study in Malawi. People older than 90 years of age were excluded because it might have been difficult to interview them. Patients without health passbooks were excluded because their blood pressure readings and weights would have been unavailable and this information was required during the data

analysis phase of the study. Only persons who could understand and speak Chichewa or English or both could be interviewed as the research assistants could only speak these two languages. Any person who did not wish to sign consent to participate in the study was excluded as no one was coerced to participate in the study.

3.2.3.5 Sample selection procedure

Based on the health service delivery system at the QECH hypertension clinic, patients were consulted by appointment. The clinic day was Friday and was managed by five clinicians, one registered nurse, two nurse technicians and two clerks. The patients were given appointments by date and not by time. Therefore, all the patients booked on a specific Friday, arrived at the clinic waiting room by six o'clock in the morning and were organised on a first-come first-served basis, using the numbers 001-100. The patients had a group health education session, followed by blood pressure and weight checking before consultation with the clinician.

The researcher recruited and interviewed respondents at the hypertension clinic. The clinicians and the nurses were not involved in the recruitment of patients and data collection, to avoid bias. The researcher made an announcement about the study to all hypertensive patients in the waiting room after the conclusion of the health education session and after their blood pressure and weight checks. The announcement included the: researcher's name, title and aim of study, study objectives, sample selection, data collection procedure and period, ethical considerations to be observed and how long the interview would last. This information was given to help the patients to make informed decisions as to whether or not to participate in the study. Voluntary participation was emphasised, and that they could withdraw from the study at any point without incurring any penalty. The researcher explained to the patients that those willing to participate in the study would be interviewed after the clinician's consultation but before they went to the pharmacy for treatment refills. This allowed the patients to attend to their core business of consultation with the clinician. Conducting the interview before the patient collected his/her medicines from the pharmacy was desirable

because pharmacists give instructions to the patients. Interviewing patients immediately after receiving medicines and instructions from the pharmacy assistants could have influenced their responses on knowledge of drugs.

After explaining the information about the study and responding to questions, a neutral person shook the container with 100 pieces of papers and blindly picked 50 pieces. The picked numbers represented the randomly selected respondents to be interviewed on that specific day. The selected patients were requested to meet the research assistant after their clinical consultations. This ensured that 50 respondents were interviewed on a specific Friday.

The numbered piece of paper for any patient who declined to be interviewed, or who did not turn up for his/her clinic appointment on the designated date, was discarded and replaced by another number drawn randomly from the container until 50 respondents agreed to be interviewed every Friday. This amounted to random sampling without replacement or simple random sampling.

Thompson (2012:11) stated: “Simple random sampling or sampling without replacement is a sampling design in which n distinct units are selected from N units in the population in such a way that every possible combination of n units has an equal likelihood to be the sample selected… One may make a succession of independent selections from the whole population, each unit having an equal probability of selection at each step, discarding repeat selections until n distinct units are obtained”. Similarly, the Statistical Counselling Group of the University of California, Los Angeles (2007) state: “In random sampling without replacement, each object in the data set has an equal chance to be selected, once selected it cannot be chosen again”. According to Burns and Grove (2011:807) random sampling does not necessarily require that every unit in the population should have an equal chance to be selected, by stating: “Random sampling techniques [are those] in which each member (element) in the population should have a greater than zero opportunity to be selected for the sample..”

3.2.4 Research instrument

Polit and Beck (2010:557) define an instrument as a, “device used to collect data such as a questionnaire, a test or an observation schedule”. In this study, the researcher used a structured interview schedule to collect data. The structured interview schedule was chosen to allow the researcher to assess multiple variables with minimal risks of researcher and respondent bias. In addition, it allowed the researcher to employ various questioning styles during the face-to-face interviews. This personal contact led to a high response rate. Furthermore, the presence of the researcher assisted with clarification of any misunderstood questions to the respondents, which enhanced completeness and correctness of data as the respondents chose their responses from predetermined response options or described their experiences in their own words. The mixture of various types of questioning styles provided an active interaction between the parties which ensured easiness of administration. Furthermore, the face-to-face interview process provided an interaction that prevented boredom to the parties. The structured interview schedule also provided the researcher ease of data entry and analysis.

3.2.4.1 The structured interview schedule

The structured interview schedule, for this study was developed by the researcher based on the literature reviewed and on the concepts of the HBM.

The instrument had several sections, each measuring different aspects of the phenomenon "adherence". The initial "check list" was followed by sections A-F with the following subheadings:

- demographic data
- knowledge about hypertension
- knowledge about treatment of hypertension
- medical, social cultural and reproductive health data

- the HBM concepts
- Morisky Medication Adherence Scale (MMAS-8).

The instrument comprised closed-ended questions and open-ended questions (see annexure D). The closed-ended questions required the interviewer to tick from the predetermined response options. Items with an option of yes/no and Likert scale items were also included. For the open-ended questions the respondents were allowed to phrase their responses in their own words and the interviewers documented their responses verbatim. The instrument had the following sections:

The check list: There were ten items eliciting the specific type of data to be obtained from the hypertensive patients' health pass books as previous clinical records (see annexure D). The clinical records of the respondents were used because previous records contain clinical data that could be used as a reference for comparison. The following hypertensive respondents' clinical records from the health passbooks were elicited and recorded in the instrument: the current blood pressure reading, four previous blood pressure readings. It also elicited data on the names of prescribed medicines, their doses and frequencies. In addition, the appointment dates and drug refills, height, weight and body mass index were elicited. The year the hypertension was diagnosed and at what age, number of years the patient had been on hypertension treatment, year tested for HIV, year started on antiretroviral therapy (ART), and the names of the antiretroviral drugs the patient was taking (if applicable).

Section *A:* Demographic data comprised 16 items, A1-A16, that elicited the following data: age, gender, marital status, ethnic background, religion, level of education, occupation, home district, marital status, number of children and referring health facility.

Section B*:* Knowledge about hypertension comprised 12 items, B.17-B.28. The items elicited data on the patients' knowledge about hypertension, the signs and symptoms, the triggering factors, and what they thought triggered their hypertensive condition.

Section C: Knowledge about treatment of hypertension comprised 9 items, C29-C36, and included an open ended question 36a. This section elicited data on the patient's knowledge of the names of their prescribed drugs, doses, the side effects they experienced and lifestyle changes that were undertaken to reduce hypertension.

Section D: Medical, social, cultural, internal and external factors, reproductive health history, lifestyle, treatment received comprised 38 items, D37-D74 that elicited data on medical, social, reproductive health history, lifestyle, treatment received for malaria, bilharzias, liver cirrhosis, cancer and tuberculosis as well as antiretroviral drugs. This was deemed essential as the use of over-the-counter drugs, religious, cultural and traditional medicines and practices related to hypertension, could influence hypertension treatment adherence and outcomes. In addition some drugs could have interactions with anti-hypertension drugs hindering their intended effects.

Section E: The HBM's concepts comprised 18 items that elicited data on the perceptions of hypertensive patients according to the HBMs concepts. These were: perceived susceptibility, 4 items; Esu.75-77 and an open-ended item, 77a; perceived severity, 4 items; Esev.78-80 and an open-ended item 80a; perceived benefits, 3 items, Ebe.81-83; perceived barriers, 13 items; Eba.84-86 and open-ended items 86a-86j; cues to action, 4 items, Eca.87-90; and self-efficacy, 3 items, Esef.91-93.and open-ended questions 93a-93b.

Section F: The Morisky Medication Assessment Scale (MMAS-8) comprised 8 items that elicited data on treatment adherence. The items were numbered F94-F101 for purposes of this study for ease of data entry, but all the original numbers with the three pages of the Morisky Scale were part of the structured interview schedule whenever it was used. The 8 items in the scale followed the rating scale 0-1 and 0-4 (see annexure D). The MMAS-8 was originally developed to measure treatment adherence in hypertensive patients (Morisky, 2008:5). But with time, it had been used in other chronic health conditions where adherence was an issue like in diabetes mellitus patients. The original MMAS-8 was a self-reported medication adherence scale. It has eight items, which followed a rating of 0-1, and one item that follow a 5-

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point Likert format of 0-4 (Morisky 2008:5). The eight items assessed various psychosocial determinants of adherence, knowledge, social support, satisfaction with care and complexity of medication regimen. It had four pages, page 1 had the title and 6 questions, page 2 had questions 7, 8 and the coding instructions, page 3 had the required citations and foot notes for the 8 item of the MMAS-8, page 4 had the copyright instructions, declaration and signature of the user of the scale.

3.2.5 Data collection procedure

As patients walked out of the doctors' rooms, those who had been randomly selected were requested by the clinic nurse to speak to a research assistant in a specific private room. In the private room, each patient was welcomed by a research assistant, introduced herself to the patient and requested to see the health passbook to verify the patient's eligibility to participate, based on the inclusion criteria. If the patient was not eligible to participate in the study, the research assistant thanked the patient for coming and explained why he/she was not eligible for being interviewed; and was offered a soft drink of choice, with a snack; after which, she/he was allowed to leave. Such a patient's random number was discarded and replaced by another randomly selected number. If the patient was eligible a signed consent form was obtained by the research assistant. Those participants who were unable to sign were assisted with an ink pad, to record a right thumb print.

3.2.5.1 Pre-testing the research instrument

Polit and Beck (2008:507) defined a pre-test as "the trial administration of a newly developed instrument to identify flaws and to assess time required". In the current study the pre-test was conducted during the training of the 10 research assistants. The structured interview schedule (comprising the researcher-developed sections and the borrowed MMAS-8) was pre-tested at Ndirande Health Centre Out Patients Department with ten hypertensive patients. The ten hypertensive patients who were selected had similar characteristics as those of the main study. Each research

assistant interviewed one patient. Permission to use the Ndirande Health Centre Out-Patients' department was sought from Blantyre District Health Officer (see annexure M). The data obtained from the pre-test was not used for the main study. The facility was also excluded from data collection for the main study. The interviews took approximately 45 minutes.

3.2.5.2 Refinement of the research instrument

After development of the instrument, it was reviewed by four content experts in the field of hypertension management (two clinical nurse specialists and two nursing education specialists), two language specialists and the statistician. Their feedback was used to refine the instrument. The nurse specialists indicated that the questions were clearly related to the purpose of the study and the statistician indicated that the quantitative data could be entered into the SPSS program relatively easily. The two language experts suggested that a few simpler Chichewa words should be used in brackets to explain potentially difficult concepts. All these recommendations were implemented.

The refinement of the research instrument used feedback from the pre-test. The feedback from COMREC (College of Medicine Research Ethics Committee of Malawi) requested the researcher to include external factors in the items asked in the barriers section. These were depleted stocks of prescribed drugs at QECH and the distance patients had to travel to the QECH hypertension clinic. The feedback from the pre-test included:

- checking for HIV test in the passbook, it was found that patients usually have two passbooks, the one they use for other diseases is different from the one they use for HIV testing and for getting ARVs. It was agreed that the question should remain and see what data would be obtained;
- another option "other, please specify....." was added;
- similar items were combined;
- on the HBM concepts, a 5-point Likert rating scale was implemented: Strongly agree=4, Moderately agree=3, Agree=2, Dont agree=1, Dont know=0. However,

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with the respondents' low level of literacy it was difficult to differentiate and suggested 3-point Likert scale wasused: Agree=3, Disagree=2, Don't know=1.

- A question on have you ever suffered from cancer? and a follow up one ,"have you received medicines for it, were combined as: "Were you treated for cancer during the last three months. If yes, please specify?"
- All questions were rephrased to start with "is it true" for example, "Is it true that hypertension runs in families?

3.2.5.3 Recruitment and training of the research assistants

The recruitment of 10 research assistants was done based on the desired nursing qualifications and field of experience in line with the subject area of the research study. The required characteristics included that each person had to be a team player, dependable, available full time, for the training and data collection period, able to speak Chichewa or English, humane, respectful and polite, physically fit, able to create rapport easily, and write legibly. These characteristics were necessary for good practice and to add credibility to the study process. Ten research assistants were recruited from staff members of the medical and surgical nursing department of KCN and from nursing staff of the medical wards of QECH, because these were experts in the subject area of study.

The selected research assistants were trained during in a two day programme (see Annexure L), to empower the team of 10 research assistants, with the research protocols' title, objectives, design, sample recruitment of participants, the QECH protocol of hypertension diagnosing and treating hypertension (see Annexure L), participant information sheet with the informed consent (see Annexures F & G), and the data collection instrument (see Annexures D & E).

As indicated in Annexure M ethical aspects of research were addressed including aspects related to informed consent, voluntary participation, confidentiality, privacy,

anonymity and respect for people. Before conducting any interview, every research assistant signed a confidentiality agreement.

During their training the research assistants were equipped with knowledge, skills and attitudes to ensure a successful data collection exercise that would produce good quality data. The researcher selected experienced nurses from KCN faculty members and nurses in the medical wards of QECH as research assistants because of their expertise in the subject area of the current study. The training was conducted by the researcher and an independent consultant with vast experience in field work and health-related studies. The researcher was always available while the research assistants conducted interviews with the patients and could assist in case any interviewer required assistance or if any patient might have required medical care. No emergencies occurred during the data collection phase.

3.2.5.4 Data collection technique

If the patient was eligible to participate, the research assistant informed the patient about the study, the researcher's name, title and aim of study, the objectives, data collection procedure and the interview. The research assistant had to emphasise the nature of voluntary participation, and to indicate that even after volunteering any respondent could withdraw from the study without incurring any penalty whatsoever. Finally the research assistant had to ask the patient whether the explanations about the study had been understood and whether the patient wished to ask any questions. If the patient said all was understood, the researcher asked the patient to sign a consent form. Those unable to sign were assisted with an ink pad, to record a right thumb print. The researcher kept these consent forms locked up as proof of informed consent. The individual face-to-face structured interviews lasted approximately 45 minutes. After the interview the respondent was thanked and offered a drink and a snack. The researcher collected all the completed interview schedules and the signed consent forms from the 10 research assistants, verified the completeness and locked them up. This interview process was followed every Friday until the sample size of 480

had been achieved, during the period July to September 2013. Each of the ten research assistants conducted a maximum of five interviews on Fridays, amounting to a maximum total number of 50 interviews per Friday.

3. 3 VALIDITY AND RELIABILITY

Schmidt and Brown (2012:492) define validity as the degree that an instrument measures what it is supposed to measure.

3.3.1 Validity of the research design and instrument

According to Schmidt and Brown (2012:149) design validity is defined as, the ability to accept study results as logical, reasonable and justifiable according to the evidence provided. There are internal and external threats, forces that can change the results of studies; which have to be controlled for design validity to be achieved (Schmidt & Brown 2012:149). The researcher in the current study controlled the threats in the following ways:

3.3.1.1 Validity of the structured interview schedule

Validity of the instrument is defined as ‘the degree that an instrument measures what it is suposed to measure’ (Schmidt & Brown 2012:492). After development of the instrument, it was reviewed by four content experts in the field, two clinical nurse specialists and two nursing education specialists. The instrument was reviewed by two language specialists. The feedback from six reviewers was used to refine the instrument. Furthermore, the instrument was pre-tested. The feedback of the pretest further refined the instrument.

3.3.1.2 Internal validity

Internal validity is defined as the degree to which one can conclude that the independent variables, not extraneous variables, produced changes in the dependant variable (Schmidt & Brown 2012:482). In this study, the researcher used a simple random sampling technique which is an effective way of controlling extraneous variables therefore achieving validity. In addition, the researcher used inclusion criteria which brought elements of the same characteristics into the study. The researcher conducted intense training of the research assistants, thus, consistency was maintained in sampling and data collection, to avoid instrumentation and testing biases. The study was conducted at one site; therefore, it was easier to control the environment.

3.3.1.3 External validity

External validity is defined as the degree to which the results can be generalised to other subjects, settings and times (Schmidt & Brown 2012:480). In this study, results could be generalised to patients being treated for hypertension at the QECH because simple random sampling was used, a strong technique that allows generalisability.

The instrument items were developed with consideration of the following: reading skill level of a twelve year old; use of simple terms which were not difficult or ambiguous, or double barrelled; the reading skill level or interpretability, the items used simple words with few syllables, and sentences with few words, short questions that asked for one variable (Steiner & Norman 2006:65)**.**

3.3.1.4 Face validity

Polit and Beck (2008:753) describe face validity as “The extent to which a measuring instrument looks as thoug it is measuring what it purports to measure”. In a similar manner Burns and Grove (2005:798) maintain that face validity “verifies that the instrument looked like or gave the appearance of measuring the content”. In this study, two language experts, and the researcher's supervisor, as well as a statistician, and

Professor Morisky verified the face validity (see annexures H and I) by confirming that all the items in the instrument appeared to be relevant to the major purposes of the study namely to identify patients anti-hypertension adherence levels and to identify factors that could influence these levels of adherence.

3.3.1.5 Content validity

Content validity reflects the extent to which a research instrument's items "adequately represent the universe of content for the concept being measured" (Polit & Beck 2008:750). The items were developed by the researcher based on the title of the research, the aim, objectives, design, the concepts of the HBM and literature. Most items were derived from the (WHO-ISH 2003) protocol for treating hypertension. The items were reviewed by the two subject experts, the researcher's supervisor and Professor Morisky who verified the content validity (see annexures H & I).

3.3.1.6 Construct validity

Construct validity "examines the fit between conceptual and operational definitions of variables and determines whether the instrument actulally measures the theoretical construct that it purports to measure" (Burns & Grove 2005:793). The structured interview schedule items were reviewed by the researcher's supervisor, two language experts and Professor Morisky who verified that the construct validity was acceptable because the operational definitions and concepts used in the study were relevant to the theoretical constructs (see annexure H & I). The concepts of the Health Belief Model also guided the instrument development.

3.3.1.7 Validity of the MMAS-8

The MMAS-8 was validated in a sample of 1 367 hypertensive patients and had a Cronbach alpha coefficient of 0.83. Another study was done in Malaysia, the first to systematically translate and validate MMAS-8 into the Malaysian language. A

significant association was found between the MMAS-8 scores and diabetic control represented by HbA1c (χ^2 = 20.261; $p \geq 0.001$), with sensitivity and specificity of 77.6% and 45.3%, respectively. This finding was accepted, as those patients with higher adherence had more awareness about the control of their diabetes and self-management processes, and they were concerned that poor adherence might worsen their clinical condition.

Other studies included the translation and validation of the Malaysian version used on diabetic patients and correlated hypertensive patients' self-reported medication adherence with their pharmacy refills (AlQazaz, Hassali, Shafie, Sundram & Morisky 2010:217; Krousel-Wood, Islam, Webber & Morisky 2009:61). Researchers assessed factors contributing to non-adherence to oral hypoglycaemic medications among ambulatory type 2 diabetic patients and the scale was reported to be a valid one (Adisa et al 2009:165)**.** A study was conducted in Malaysia on the relationship between beliefs about medications and adherence levels (Gatti et al 2009:658). In all these studies the Morisky Scale was used and was reported to be a valid scale. The Chichewa, Malawi version of MMAS-8 was sent to Prof. Morisky, for the content and construct validity which was acceptable and approval was granted on 3rd March, 2012 (see annexure G).

3.3.1.8 Reliability of the MMAS-8.

Reliability is defined as the ability of the instrument to obtain consistent measurements over time (Schmidt & Brown 2012:488). Reliability of the MMAS-8 was tested originally in a study, on a sample of patients with hypertension to test the validity and reliability of the tool. The results showed that the scale was reliable, with good predictive validity and sensitivity, and was published (Morisky 2008:5; Morisky, Ang, Krousel-Wood & Ward 2008:354; Sakthong, Chabunthom & Charoevisuthiwongs 2009:956). The Cronbach alpha coefficient for internal consistency was 0.675 for the eight items in MMAS-8. The test-retest reliability of the MMAS-8 items indicated excellent reliability and stability of the instrument with Spearman's rank correlation coefficient of 0.816 ($p< 0.001$). Reliability tests showed a positive correlation between the MMAS-8 and the original four item MMAS scale ($r =0.792$, $p< 0.01$).

3.3.1.9 Inter-rater reliability

This is defined as the measure of association and examining the effect of different observers on scores (Munro et al 2005:48; Streiner & Norman 2006:137). In this study, there were ten research assistants who collected data. To ensure that the collected data would be reliable, the research assistants were trained for two days. This included classroom training and field experience. Classroom sessions concentrated on familiarising the research assistants with the research topic, aim, objectives, and the 101 items of the structured interview schedule (see annexure D). Role plays were also done to demonstrate the correct way of using the structured interview schedule when the research assistants interviewed each other. The field experience was the pre-test of the structured interview schedule when every research assistant conducted one interview with one patient. An inter-rater reliability coefficient could not be determined because 10 research assistants could not interview the same patient to obtain data for such a calculation. However, the interview schedules completed during the pre-test were compared and no major discrepancies occurred. The researcher was always available during the data collection phase and could be consulted whenever deemed necessary by the research assistants. The researcher also tried to scan every completed interview schedule as soon after the completion of every interview as possible.

Permission to use and translate the Morisky scale to Chichewa

The researcher sought written permission from Professor Morisky to use and translate the MMAS-8 to Chichewa and for the researcher and research assistants to conduct face-to-face interviews instead of patients self-reports. This was to ensure completeness of data considering the low literacy levels in Malawi (MDHS, 2005:8). The process of formalising the copyright instructions with the publisher and author started in July 2011. Permission to use the scale was granted by Professor Morisky on 5th January 2012 (see annexure F). Written approval of the backward and forward

translation of the MMAS-8 Chichewa version was granted on 3rd March, 2012 (see annexure H) with a specific validity limited to the current research study only, up to the time of submission of the research results to the university and to the College of Medicine Research Ethics Committee. It is a copyright requirement that a report of the study be submitted to Professor Morisky.

The copyright procedure MMAS-8 translation

Through the literature review, several adherence tools were identified. The researcher chose the MMAS-8 because of its characteristics that were relevant to the study objectives. The author sent the tool with copyright instructions to the researcher. The researcher followed the MMAS-8 copyright instructions to translate the scale as follows:

Forward translation of the original scale was done from English to Chichewa to produce a version that was semantically and conceptually as close as possible to the original one. There were two groups of language experts from the language departments in the University of Malawi, at Chancellor College and at Kamuzu College of Nursing. They undertook the translation process of the MMAS-8 into the Chichewa language using the standard “forward–backward” procedure (Morisky 2008:8; Wild et al 2005:8). Each group of translators produced a forward translation of the original structured interview schedule into the target language without mutual consultation. One Malawian researcher reviewed the two primary versions and compared them with the original version.

Reverse translation was done by another translator, from Chichewa to English after repeated discussions between the translators and Malawian researchers. Inconsistencies were resolved in a consensus meeting and a final version was generated. The translated scale was distributed to 20 Chichewa speaking individuals who completed the structured interview schedule and commented on the questions. The comments were discussed by the researchers.

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Subsequently, six master's students who were experts in the field judged the face and content validity of the scale. The final version of the Chichewa MMAS-8 was sent back to Professor Morisky for validation after which approval was granted to the researcher to use it. Permission to use the scale was granted only for the duration of the current study (see annexure F) and would expired after completion of the study report

Scientific honesty and integrity

Polit and Beck (2010:568) define scientific merit as the degree to which a study is methodologically sound. In this study the main goal was to generate sound scientific knowledge through honest methods and to reach conclusions, generalise findings, and suggest further studies to improve the hypertension patients' treatment adherence levels. Scientific dishonesty involves fabrication or falsification of research steps and results, plagiarism and manipulating results to obtain financial benefits or honour. Research must be conducted and reported with honesty and integrity and it must be in line with established national, institutional and professional codes of practice (Schmidt & Brown 2012:480). The researcher followed the principles of scientific honesty and integrity in research. The required process of data collection was followed as guided by the supervisor. An independent statistician performed the statistical analysis of data and no attempts were made to manipulate or fabricate raw data or falsify research findings. All quoted or paraphrased sources of information used in this study were acknowledged and a complete list of references is included so that any reader of the thesis can access the sources consulted.

3.3.1.10 Reliability of the instrument

Schmidt and Brown (2012:492) define reliability of the instrument as the atainment of consistent measurements over time. In this study the pre-test corrections were used to

improve the reliability of the tool. For the MMAS-8, several studies had used it over time, it yielded consistent measurements (Fongwa, Evangelista, Hays, Martins, Elashoff, Cowan & Morisky 2008:157; Krousel-Wood et al 2004:358; Morisky et al 2008:52; Sakthong et al 2009:102).

3.4 DATA ANALYSIS

Data analysis is defined as the systematic organisation and synthesis of research data, the testing of a research hypothesis using the acquired data (Polit & Beck 2010:758). In this study, quantitative data were entered and analysed using the SPSS program version 19.0. Descriptive statistics were computed for the demographic data and presented as frequencies. The results are presented in tables, figures and graphs. To generate the outcome variable of adherence, scores for each respondent were generated which formed the basis for categorisation into three adherence levels namely low (score of <6), moderate (score of 6 to <8) and high (score of 8) (Morisky 2008:3; Morisky et al 2008:350). In order to estimate levels of adherence, one-way tabulation of the adherence variable was done in order to obtain frequencies for each category. The adherence variable was analysed as an ordinal outcome variable with the three categories described above.

To investigate factors associated with levels of adherence, a number of statistical methods were employed. For categorical variables, Pearson Chi-square or Fisher's Exact tests were used to assess whether a significant association existed between a specific factor and the patient's adherence level. Analysis of variance (ANOVA) was used to investigate associations between continuous variables (factors) and adherence. In order to compute odds ratios (ORs) and p-values for each variable, simple ordinal logistic regression models for each factor were fitted.

To compute data distributions for the measures of the specific objectives, one way tabulation was used to obtain frequencies related to the objectives as specified in section 1.3.2 of this thesis. The accepted level of significance was 5%.

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3.5 DISSEMINATION OF RESEARCH FINDINGS

The results will be disseminated locally, nationally, regionally, and globally. Locally, a meeting will be organised for hypertensive patients and staff of QECH to provide feedback about the findings. The study reports will be submitted to the College of Medicine Research Ethics Committee (COMREC) of Malawi, to Professor Morisky in California, and to the Kamuzu College of Nursing in Blantyre, Malawi. A copy of the thesis will be submitted to University of South Africa and to the Library at the Kamuzu College of Nursing. A paper will be presented at an annual scientific research conference at the College of Medicine of Malawi, and at other conferences. A paper will be submitted for publication in an academic accredited journal.

3.6 ETHICAL CONSIDERATIONS

Ethical considerations in research imply “a system of moral values that is concerned with the degree to which research procedures adhere to professional, legal and social obligations to the study participants” (Polit & Beck 2008:753). Basically research ethics imply that the rights of all participants/respondents and all institutions should be respected at all times and that the researchers should maintain scientific integrity by adhering to “… the principles of respect for persons, beneficence, and justice relevant to the conduct of research” (Burns & Grove 2005:797).

The researcher obtained ethical approval from the Higher Degrees Committee of the Department of Health Studies at the University of South Africa. The committee granted an ethics clearance certificate number HSHDC/2012, dated 29th August 2012 (see annexure A). Permission was also granted by the Kamuzu College of Nursing's Research and Publications Committee (see Annexure J). Permission to conduct the study at the QECH, Hypertension Clinic, in Blantyre was granted by the Hospital Director (see annexure K). The University of Malawi’s Research and Ethics Committee (COMREC) of the College of Medicine in Malawi granted an ethics clearance, under

certificate number P.03/13/1370 dated 16th May 2013 (see annexure M). The Blantyre District Health Officer granted permission to conduct a pre-test of the study instrument at Ndirande Health Centre (see annexure N).

The researcher respected the respondents' autonomy, and adhered to the ethical principles of beneficence, non-maleficence and justice, as explained in the following paragraphs.

Autonomy refers to self-rule and self-determination to have the ability to make one's own decisions regarding one's own life (Schmidt & Brown 2011:482). In this study the researcher upheld this principle, by respecting the respondents who were fully informed about the study, including the study's title, purpose, site, population, duration and the researcher's particulars. This allowed respondents to make informed decisions as to whether or not to participate in the study. Informed consent was obtained as an indication of voluntary participation by the respondent (see annexures F and G). Those who could not sign provided a right thumb print. Respondents were informed about their right to withdraw from the study, if they felt so at any point in time, without incurring any penalty whatsoever.

The **principle of beneficence** refers to the concept of doing 'good' and maximising benefits for the respondents (Schmidt & Brown 2011:475). During data collection, private rooms were used to maintain privacy and confidentiality. In addition, respondents were guaranteed that their information would be kept in the strictest confidence throughout the study, and would be locked up and used only for research purposes and be accessible only to the researcher, supervisors and the statistician. The structured interview schedules had codes and not names to maintain anonymity. After data analysis and report writing, the completed interview schedules would be destroyed after three years. Respondents were given the researcher's contact details to talk to her if they had any queries about the study.

The **principle of non-maleficence** refers to the obligation of the researcher to minimise harm. In the current study there was no risk of physical harm to the

respondents. However, some might have experienced emotional upsets when thinking about painful experiences, in which case the interview would be stopped and the respondent would be referred to a psychologist or relevant health care professional.

The **principle of justice** is an ethical principle of equity and fairness in the distribution of benefit and opportunities and giving equal treatment to equal people (Schmidt & Brown 2011:482). In this study the respondents were randomly selected using selection criteria. Both males and females were equally assessed by the same eligibility criteria to be recruited in the study and were accorded similar respect during data collection. The simple random sampling process allowed the respondents a known chance of participating in the study. The researcher and all assistants gave respondents with hypertension equal and fair treatment at the hypertension clinic.

3. 7 LIMITATIONS OF THE STUDY

The study was conducted at one site only; multiple sites could have enriched the research findings. A structured interview schedule was used, but individual in-depth interviews might have yielded richer data. These limitations resulted from the time and financial constraints of the researcher as the study was a requirement for the fulfilment of the degree of doctor of philosophy in health studies; and as such the researcher had to complete the study with limited financial resources.

3.8 SUMMARY

This quantitative descriptive study employed structured interviews (including a checklist) to collect data. The research design, sampling method, ethical issues related to sampling, population sample, data collection and data analysis were explained. The internal and external validity of the study were discussed. Various measures were applied to enhance the study's validity and reliability and to uphold the ethical principles of research. The findings will be presented and discussed in chapter 4.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents the results of a quantitative descriptive study conducted to investigate levels of patients' adherence to anti-hypertensive treatment regimens and factors influencing adherence at QECH hypertension clinic in Blantyre, Malawi. Data were collected from 480 randomly selected hypertension patients using structured interviews and the adherence levels were measured by using the MMAS-8 instrument. The questions that needed to be answered were:

- What are hypertension patients' treatment adherence levels?
- What are the factors that influence hypertension patients' treatment adherence at QECH hypertension clinic?

The specific objectives of the study, phrased in terms of the major concepts of the HBM, were to:

- establish hypertensive patients' levels of adherence to their treatment regimens;
- identify hypertensive patients' knowledge of high blood pressure, non-pharmacological and pharmacological management of high blood pressure;
- identify hypertensive patients' perceived susceptibility to potential complications attributable to high blood pressure;

- identify hypertensive patients' perceptions of severity of high blood pressure complications;
- determine hypertensive patients' perceived benefits of treatment adherence;
- describe hypertensive patients' perceived barriers to treatment adherence;
- describe hypertensive patients' cues to action and self-efficacy for treatment adherence.

4.2 DATA ANALYSIS

The quantitative data were entered using the SPSS program version 19.0. Descriptive statistics, including univariate and multivariate analyses, were computed using Stata software version13.0. The level of significance was set at 5%.

To generate the outcome variable of adherence, scores for each respondent were generated which formed the basis for categorisation into three adherence levels based on the MMAS scores of low (<6), moderate (7<8), and high (=8) adherence (Morisky et al 2008:350). In order to estimate respondents' levels of adherence, one-way tabulation of the adherence variable was done in order to obtain frequencies for each category. The adherence variables were analysed as ordinal outcomes with three categories described according to the MMAS-8 coding instruction (Morisky et al 2008:352).

To investigate factors associated with levels of adherence, a number of statistical methods were employed. For categorical variables, Pearson Chi-squares or Fisher's Exact Tests (for cell values less than 5 in contingency tables) were used to assess whether a significant association between the factor and adherence levels existed. Analysis of variance (ANOVA) was used to investigate associations between continuous variables and adherence. In order to compute

odds ratios (ORs) and probability values (*p*-values) for each variable, simple ordered logistic regression models were calculated for each variable. Likelihood ratio tests were used to compare models in order to build the most parsimonious model. To compute data distributions for the measures of the specific objectives, one way tabulation was used to obtain frequencies. The following conventions have been used for the discussion of the research findings in this chapter:

- N = total sample
- n = total of sub variables or topics
- f = frequency within N or n.

4.3 RESPONDENTS' DEMOGRAPHIC CHARACTERISTICS

This section presents information about respondents' demographic characteristics obtained through questions in the demographic section of the interview schedule. These included respondents' gender, age, religion, tribe, marital status, educational level occupational status. A total of 480 respondents, being treated at QECH hypertension clinic, participated in the study. Their demographic and socio-economic characteristics are presented in sections 4.3.1-4.3.7.

4.3.1 Gender

More females (78.0%; f=370) than males (22.0%; f=105) participated in this study (see table 4.1).

Table 4.1 Respondents' gender (n=475)

Gender	(f)	(%)
Males	105	22.1
Females	370	77.9
Total	**475**	**100.0**

These findings are similar to those reported by Chibwana, Mathanga, Chinkhumba and Campbell (2009:221) in Malawi, indicating that men were reluctant to use health facilities, even when they were ill. Holt et al's (2010:481-483) study on health–related quality of life, and anti-hypertensive medication adherence levels among adults with a mean age of 75 years, revealed that 58.0% of the patients suffering from high blood pressure were females in New Orleans (USA). Ramli et al (2012:613) assessed medication adherence, among hypertensive patients treated in PHC clinics in Malaysia. Females comprised 62.8% of the sample of hypertensive patients. Similarly, Ambaw et al (2012:282) assessed treatment adherence among hypertensive patients in Ethiopia's Gondar health facility. The findings showed that 63.0% of patients with hypertension were females. Msyamboza et al (2011:3) assessed the burden of selected chronic non-communicable diseases and their risk factors in a nationwide STEPS Survey in Malawi. These findings showed that 68.0% of the patients with hypertension were females.

In Malawi women face many challenges. For example, when a husband, a child or a relative is sick, the key person responsible for providing care is the woman/wife/mother/daughter. Malawian women also cultivate land and sell produce at the roadside. Stress is reported to be a risk factor for hypertension through the sympathetic nervous system's stress reactions, as discussed in chapter 1 of this thesis. Gianaros et al (2007:134) reported that when an individual experiences stress and/or worries continuously; there is a release of adrenaline from the adrenergic fibres of the adrenal glands, the stress hormone. This is a stimulant and a vasoconstrictor, which increases peripheral resistance resulting in raised blood pressure.

However, Roeters van Lennep, Westerveld, Erkelens and Van der Wall's (2002:541) article on risk factors for coronary heart disease, reported that hypertension results from a loss of arterial elasticity which increases with age in both males and females. It was not reported how women or men responded to

hypertension treatment and prevention, as this review article addressed the role of cardiovascular risk factors focusing on the differential impact they might have on men and women (Roeters et al 2002:541).

4.3.2 Respondents' ages

The ages of the respondents ranged from 30 to 85 with a mean of 58 years. However, the majority of respondents were within the age range of 51-60 years but as many as 79.0% (f=380) of the respondents fell within the 31-70 year age group (see figure 4.1 and table 4.2).

Hypertension is a physiological process which can occur at any age, but it occurs mostly at or after middle age and among older adults (McCance et al 2010:1155). It is a response to alterations in the blood pressure controlling factors in old age that slows down a person's activity levels. Activity is important for burning of the fats in the body. In the same manner the metabolic processes in the body also slow down. This leads to the accumulation of fats in the body including the blood vessels, narrowing of the lumen which eventually disturbs the normal flow of the blood, leading to an accumulation of blood in the vessels and causing hypertension (because of the increased pressure of the increased volume of blood against the blood vessels' walls). This increases the peripheral resistance causing hypertension in older persons. Older adults refer to persons in the age range of 30-70 years according to Lewis et al (2011:742) although different authors have different age brackets for 'older adults'.

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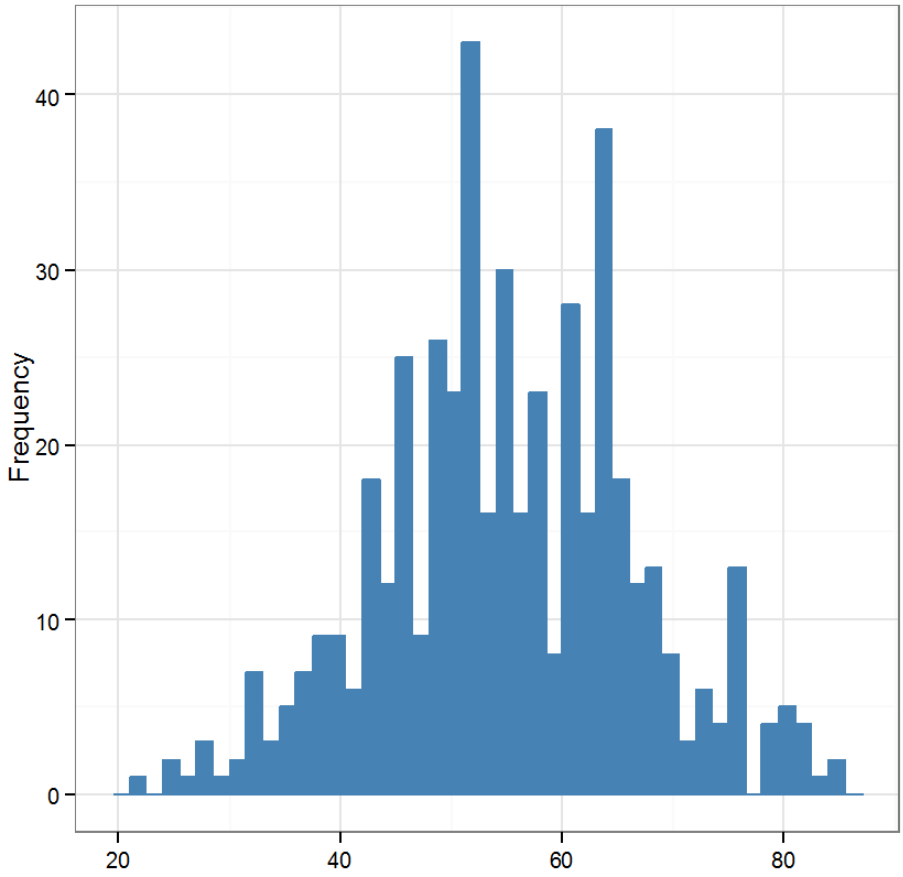

Figure 4.1: Age of respondents (n=479)

This age range is the productive age group, busy and stressful as they try to earn a living while raising their families. The stress, in turn, has some negative effects on their bodies (Gianaros et al 2007:134). Similar findings were reported at Tikur hospital, Addis Ababa (Hareri & Abebe 2013:2). While assessing 286 patients' adherence to their anti-hypertension medications and associated factors, results showed that this sample's mean age was 52. A systematically selected sample of 286 patients was interviewed (Hareri & Abebe 2013:2).

Table 4.2: Respondents' ages (n=479)

Age range	(f)	(%)
30 & below	13	2.7
31 - 40	49	10.2
41 - 50	121	25.3
51 - 60	152	31.7
61 - 70	107	22.3
71 - 80	32	6.7
81 - 90	5	1.0
Total	**479**	**99.9**

The respondents mean age was 54.9 years (standard deviation [SD] 11.6). The average age at high blood pressure diagnosis was 50.4 years (SD 12.1 years). Age in years was normally distributed (see figure 4.1), and was analysed as a continuous variable. The average age of this study's respondents is in line with the age findings of Ambaw et al (2012:284) in Ethiopia at Gondar Hospital where the hypertension patients' mean age was 57 years. Other studies, conducted on patients with hypertension, have described similar age groups for hypertension patients, 36-45 years (Turki & Sulaiman 2010:27), 40-50 years (Sulaiman et al 2009:41), and 32-84 years with a mean of 57.84 years (Ramli et al 2012:616).Thus the 475 respondents' mean age of 58 in this study seems to correlate with the mean age of hypertensive patients reported by various studies from different parts of the world.

4.3.3 Religion of the respondents

Out of 480 respondents, 27.7% (f=133) belonged to the Presbyterian Church, 26.2 % (f=126) were Roman Catholics and 11.2% (f=54) belonged to Seventh Day Adventist Church. It was important to know respondents' religious affiliations because some religions might prohibit their members from taking

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Western medicines thereby causing non-adherence in patients. There were also some Muslims 8.1% (f=39). The other respondents belonged to religions such as the Anglican, Pentecostal, Church of Christ, Calvary and Assemblies of God (see table 4.3).

Table 4.3: Respondents' religious affiliations of (N=480)

Religion	(f)	(%)
Roman Catholic	126	26.3
Presbyterian	133	27.7
SDA	54	11.3
Muslims	39	8.1
Pentecostal	29	6.0
Others	99	20.6
TOTAL	**480**	**100.0**

Similar religious groupings, although with different percentages of followers, were reported by the MDHS (2010:26). This report indicates that in Malawi, Presbyterians represent 33.4% and Roman Catholics 42.9% of the population.

Religion has been found to be significantly correlated with treatment adherence (Gatti et al 2009:657; Kazembe 2007:45, 58; Robinson & Zhang 2011:2; Sato 2012:1; WHO 2011:358) because of the spiritual support that religion could provide to people. However, patients' treatment adherence levels could also be adversely influenced if their church maintains that people who have been prayed for, do not need to take medicines to get cured of their illnesses (Holt et al 2010:483).

Gatti et al (2009:657) examined the relationship between beliefs about medications, health literacy, and self-reported medication adherence of 275 African-Americans. These researchers used the "Beliefs about Medicines Questionnaire" and the MMAS-8, at an inner city hospital in Washington DC in the USA. Their results showed that 52.7% of the participants reported low

medication adherence levels of <2. Multivariate analysis indicated several factors that were associated with low adherence levels including negative beliefs about medications, younger age, low medication self-efficacy and hyperlipidaemia. Health literacy was not independently associated with beliefs or adherence. Patients who had negative beliefs about medications, who were younger than 65 or who had low medication self-efficacy, reported low medication adherence. When patients face tasks such as taking hypertension medication every single day for the rest of their lives, it is not an easy issue. They weigh many factors, including their beliefs about the necessity of the medications against their concerns such as side effects, the inconvenience of swallowing pills, and the cost of obtaining the medications. The patients' analyses of all the factors, could influence their decisions whether or not to adhere to the prescribed treatment regimen (Gatti et al 2009:658).

4.3.4 Respondents' tribal affiliations

Respondents belonged to the following tribes: Chewas, 15.6% (f=75), Ngonis 23.3% (f=112), Lomwes 24.0% (f=115); and Yaos 16.9% (f=81). It was important to know respondents' tribes because some tribal customs might prohibit their members from taking Western medicines thereby causing non-adherence by patients to their anti-hypertensive medications. There were other tribes as well (refer to table 4.4 and figure 4.2).

Table 4.4: Respondents' tribal affiliations (n=478)

Tribe of respondent	(f)	(%)
Chewa	75	15.7
Ngoni	111	23.2
Tumbuka	29	6.1
Lomwe	115	24.1
Yao	82	17.2
Other	66	13.8
Total	**478**	**100.1**

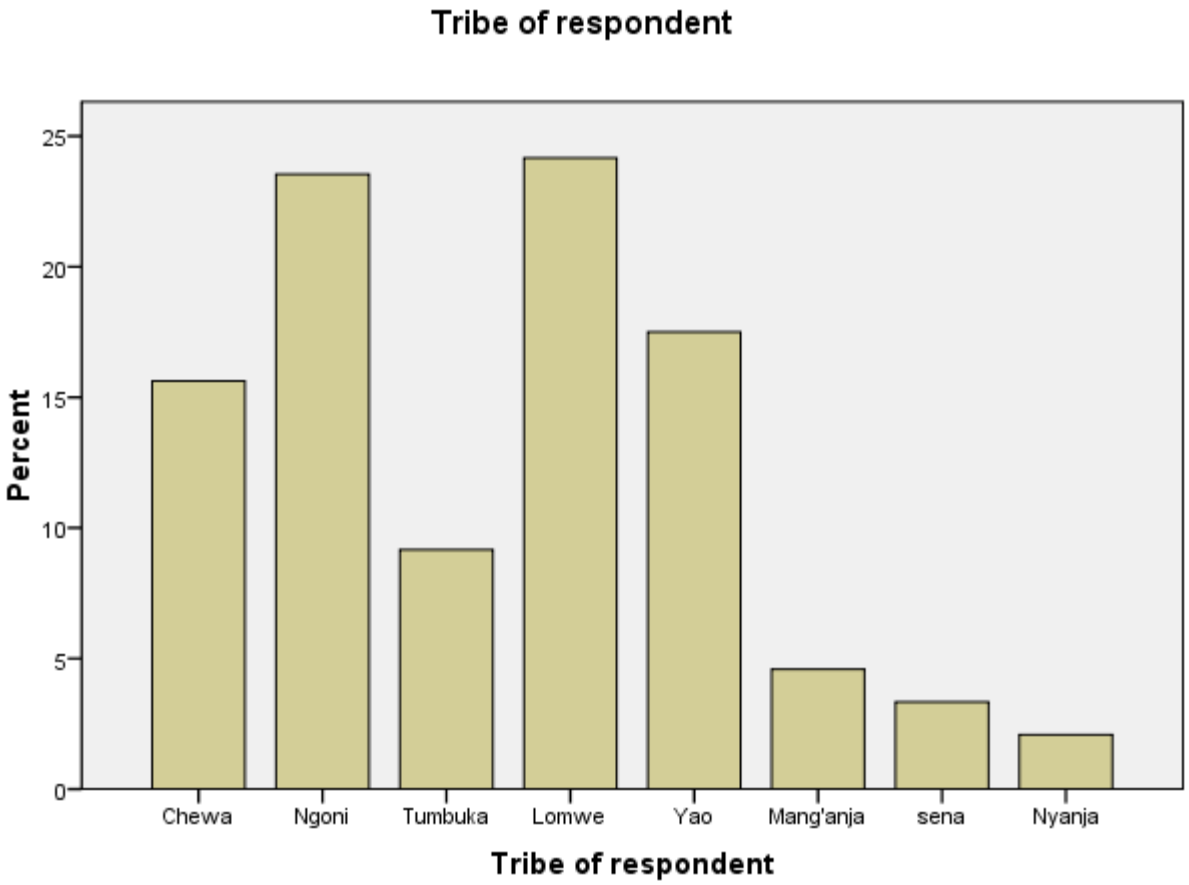

Figure 4.2: Tribal affiliations of respondents (n=478)

The MDHS (2010:26) reported the following tribal affiliations of Malawian citizens for the entire country: Lomwes 34.1%, Chewas 67.4%, Ngoni 25.8% and Yaos 26.3%. However, Blantyre city, bordered by the districts of Chiradzulu, Mulanje, Thyolo and Zomba, is a cosmopolitan city which has industries, companies, governmental and non-governmental organisations and international shopping malls and Asian shops. People from all these neighbouring districts come to Blantyre to seek employment and patients are referred to QECH from many areas and districts. It has Lomwe and Chewa and

Ngoni as key tribes (MDHS 2011:26) and most of this study's respondents belonged to these three key tribes (see figure 4.4 and table 4.2). Tribal affiliations could influence patients' adherence behaviours because tribe shapes peoples beliefs, attitudes and practices (Kazembe 2007:54). Therefore tribal influences could affect peoples' treatment adherence based on their perceptions of the disease, treatment and adherence.

Epstein et al (2012:1764) in America randomly assigned participants to three groups: DASH diet only, DASH diet plus weight management and usual diet controls. The primary outcomes of the study were adherence to DASH diet and level of blood pressure. They found that the two groups, DASH diet only, DASH diet plus weight reduction, showed significant reduction in blood pressure in comparison with the usual diet controls. A dietary adherence of 95% showed a reduction in blood pressure (Epstein et al 2012:1764; Kastarinen, Puska, Korhonen, Mustonen, Salomaa, Sundvall, Tuomilehto, Uusitupa & Nissinen 2002:2505).

4.3.5 Marital status of respondents

Out of 476 respondents, 67.6% (f=322) were married; 24.4% (f=116) were widows. The single, divorced/separated respondents were 8.0% (f=38) (see table 4.5).

Table 4.5 Respondents' marital status (n=476)

Variable	(f)	(%)
Married	322	67.6
Widowed	116	24.4
Divorced/separated	38	8.0
Total	**476**	**100.0**

According to the MDHS (2010:26), 58.7% of Malawians are married. Malawi, as a country, supports marriage as an institute of love and support in wellness and in disease and in the upbringing of children. Marriage is included in the Constitution of Malawi, referred to as: “The African Marriage Registration Act, Caption 25 section 02”. In Malawi, marriage is encouraged and supported by religions, tribes and government (Constitution of Malawi 2004:18). This explains why 67.6% (f=322) of the respondents were married. If one member of the couple has hypertension, the other one could provide support through encouragement in terms of reminders to take the medicines for the day.

Therefore, marital status as a demographic characteristic could influence treatment adherence. In this study, out of the 67.6% (f=322) married respondents, only 50.6% (f=163) were adherent. Consequently, this study’s findings did not indicate that married people were significantly more adherent to their hypertension treatment than those who were not married. Similarly, Kulkarni, Alexander, Lytle, Heiss, and Petersen (2006:490) did not find a relationship between marital status and adherence. However, Caldwel, Theisen, Kaunisto, Reddy, Smythe and Smith as reported by Trivedi, Ayotte, Edelman and Bosworth (2008:490), indicated that marital status played an important role, as part of the patient’s social network, and it was associated with improved adherence (r=.19; p<.001).

4.3.6 Respondents’ educational levels

The results showed that out of 479 respondents, 55.7% (f=267) attained primary school education, and 24.8% (f=119) had secondary school education. There were a few of the respondents who had reached college 3.5% (f=17) and 1.7% (f=5) had university education. However, 14.8% (f=71) of the respondents had never attended school (see figure 4.3).

Table 4.6: Respondents' educational levels (n=479)

Education level	(f)	(%)
None	71	14.8
Primary School	267	55.7
Secondary School	119	24.8
College (Deg/Dip/Cert)	17	3.5
University (Deg/Dip/Cert)	5	1.0
Total	**479**	**99.8**

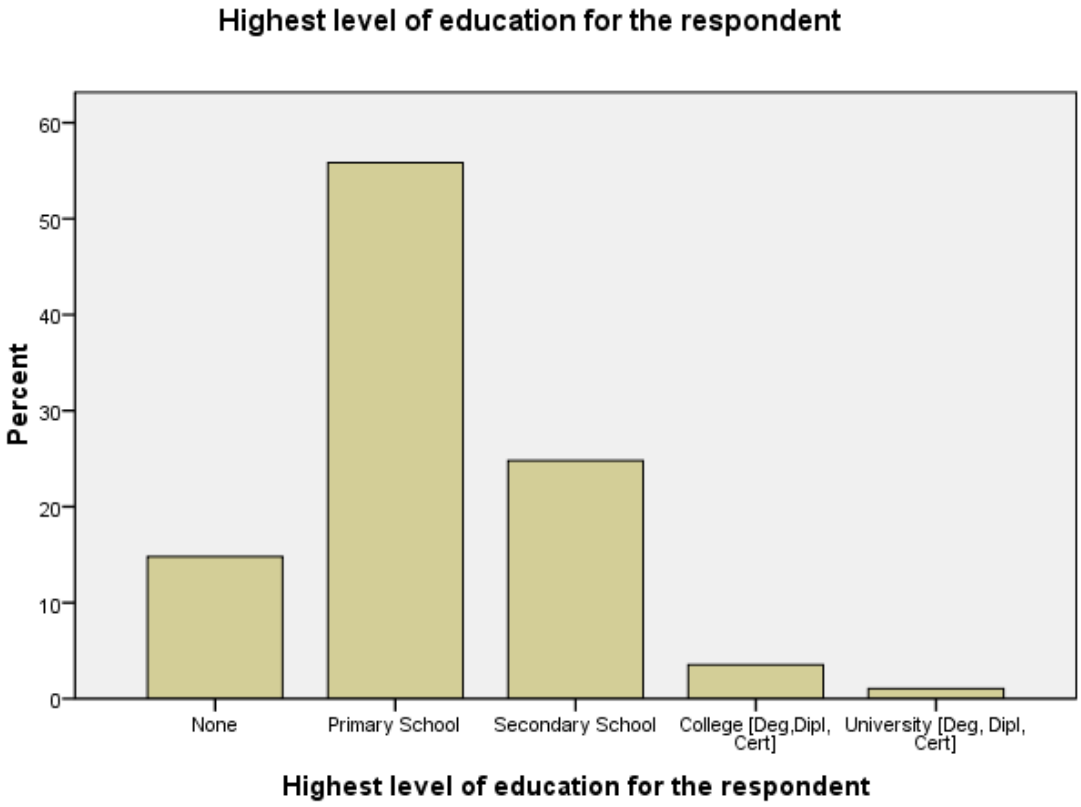

Figure 4.3: Respondents' level of education (n=479)

The significance of knowing the level of education of the respondents was that people with higher education levels should be able to acquire the knowledge of hypertension required to understand the consequences of treatment adherence and non-adherence. Such insight is essential to be able to make informed decisions and to adhere to the prescribed treatment regimens. According to Glanz (2002:42) the six concepts of the HBM require that an individual should have a base of knowledge, upon which health education knowledge could be grounded, before an individual can make an informed health-related decision and perform the required actions.

This is supported by a nurse-led intervention study conducted at the QECH hypertension clinic (Starichi et al 2011:22), that involved providing health education regarding hypertension, its treatment, importance of adherence to treatment, and the dangers that might arise as a result of non-adherence. Thirty seven hypertension patients attended a mean of 3.5 individual counselling session on a one-to-one basis, over a mean of 118.5 days. The results showed that the education intervention increased the patients' adherence to treatment and the patients' blood pressure readings were reduced. This supports the argument that health education interventions can benefit hypertension patients' medication adherence levels (Aminoff & Kjellgren 2001:582; Chang, Fritschi & Kim 2012:119; DeCola, Benton, Peterson & Matebeni 2012:322; Drevenhorn, Bengtson & Kjellgren 2007:47; Drevenhorn, Bengtson & Kjellgren 2009:350; Ericksson & Nilsson 2008:2353; Epstein et al 2012:1764; Ham & Bong 2011:1246; Kastarinen, Puska, Korhonen, Mustonen, Salomaa, Sundvall, Tuomilehto, Uusitupa & Nissinen 2002:2506).

Hacihasanoglu and Gozum (2011:696), in Turkey, assessed the effect of anti-hypertensive patient-oriened education and in-home monitoring of medication adherence, hypertension management, healthy life style, and body mass index in a PHC setting by providing education about medication adherence and

healthy lifestyles. The 120 hypertensive patients were divided into groups A and B. Structured education sessions on medication adherence and healthy lifestyle behaviours were provided to Group B for six weeks. These results showed that healthy lifestyle behaviours and perceptions of self efficacy, regarding medication adherence, improved after education sessions. Benefits of such education sessions also included decreased blood pressure readings, healthier life styles, with increased perceptions of self-efficacy regarding blood pressure control and its benefits. However, behaviour changes take time.

Among African-Americans, Middleton (2009:12) found that the factors related to uncontrolled hypertension were not knowledge nor access to health care services. This was because their knowledge scores on hypertension tests were high and they had access to health care because they had health insurance. It is thus important to consider all possible factors that could influence medication adherence (Barksdale 2009:54; Kalogianni 2011:157; Mazzaglia et al 2009:1601), in addition to patients' knowledge levels and access to health care services.

4.3.7 Occupations of respondents

Table 4.7 represents the respondents' occupations. Recording the respondents' occupations in the current study was important as it could indicate the hypertensive patients' financial ability to travel to the clinic for appointments. In addition, they would manage to buy drugs from private suppliers if these were out of stock at the public clinic's pharmacy and they would be able to afford to follow the prescribed diet for hypertension.

The occupations of respondents included those of housewives (36.3%; f=166). Out of the 457 respondents 22.8% (f=104) engaged in private small businesses and others (18.8%; f=86) were retired (see table 4.7).

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Table 4.7: Respondents' occupational status (n=457)

Variable	(f)	(%)
Housewives	166	36.3
Small-scale business	104	22.8
Retired	86	18.8
Farmer, tailor	38	8.3
Supervisor, teacher, secretary	30	6.6
Others	33	7.2
Total	**457**	**100.0**

Similar findings were recorded by Hareri and Abebe (2013:4) who assessed adherence to anti-hypertension medications among patients at Tikur Hospital, in Addis Ababa, Ethiopia. The participants' occupations were housewives (7.3%; f=35), traders (6.7%; f=32) and retirees (0.6%; f=3).

4.3.8 Correlations between biographic factors and adherence to anti-hypertensive treatment

In summary the findings of the current study indicated no significant association between anti-hypertension medication adherence and gender, age, tribe, religion, education or occupation, as shown in table 4.8. From One-Way Analysis of Variance (ANOVA), there was no significant association between gender, age and education level with blood pressure.

Table 4.8: Two-way associations between biographic characteristics and anti-hypertensive treatment adherence

Factor	Chi-square/F	df	P-value	F
Gender	0.525	2	0.769	476
Age (years)†	1.34	2	0.264	480
Tribe of respondent	14.54	16	0.558	478
Education level	3.40	2	0.691	479
Marital status	1.25	6	0.975	475
Number of children	10.84	6	0.094	460
Suffered BP in previous pregnancy	0.81	2	0.667	351
Number of live children	33.53	26	0.147	460
Number of children who had died	25.44	18	0.113	436
Currently pregnant	0.36	2	0.836	370

†*P*-value from Analysis of variance (ANOVA).
‡ From Pearson Chi-square or Fisher's Exact test
*df: degrees of freedom

Table 4.9: Two-way associations between demographic factors and blood pressure

Factor	Chi-square	df	P-value	N
Gender	2.59	4	0.628	465
Age (years)*	1.48	4	0.208	469
Education level	16.56	16	0.415	468

From one-way analysis of variance (ANOVA)
df: degrees of freedom

4.3.9 Health facilities that referred patients to the QECH hypertension clinic

The health facilities which referred patients to QECH hypertension clinic were QECH outpatients/accident and emergency trauma departments (67.4%; f=323); health centres such as Limbe (8.6%; f=41); Ndirande (7.9%; f=38); Zingwangwa (5.8%; f=28); Chilomoni (4.0%; f=19). In addition, there were some patients who were referred from other districts 6.3% (f=30), including Chikwawa, Chiladzulu, Dedza, Lilongwe, Mulanje, Nsanje, Ntcheu, Zomba, Thyolo and Zomba (see table 4.10)

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Table 4.10: Health facilities that referred patients to QECH hypertension clinic (n=479)

Age range	(f)	(%)
QECH	323	67.4
Limbe	41	8.6
Ndirande	38	7.9
Zingwangwa	28	5.8
Chilomoni	19	4.0
Other districts	30	6.3
Total	**479**	**100.0**

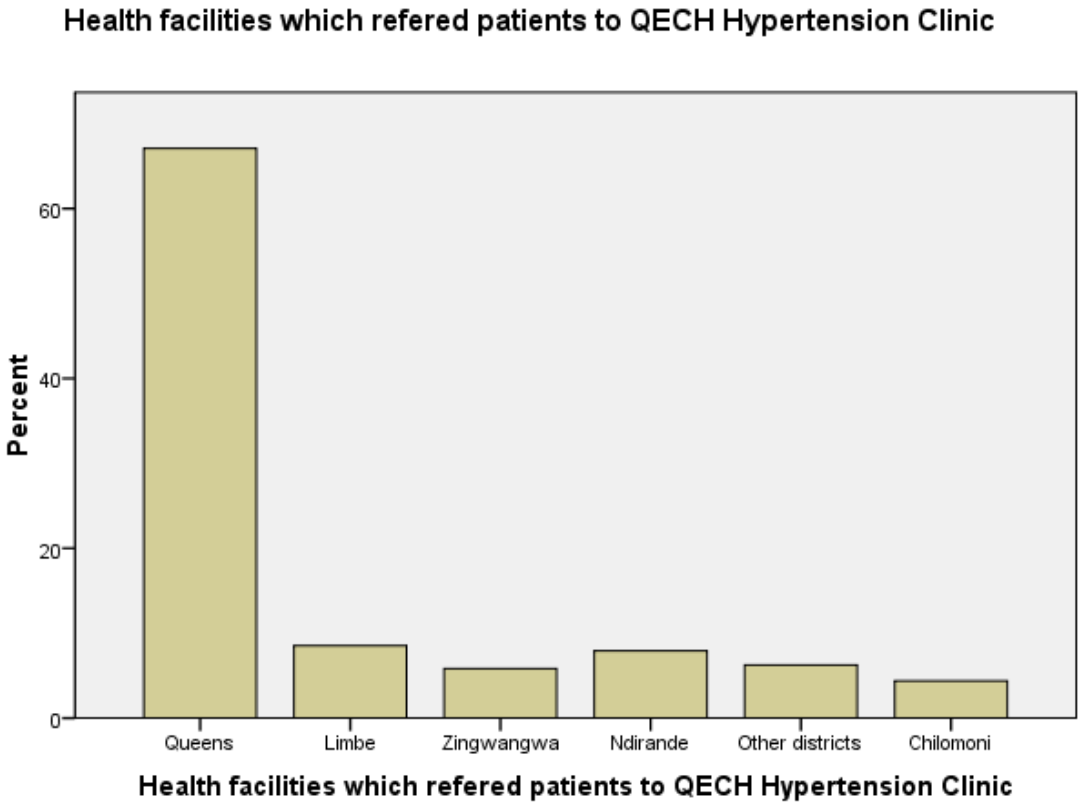

Figure 4.8: Health facilities which referred patients to the QECH hypertension clinic (n=479)

These patients had QECH as their nearest health facility where they were seen with their initial health complaints. Therefore, when hypertension was diagnosed at the QECH facility, they were referred to the hypertension clinic, a unit within the QECH outpatient department run by medical specialists. The significance of this is that the majority of the respondents travelled a short distance to get treatment. However, some patients came from other districts outside Blantyre, travelled long distances from Chikwawa, Chiladzulu, Dedza, Lilongwe, Mulanje, Nsanje, Ntcheu, Thyolo and Zomba.

Having to travel long distances to the QECH facility could influence patients' treatment adherence negatively. For instance, if the patient lives in another district, such as Mulanje, did not have transport money to travel to QECH to get the medication refilled, he/she would be unable to adhere to the prescribed anti-hypertensive regime. This would mean that treatment would be missed for a period of time, lack of transport money being a barrier to adherence. These findings are supported by Ambaw et al (2012:283), who indicated that time taken to reach the hospital had an influence on patients' medication adherence levels. For those who took 30 minutes to reach the hospital, 29.2% were adherent and 20.1% were non-adherent. Of those who took more than 30 minutes to reach the hospital, 35.4% were adherent while 25.3% were non-adherent. In normal circumstances, the understanding would be that, those who took a short time to the hospital would be more adherent than those who took a long time to do so.

However, Ambaw et al (2012:283) found that the patients who travelled for a longer time, implying that they lived far from the clinic, were the ones who adhered in large numbers. Those who travelled for a shorter time, because they lived near the clinic, adhered in small numbers. The possible explanation for these findings could be that those who travelled from far made a greater effort on time and transport money which is a sign of motivation towards their treatment. Therefore when they collected the medications, which costed them

dearly in terms of money and time, they felt motivated to swallow the pills as prescribed. Likewise the others who lived near to the clinic and spent less time and money to get their medications, became complacent, were less motivated and did not swallow their medicines regularly. These findings on low motivation in patients were supported by Hareri and Abebe (2013:5) who showed that patients who lacked awareness of the risks of non-adherence, had low motivation levels which led to low levels of adherence. These findings show that whether near or far from the clinic, some hypertensive patients would adhere to their prescribed anti-hypertensive medications regimens and others would not. This also confirms how complex the issue of anti-hypertension treatment adherence is.

4.3.10 Respondents' clinical manifestations and adherence levels

In this section possible correlations between patients' clinics signs and symptoms and their treatment adherence levels will be addressed.

4.3.10.1 Blood pressure levels of respondents

In the current study out of the 469 respondents:

- 6.6% (f= 31) were controlled
- 21.1% (f=99) had pre-hypertension
- 36.9% (f=173) had hypertension stage 1
- 19.8% (f=93) had hypertension stage 2
- 5.6% (f=73) had a hypertensive emergency.

The WHO (2003:1986) classifies blood pressure as:

- normal at 120/80mm Hg
- pre-hypertension at 129/85 mm Hg
- hypertension stage 1 at 130/90mm Hg

- hypertension stage 2 at 140/95mm Hg
- hypertensive emergency (crisis) at 150/110mmHg and higher.

These WHO blood pressure classifications were used in the data analysis of the current study.

Table 4.11 Blood pressure levels of respondents (n=469)

Blood pressure levels*	(f)	(%)
Controlled	31	6.6
Pre-hypertension	99	21.1
Stage 1 Hypertension	173	36.9
Stage 2 Hypertension	93	19.8
Hypertensive Emergency	73	15.6
Total	**469**	**100.0**

In the current study, the respondents' recent blood pressure levels, documented by the clinic nurse in the health passbook on the day of data collection was recorded, by the research assistants from each respondent. Therefore from the blood pressure readings, adherence and blood pressure control could be identified. Medications do work for those people who take them the way they should take them and their blood pressures do get controlled (Osterberg & Blaschke 2005:448; Gerin et al 2007:460).

Many patients discontinue their medications within six months of commencing the treatment as they might experience swallowing of drugs to be tiresome (Osterberg & Blaschke 2005:487; Weber, Schiffrin, White, Mann, Lindholm, Kenerson, Flack, Carter, Materson, Ram, Cohen, Cadet, Jean-Charles, Taler, Kountz, Townsend, Chalmers, Ramirez, Bakris, Wang, Schutte, Bisognano, Touyz, Sica, Harrap 2014). The Seventh Joint National Committee Guidelines reported that non-adherence to prescribed treatment is a major barrier to achieving and maintaining adequate blood pressure control (Chobanian et al 2003:2560). Non-

adherence compromises treatment effectiveness causing uncontrolled hypertension. In the USA the national health and nutrition examination survey revealed that non-adherence with non-pharmacological and pharmacological therapy was the cause of the limited blood pressure control (Gerin et al 2007: 460). There are several forms of non-adherence behaviours. These include ommisions or missed daily or weekly doses, delayed, early taking, halving doses, doubling doses and defaulting treatment (Osterberg & Blaschke 2005:487). It has been reported that two thirds of the people with hypertension have uncontrolled blood pressures (Bastos-Barbosa, Ferriolli, Moriguti, Nogueira, Nobre, Ueta & Lima 2012:636; Rachel et al 2006:36).

The greatest challenge in public health is to get patients to adhere to treatment. However, in the adherence model there is more than the patient. Gascon, Sanchez-Ortuno Llor Skidmore and Saturno (2004:125) investigated why hypertensive patients did not adhere to their treatment, using qualitative methodology. They found that a complex web of factors caused non-adherence, including patients' fears and negative imaginations of anti-hypertensive drugs. There was a lack of basic background knowledge about hypertension; the clinical processes were viewed as unsatisfactory because it took long, few explanations were supplied by the providers, low levels physician-patient interaction, and a disregard for patients' options and preferences. From the patients' point of view, there were more problems to be sorted out by the providers than the patients. Although Osterberg and Blaschke (2005:490) suggested that adherence factors require the patient to do more work to improve the situation because many factors centre on patients Barksdale (2009:54) suggested that provider-related factors affect treatment adherence in hypertension patients, and providers have to be culturally competent and sensitive. All the dimensions of the adherence model should guide efforts to attain and maintain adherence to anti-hypertensive treatment. In the current study, out of 480 hypertensive patients, only 10.8% (f=52) achieved blood pressure control because they were adherent. This is also supported by the

findings of Starichi et al (2011:26) whose results indicated that nurse-led interventions at the QECH hypertension clinic, managed to achieve reduced blood pressure levels and increased adherence levels in hypertension patients and Bosworth (2008:338) reported similar results.

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4.3.10.2 Adherence levels of respondents

Table 4.10 presents the adherence levels of the respondents. This was essential for good adherence is important for blood pressure control and for the prevention of hypertension complications. Adherence levels of respondents were measured using the MMAS-8 which categorises adherence into three different levels. These are low, if the score is less than 6, or moderate, if the score is 7 <8 and high, if the score is 8.

At the QECH hypertension clinic from the 480 respondents, 50.6% (f=243) had low adherence levels, 32.1% (f=154) had medium adherence, and 17.3% (f=83) had high adherence. The results indicated that out of 480 respondents, only 6.6% (f=31) had their blood pressures controlled, a benefit of high adherence levels. The majority, had low and medium adherence (82.3%; f=395) and these were at high risk of incurring potential complications due to their uncontrolled blood pressure levels (see table 4.12). Bastos-Barbosa et al (2012:637) found similar results.

Table 4.12: Adherence levels of respondents (N=480)

Adherence level	(f)	(%)
Low adherence (<6)	243	50.6
Moderate (7< 8)	154	32.1
High (=8)	83	17.3
Total	**480**	**100.0**

According to the WHO (2003:1983) the recommended adherence rate is 80.0% to 95.0% for the control of hypertension and for the prevention of potential

complications. In SSA, adherence rates in the range of 47.0%-50.0% have been reported (Osterberg & Blaschke 2005:488) which are below the WHO's recommended adherence rate to control hypertension and prevent complications from occurring.

These findings at QECH hypertension clinic indicate low anti-hypertension treatment adherence levels. Computing the average of the three levels of adherence gives a rate of 33.3%. These findings are supported by Holt et al (2010:483) in the USA. They used two instruments, the 36-item tool, assessing health-related quality of life, and MMAS-8 assessing adherence levels in older hypertensive adults. Out of those 2 180 participants, 48.3% had low adherence and 51.7% had high adherence levels. Low adherence rates have also been reported in other countries such as 74.0% in Egypt (Mweene et al 2010:259), 49.0% in Malaysia (Sulaiman et al 2009:38), 77.0% in Pakistan (Hashmi, Afridi, Abbas, Sajwani, Saleheen, Frossard, Ishaq, Ambreen & Ahmad 2007:1315), 69.2% in Addis Ababa in Ethiopia, 75.0% in Nigeria, 73.0% in India, 72.0% in Turkey (Hareri & Abebe 2013:5), 46.0% in the Seychelles (Edo & De Villiers 2012:4), and 76.0% in Lusaka, Zambia (Mweene et al 2010:259). These reported rates of adherence in most of these countries are inadequate to control the blood pressure effectively and prevent potential complications (Osterberg & Blaschke 2005:488 WHO 2003:1983).

The differences in the adherence rates in countries might be attributed to various factors according to the adherence model. In the developing countries, the reported adherence rates were lower than in developed countries. The higher rates in the developed countries might be as a result of better access to the health facilities, which were well stocked with medicines, and patients had high literacy levels and could read about anti-hypertensive medications on their own, understand and follow the prescriptions easily enhancing their treatment adherence levels. The similarities in low adherence rates in developing countries might be explained by a lack of access to treatment, as well as

practices and attitudes, low literacy levels and limited financial capacities. In developed countries health services are paid for by health insurances but in developing countries very few people can afford health insurance. Many patients have to depend on government hospitals where the medicines are out of stock sometimes.

Lack of knowledge is not the only factor that affects patients' adherence levels to their anti-hypertensive treatments. In the Ethiopian Gondar study, the respondents' knowledge about hypertension and treatment was high, at 76.8% but the adherence rate was only 64.6% (Gatti et al 2009:659).

There appears to be a need for better health education for patients to know that if anti-hypertension treatment adherence is jeopardised or discontinued, they might be susceptible to potential health problems as complications of uncontrolled hypertension including cardio-vascular, renal and ocular consequences. There is a need for a certain level of education to get exposed to cues that might motivate an individual to live a healthy behaviour and sustain it for a lifetime. There is a need for sustainable cues to achieve sustainable health behaviour. After a while, an individual might perceive a benefit. The perceived benefit becomes the tangible cue to continue living according to the expected health behaviour (Chang et al 2012:118; DeCola et al 2012: 321; Gatti et al 2009:657; Glanz et al 2002:42; Kusuma 2009:280) .

Adherence to treatment is a behaviour issue that requires to be addressed socially and psychologically. Behaviour takes long to be learned. Similarly, adherence to anti-hypertension treatment requires time to address all the adherence model's elements such as the patient, disease, medications, healthcare workers, health care facility as a system, and the processes that take place within the health care facility (Mazzaglia et al 2009:1601). There is a positive association between patients' adherence behaviour and their perception of disease severity and medication beliefs are also predictive of adherence

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(Drevenhorn et al 2007:46; Drevenhorn et al 2009:349; Edo & De Villiers 2012:3; Gatti et al 2009:657).

Table 4.13: The association of social, cultural and religious factors with anti-hypertension treatment adherence

Factor	Chi-square	df	P-value	f
Being prayed for	0.46	2	0.794	477
Ever suffered from malaria	3.91	2	0.142	476
Used medicines against worms in last 3 months	2.83	4	0.587	231
Treated for cancer in last 3 months	1.11	2	0.574	473
On TB treatment	2.21	2	0.331	476
Treated for yellow fever in last 3 months	7.43	2	0.024	451
Had bilharzia parasites in last 3 months	0.71	2	0.702	474
Had either malaria, cancer, yellow fever or bilharzia:	4.22	2	0.121	480
Smoking status	8.43	4	0.077	454
Alcohol drinking status	1.32	4	0.859	477
Extra salt added to food	1.20	4	0.879	477
Mother alive	4.31	2	0.116	461
Mother on BP medicines	2.75	2	0.253	133
Father alive	1.73	2	0.420	465
Father on BP medicines	6.31	2	0.043	79
Combines herbal and prescribed medicines	10.78	2	0.005	366
Used any herbs for BP for last 3 months	16.56	2	<0.001	474

‡ From Pearson Chi-square or Fisher's Exact test
*df: degrees of freedom

Concerning their knowledge of hypertension, 55.2% (f=255) of the respondents in the current study knew that hypertension is a lifelong condition and that it is not curable. In addition, 91.7% (f=440) of these respondents knew that hypertension could be controlled if the patient adheres to the medicines. Knowledge of the condition is not related to practice. This is reflected in table 4.12 where 45% (f=220) of the respondents reported that they forgot to take the medicine the previous day. There low and medium adherers in the current study

amount to 82.7% (f=395) out of 480 respondents. These patients were being treated at the clinic, but their blood pressures were not controlled. Therefore, with uncontrolled blood pressure, they were at high risk of developing potential complications of hypertension. Respondents were questioned about their social, cultural, religious practices to see whether those factors influenced their adherence behaviour. Statistically, all these aspects had no significant association with adherence except when the father was on anti-hypertension treatment which he combined with herbal treatment (see table 4.13).

4.3.10.3 Factors influencing non-adherence to anti-hypertension Treatment

Patients have multifaceted reasons patients have for being non-adherent to their anti-hypertension treatment. The current study used MMAS-8 to measure levels of adherence in the patients as it was originally developed to measure non-adherence to anti-hypertensive drugs. The theory underlying the MMAS-8 suggests that non-adherence might be due to forgetfulness, carelessness, stopping the drug when feeling worse, or stopping the drug when feeling better and the eight items of the MMAS are centred on these four possibilities. The eight questions are:

1. Do you sometimes forget to take your anti-hypertension pills?
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your hypertension medicine?
3. Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?
4. When you travel or leave home, do you sometimes forget to bring along your anti-hypertension medication?
5. Did you take your anti-hypertension medicine yesterday?
6. When you feel like your hypertension is under control, do you sometimes

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stop taking your anti-hypertension medicine?

7. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your anti-hypertension treatment plan?
8. How often do you have difficulty remembering to take all your anti-hyper-tension medications? (Please circle the correct number).

Never/Rarely……4

Once in a while……3

Sometimes……2

Usually……1

All the time……..0

The factors for non-adherence that were listed by respondents at QECH hypertension clinic included: forgetting, feeling better, feeling worse, and carelessness.

Forgetting

When the respondents were asked whether they had taken their anti-hypertension medicine the day prior to the interview, 45.8% (f=220) said “no” and 54.2% (f=260) said “yes”.

Table 4.14 Factors influencing anti-hypertension treatment non-adherence (N=480)

Factor	(f)	(%)
Forgetting	220	45.8
Skipping	207	43.1
Leave behind	141	29.4
Troubled	105	21.9
Feeling better	116	24.2
Feeling worse	105	21.9
Carelessness	103	21.5
Difficult	212	44.1

These findings concur with what was reported that in many studies forgetfulness was found to be prominent (Osterberg & Blaschke 2005:490) in patients' responses as a cause of non-adherence. In addition, Sulaiman et al (2009:42) in Malaysia also found that 51.3% of their respondents were taking their medicine irregularly. This irregularity could be described as forgetfulness, which could be an intentional and non-intentional non-adherence, forgetting when you are mentally well. The difference between the two is that non-intentional non-adherence is forgetfulness or difficulties keeping track of treatment associated with mental impairment.

Feeling better

Of the 480 respondents 78.5 % (f=377), reported that sometimes they stopped taking medications for a week or two, while 21.5%, (f=103) reported that they did not do so. These findings are similar to what was reported by (Osterberg & Blaschke 2005:487) who found that, about one third of patients stop taking drugs after feeling better, three months after beginning treatment. When they stopped the symptoms started again.

Never stopping the drug when feeling better should be emphasised among hypertensive patients. It is quite common and is a behaviour that is a sign of lack of knowledge about the condition and its potential complications that with long term drugs adherence declines significantly overtime. This often happens when patients have no symptoms. It is the absence of symptoms that poses a barrier for people to take their medication.

Table 4.15: Univariate and adjusted correlations with adherence to anti-hypertensive medications

Characteristic	f	Univariate† OR	95% CI	P-value	Adjusted†# OR	95% CI	*P*-valu
Having malaria	476	0.70	0.47, 1.04	0.077	‡		
Had cancer in the last 3 months‡	473	0.54	0.11, 2.51	0.429	‡		
Had yellow fever in last 3 months	451	0.17	0.04, 0.75	0.019	‡		
Had either malaria, cancer or yellow fever	480	0.66	0.43, 0.99	0.046	0.89	0.52, 1.52	0.67
Mother alive	461	1.33	0.91, 1.96	0.143	‡		
Father alive	465	0.67	0.42, 1.08	0.099	‡		
Have either parent alive	463	1.05	0.73, 1.50	0.803	0.96	0.63, 1.47	0.86
Mother on htn drugs	133	2.09	1.02, 4.26	0.044	‡		
Father on htn drugs	79	4.58	1.45, 14.48	0.010	‡		
Either parent on htn drugs¶	168	2.76	1.45, 5.26	0.002	2.36	1.19, 4.67	0.01
Mixed herbs and drugs	366	1.99	1.31, 3.02	0.001	‡		
Taking herbs in the last 3 months	474	0.48	0.34, 0.69	<0.001	0.53	0.34, 0.81	0.00
Long waiting times put me off	473	0.49	0.33, 0.72	<0.001	0.62	0.38, 1.03	0.06
Affected by long distance to clinic	455	0.61	0.42, 0.89	0.011	0.84	0.50, 1.39	0.49
Htn drugs make me feel sleepy	429	0.70	0.49, 1.01	0.055	‡		
Htn drugs make me feel weak	426	0.75	0.49, 1.15	0.190	‡		
Htn drugs make me feel tired	425	0.74	0.48, 1.15	0.177	‡		
Htn drugs make me feel sicker	396	0.51	0.31, 0.84	0.008	‡		
Htn drugs caused side effects*	438	0.58	0.40, 0.84	0.004	0.88	0.55, 1.41	0.59
Had any other problems	451	1.41	0.92, 2.16	0.118	0.74	0.45, 1.23	0.81
Increasing level of htn knowledge**	446	1.43	1.15, 1.78	0.001	1.40	1.08, 1.81	0.01

*Side effects: sleepy, weak, tired, sick

**1=low, 2=moderate, 3=high defined using principal components (PCA) analysis and Cronbach's alpha

† From ordered logistic regression models. ‡Not included in the adjusted final model due to multico-linearity or $p>0.2$

¶Adjusted for taking herbs in the last 3 months, htn knowledge level and long waiting times at clinic (f=154)

#Adjusted for all other variables except either parent on BP drugs (f=358)

Feeling worse

Some studies (Barksdale, 2009:55; Kazembe 2007:60; Lee, Grace & Tailor 2006:622; Sattar, Shakeel, Majeed & Petty 2004:622) have reported patients who stopped treatment because of feeling worse from the side effects. Non-adherence from side effects could be attributed to patients' lack of knowledge about these side-effects.

Health professionals should monitor the side effects and reassure the patients that with time the side effects could disappear or if necessary the treatment could be changed before non-adherence occurs (Osterberg & Blaschke 2005:492).

4.3.10.4 Cross tabulation: gender, adherence level and blood pressure

In this section attempts will be made to cross tabulate the respondents' gender with their anti-hypertension medication adherence levels and their blood pressure readings.

- ***Gender***

On cross tabulation, gender of respondents and levels of blood pressure, more female respondents had severe hypertension 152 female versus 50 males. For moderate hypertension there were 136 females and 34 males. On cross tabulation of age of respondents and levels of blood pressure, the results showed that the older the age the lower the adherence, and the more the blood pressure increases from normal to mild, to moderate and to severe. In addition, of the respondents falling within the age range 41-50 years, the majority (f=119) experienced severe hypertension, and the number increased as the age range increased, 81-90 years (f=204). In the age range 41-50, some respondents maintained their blood pressures under control (f=17) and even the age range

51-60 which was ten years older, but some respondents maintained their blood pressures under control (f=18), and at age range 81-90, some respondents maintained their blood pressure under control (f=52) (see tables 4.16 and 4.17).

Table 4.16: Cross tabulation of gender and level of blood pressure (N=480)

	controlled	mild	moderate	severe	total
Male	11	10	34	50	105
Female	41	41	136	152	370
Total	52	51	172	205	480

These findings show that many patients (42.7%; f=205) at the QECH hypertension clinic had severe hypertension despite receiving treatment.

- ***Age***

Table 4.17: Cross tabulation, age range and level of blood pressure (N=480)

Age range	Level of blood pressure Normal	Mild	Moderate	Severe
00-30	2	0	3	6
31-40	5	5	15	15
41-50	17	12	54	119
51-60	18	17	59	60
61-70	6	13	48	46
71-80	3	3	8	21
81-90	52	51	172	204

- ***Education***

The levels of education of respondents and levels of blood pressure/adherence were cross tabulated. The results indicated that the respondents were mostly in two levels of education, primary school and secondary school. More than half of

the respondents (f=266) had primary school education, while 117 obtained some secondary school education. The lower the education level the lower the ability of an individual to manage hypertension the lower the adherence and the lower the control of hypertension (see table 4.18)

Table 4.18 Cross tabulation, level of education and level of blood pressure (N=480)

Level of blood pressure

Level of education	Controlled	Mild	Moderate	Severe	Total
None	6	4	28	33	72
Primary school	27	39	91	109	266
Secondary school	16	7	46	48	117
College	0	1	7	12	19
University	3	0	0	3	6
Total	**52**	**51**	**172**	**205**	**480**

4.3.11 Respondents' knowledge about hypertension

Respondents showed that they had some knowledge about hypertension because 55.2% (f=246) said hypertension runs in families and 55.2% (f=265) also mentioned that hypertension is a lifelong condition which can be controlled with adherence 91.7% (f=440). As many as 91.7% (f=388) of the respondents identified some risk factors that could contribute to hypertension, and some of the factors were external 64.2% (f=308), while others mentioned diet (47%; f=226) and stress (83.8%; f=402).

Out of 480 respondents, 74.7% (f=355) reported that they had received health education from the nurse about hypertension on the day of diagnosis and every day of review before consultation with the doctor. This showed that people had some knowledge about hypertension (see table 4.18).

Table 4.19: Respondents' knowledge of hypertension (n=424)

	Yes (f)	(%)	no	(%)	don't know	(%)
Runs in families	246	51.2	143	29.8	91	18.9
Lifelong condition	265	55.2	143	29.8	72	15.0
Controlled with adherence	440	91.6	18	3.3	22	4.6
Has risk factors	388	80.8	43	9.0	49	10.2

Contributing factors	(f)	(%)
Stress	402	83.8
External	308	64.2
Diet	226	47.0
Salt	118	24.6
Alcohol	38	7.9
Cigarette	26	5.4

Diagnosis	(f)	(%)
Hospital	424	88.3
Antenatal	42	8.8
Family planning	14	2.9

Complaints	(f)	(%)
Dizziness	109	22.7
Headaches	101	21.0
Heart palpitations	100	20.8
Tiredness	160	33.3
Painful eyes	10	2.2

Complications	(f)	(%)
Sudden death	139	28.9
Stroke	305	63.5
Kidney failure	20	4.3
Heart failure	16	3.3

Education received	(f)	(%)
Agree	355	74.7
Disagree	125	25.3

4.3.11.1 Respondents' knowledge about the management of hypertension

Table 4.20 displays the management strategies adopted by patients suffering from hypertension.

Table 4.20: Respondents' knowledge about hypertension management (n=468)

Variable		f	%
Cigarette smoking influences htn	Yes	60	12.5
	No	420	87.5
Drinking alcohol influences to htn	Yes	63	13.1
	No	417	86.9
Stress influences to htn	Yes	355	74.0
	No	125	26.0
Hypertension influences to strokes	Yes	335	70.2
	No	142	29.8
Heart attacks can occur as htn complications	Yes	95	20.0
	No	381	80.0
Hypertension runs in families	Yes	246	51.5
	No	232	48.5
Hypertension is a lifelong condition	Yes	265	57.0
	No	200	43.0
External factors influence htn	Yes	308	65.0
	No	166	35.0
Htn contributes to eye problems if untreated	Yes	404	85.2
	No	70	14.8
Htn puts me at risk of heart conditions	Yes	436	92.0
	No	38	8.0
Htn might cause strokes if untreated	Yes	451	95.1
	No	23	4.9
Htn-triggered strokes can cause death	Yes	468	98.5
	No	7	1.5
Complications of htn can endanger life	Yes	467	98.5
	No	7	1.5
Friend/relative's motivated me to take pills	Yes	402	85.0
	No	71	15.0
Regular exercises help prevent htn	Yes	434	91.7
	No	39	8.3
Medicines help reduce htn	Yes	407	85.9
	No	67	14.1

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Almost all (98.8%; f=474) of the respondents knew the names of the drugs they were taking and these drugs were hydrochlorothiazide commonly called HCT and Propranolol. In addition some patients (41.7%; f=200) took other medicines such as Aspirin and Panadol for headaches or at bed time, while others (58.3%; f=280) said they did not do so.

4.4 THE CONCEPTS OF THE HEALTH BELIEF MODEL

The researcher assessed the patients' perceptions of hypertension complications and their severity, treatment and treatment adherence with its benefits using the concepts of the HBM. There were 18 items that elicited data on the perceptions of hypertensive patients according to the HBMs concepts.

Structured statements were read to the patients who were asked to rate the statement given using a 3-point Likert scale: Agree=3, Disagree=2, Don't know=1. These were: perceived susceptibility, 4 items and an open-ended item, perceived severity, 4 items; and an open-ended item; perceived benefits, 3 items, perceived barriers, 13 items and open-ended items; cues to action, 4 items; and self-efficacy, 3 items and open-ended questions.

4.4.1 PERCEIVED SUSCEPTIBILITY TO HYPERTENSION COMPLICATIONS

The patients attending the QECH hypertension clinic demonstrated that they perceived that they were susceptible to potential complications of hypertension. The majority (86%; f= 410) reported that just by having hypertension they felt that they were at risk of developing potential complications. However, 8% (f=38) of the respondents did not perceive that they were susceptible to any complications. In addition, 6% (f=32) of them did not know whether they were susceptible to complications attributable to hypertension. Those who perceived themselves to be susceptible to complications listed potential complications

such as eye problems (84.2%; f=404), heart conditions (90.8%; f=436) and strokes (94.0%; f=451) as shown in table 4.21.

Table 4.21: Perceived susceptibility to hypertension complications (N=480)

Perceived susceptibility	opinion	(f)	(%)
Develop eye problem	agree	404	84.2
	disagree	38	8.0
	don't know	38	8.0
Develop heart conditions	agree	436	90.8
	disagree	24	5.0
	don't know	14	2.9
Develop stroke	agree	451	94.0
	disagree	16	3.3
	don't know	7	1.5

These findings are in contradiction with those of Hareri and Abebe (2013:3) in Tikur Hospital, Addis Ababa, where they assessed adherence and associated factors of adherence to medications among hypertensive patients attending a renal unit. Most of their respondents (82.2%; f=235) had a low level of perception of risks of developing hypertension complications.

Kusuma (2009:268) in New Delhi, India, investigated the perceptions of patients with hypertension among the Indian immigrants using a qualitative design. The results showed that hypertension was perceived as a condition that reduces physical activity and causes tiredness, it was a result of being overweight and eventually it causes weakness and shortness of breath. These patients' perceptions of hypertension were based on symptoms.

The respondents were further asked to explain why they felt that they were susceptible to develop potential complications. Some patients (58.3%; f=280) explained that the fact that their blood pressure was high made them

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susceptible to strokes because they had heard that it is a common complication and they had seen many stroke patients in their communities (see table 4.22).

Table 4.22: Respondents' explanations of their perceived susceptibility to complications attributable to hypertension (N=480)

Explanation	(f)	(%)
I know people who have stroke, it can happen to me too	280	58.3
Drugs are sometimes out of stock	100	20.8
My blood pressure is always high despite taking medicines	43	9.0
Condition is incurable, I lack discipline to stop drinking	26	5.4
I lack discipline to follow the advice given by the doctor	25	5.2
I live with stress from my family, and lack of support	6	1.3

The major findings were that some respondents (58.4%; (f=280) in the current study were aware that uncontrolled hypertension could cause strokes, eye problems or heart attacks. This was possibly the case because they had received health education at the hypertension clinic where this study was conducted.

4.4.2 PERCEIVED SEVERITY OF HYPERTENSION COMPLICATIONS

The findings of the current study showed that most respondents (97.5%; f=468) at QECH hypertension clinic perceived the complications of hypertension to be severe. Only 1.7% (f=8) of the respondents did not perceive the complications of hypertension to be severe. In addition, 0.8% (f=4) of the respondents did not know if complications of hypertension were severe. Of the 480 respondents, 97.3% (f=467) reported that complications of hypertension could be very dangerous to life. As many as 83.8% (f=402) reported that a relative's death motivated them to take their anti-hypertension pills correctly for fear of death. Those who perceived the severity of the complications were requested to explain further how severe or dangerous the complications were. Out of 480

respondents, 34.8% (f=167) mentioned that complications could be heart attacks, 30.6% (f=147) said it could lead to sudden death, 4.2% (f=404) mentioned eye problems, while the majority (90.8%; f=436) mentioned heart conditions and strokes (94.0%; f=451) as shown in table 4.23.

Table 4.23: Perceived severity of hypertension complications (N=480)

Perceived severity	opinion	**(f)**	(**%**)
Someone can have a stroke but unaware of condition	Agree	468	97.5
	Disagree	8	1.7
	Don't know	4	0.8
Complications of hypertension are dangerous	Agree	467	97.3
	Disagree	11	2.3
	Don't know	2	0.4
A relative's death motivated me to take pills correctly	Agree	402	83.8
	Disagree	67	13.9
	Don't know	11	2.3

4.4.3 Perceived benefits of adhering to anti-hypertensive treatment

These findings showed that the respondents had realistic perceptions of the severity of hypertension complications. This could be attributed to the health education that the nurses gave to the patients at the hypertension clinic. This education is given to a group of patients, and then followed by individual health education sessions. Health education is given every clinic day to the patients before consultation with a doctor. The health education, received at the hypertension clinic, enabled them to obtain high knowledge scores. They even explained the severity and gave examples to show that they knew what they were talking about (see table 4.24).

These findings were similar to those found by Hareri and Abebe (2013:3). In that study, the respondents (67.8%; f=194) had high perceptions of the severity of hypertension. Patel and Taylor (2002:43) conducted a study at Michigan Medical Centre's hypertension clinic that aimed to determine if there was a relationship between illness perception, illness control and adherence to anti-

hypertensive treatment. This was a prospective, cross-sectional survey of hypertension patients. The results showed that almost 68.0% of those patients, who perceived that they had hypertension and that hypertension causes complications, were adherent to treatment.

Table 4.24: Respondents' perceived benefits of anti-hypertension treatment adherence (N=480)

Item on perceived benefits	opinion	(f)	(%)
Exercise and weight reduction			
Prevents complications	Agree	441	91.9
	Disagree	21	4.4
	Don't know	18	3.8
Medicine stop symptoms and I feel good	Agree	413	86.0
	Disagree	61	12.7
	Don't know	6	1.3
Salt reduction has reduced my heart palpitations	Agree	465	96.8
	Disagree	11	4.4

Almost all respondents (91.9%; f=441) interviewed during the current study, reported perceived benefits of adhering to regular exercises and weight reduction which had helped them to prevent hypertension complications; 90.8% (f=436) of the respondents reported a reduction in heart palpitations as a result of reducing salt in their food; 86.0% (f=413) indicated that their anti-hypertensive medicines made them feel good, without hypertension symptoms. This meant that they had a feeling of well-being, and were able to do household chores which they were unable to do previously before they started treatment. The expression was that before their treatment they could not manage to do their household chores due to breathlessness. But when they started attending the hypertension clinic, they received health education about diets, exercises, stress management and anti-hypertensive medications. These health education sessions were given by the clinic nurses on day of diagnosis and repeated at every subsequent clinic visit. Patients reported that they received health education about the names of drugs, doses and how the drugs worked. The

patients were able to mention the drugs' names which they were taking, and could explain how many tablets they had to take how often.

4.4.4 Perceived barriers to adhering to anti-hypertensive treatment

The respondents perceived barriers impacting on their adherence to their treatment regimens as long waiting times for consultations with their clinicians (28.9%; f=139); shortages of drugs at the clinic's pharmacy (69%; f=327); having to travel long distances to clinic (33.4%; f=160) (see table 4.25).

Table 4.25: Respondents' perceived barriers to adhering to anti-hypertensive treatment regimens (N=480)

Barrier		(f)	(%)
Long waiting time	Agree	333	69.3
	Disagree	140	29.2
	Don't know	7	1.5
Side effect-sleepy	Agree	95	19.8
	Disagree	369	76.9
	Don't Know	17	3.3
Side effect -weak	Agree	79	16.5
	Disagree	397	82.7
	Don't know	4	0.8
Side effect -tired	Agree	48	17.1
	Disagree	399	82.1
	Don't know	24	5.0
Side effect-Sicker	Agree	48	10.0
	Disagree	339	85.1
	Don't know	93	19.4
Long distance to clinic	Agree	160	33.4
	Disagree	317	69.2
	Don't know	3	0.6
Drug stock out at the clinic	Agree	327	69.0
	Disagree	153	31.0
	Dont know	0	0

At the QECH hypertension clinic, 100 patients are booked every Friday. This makes the clinic full. QECH is the only central hospital that has a hypertension clinic and this is the reason why many patients are booked and so they have to wait in queues. Appointments are given by dates and not by time which means every patient arrives at 6:00am so that they are in front of the queue but they wait half the day before they get treatment. Patients experience long waiting hours but they still come because there is no other hypertension clinic except OECH.

These findings are supported by Gascona et al's (2004:125) qualitative study in which they investigated the factors why hypertensive patients did not adhere to their treatment. The patients viewed the encounter and the process as being unsatisfactory because of the long waiting times. Mweene et al (2010:252) in Lusaka, Zambia, interviewed 237 adult hypertensive patients and identified factors associated with poor medication adherence. The majority of these patients (83.0%; f=195) reported that their barriers were prescribed drugs which were unavailable at the hospital pharmacy. This could influence a patient's adherence if he/she has to arrive at the clinic by 6:00 am and wait for many hours to be seen by a doctor only to get a prescription which the pharmacy cannot supply and which the patient cannot afford to buy elsewhere.

4.4.5 Respondents' cues to action

Out of the 480 respondents, 95.2% (f=457) said that health education about hypertension, which they received at the hypertension clinic, helped them to get motivated to follow their treatment regimens. It is the practice at the QECH hypertension clinic that when patients are referred for diagnosis and management they are given health education on hypertension as a condition, the causes, risk factors and the management. This is to equip the patients with basic knowledge to help them understand their condition. This also helps them to accept the condition, own it and take personal responsibility and active involvement in its control (Dreyer 2011:1-2). There is group education as well as

individual education. At the clinic there is a protocol for the management of hypertension (QECH, Protocol on diagnosing and treating hypertension 2011). The clinic nurse is a registered nurse who is in charge of the education programme of the patients and of running of the clinic. During the structured interviews, the respondents frequently referred to the health education they received at the hypertension clinic.

Table 4.26: Respondents' perceived cues to action for adhering to their treatment regimens (N=480)

Item on cues	opinion	(n)	(%)
Health education motivates adherence	Agree	457	95.2
	Disagree	5	1.0
	Don't know	18	3.8
Family and friends' advice motivates me	Agree	429	89.4
	Disagree	38	7.9
	Don't know	13	2.7
Fear of kidney failure motivates me	Agree	423	88.1
	Disagree	24	5.0
	Don't know	33	6.9
Fear of heart attack and stroke	Agree	440	91.7
	Disagree	21	4.4
	Don't know	19	3.9

These findings are supported by those of Kalogianni (2011:157) who found that provider-patient positive relationship fosters motivation, reinforcement and encouragement of adherence behaviours. Some of the patients (89.4%; f=429) said that they were motivated to adhere to treatment by their family members and friends through their advice. Family and friends are a support system of patients. In Malawi the severity of hypertension's potential complications have been publisised (Mahawish & Heikinheimo 2010:25; Msyamboza et al 2010:88; Msyamboza et al 2011:4; Starichi 2011:24, QECH 2008:13; QECH 2010:15). Therefore family members and friends discuss this condition and warn each

other about the dangers of not adhering to treatment thereby motivating the patient to adopt adherence behaviours. Kalogianni (2011:158) also found that lack of motivation was associated with poor medication adherence. Hence, the importance for health professionals to assess their patients and follow protocols that will motivate patients to increase their medication adherence.

These findings were in contradiction to those found by Hareri and Abebe (2013:3) where 52.4% of their respondents were not motivated to adhere to anti-hypertensive medication. This was explained, that some patients, especially men, were burdened by the outdoor activities which kept them busy causing them to lose focus, resulting in a lack of motivation to adhere to the anti-hypertensive medications. Alcohol consumption, a common practice by many males, could also destroy their motivation towards medication (Hareri & Abebe 2013:5).

In the current study there was another group of patients (88.1%; f= 423) who said that the fear of a heart attack and kidney failure motivated them to become more adherent. They had seen some patients who were bed ridden because of these complications of hypertension. Some actually saw how others lost their lives due to strokes, kidney failure and heart attacks. This negative impact of the complications of hypertension on some patients was a positive motivator to be adherent because of the fear of potential hypertension complications and sudden death. This is supported by the HBM which hypothesises that in a patient with hypertension, a high perceived threat; low perceived barriers and a high perceived benefit would result in the likelihood of exhibiting adherent behaviour (Glanz et al 2002:42).

4.5 OVERVIEW OF RESEARCH FINDINGS

The research findings have addressed demographic characteristics, socio-economic aspects, knowledge, age, gender, religion, tribe, marital status, occupational status, health facility-related issues and blood pressure.

Table 4.27: Two-way associations between HBM concepts and adherence to anti-hypertensive treatment regimens

	Factor	Chi-square	df	*P*- value‡
Susceptibility	BP puts me at risk of eye problems	5.83	2	0.054
	BP puts me at risk of heart conditions	3.95	2	0.139
	BP might cause stroke	3.06	2	0.216
Perceived severity	BP may lead to stroke-related death	0.39	2	0.825
	BP complications are dangerous	1.43	2	0.490
	Death of relative/friend motivates me	2.63	2	0.269
Perceived benefits	Excercise reduces BP complications	2.67	2	0.264
	BP medicines relive me of BP	2.82	2	0.245
	Reducing salt reduces palpitations	2.00	2	0.878
Perceived barriers	Long waiting times put me off	14.75	2	0.001
	Affected by long distance to clinic	8.80	2	0.012
	Any adverse event from BP drugs	10.19	2	0.006
	Any headaches	2.00	2	0.369
	Experienced any stock outs	2.06	2	0.357
Cues to action	Health education motivates me	2.13	2	0.345
	Family's/friends' advice motivates me	1.96	2	0.375
	Fear of kidney failure motivates me	0.23	2	0.893
	Fear of a heart attack motivates me	1.31	2	0.520
Self-efficacy	Able to manage own BP	4.74	2	0.093
	Capable of managing own BP	4.72	2	0.095

‡ From Pearson Chi-square or Fisher's Exact test
*df: degrees of freedom

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Cross tabulations were done of age, blood pressure range, and level of education. It has also presented respondents' knowledge about hypertension management, of blood pressure, perceived severity of hypertension, perceived susceptibility to hypertension complications, perceived benefits, perceived barriers of adhering to anti-hypertensive treatment, and respondents' cues to action. All these aspects are summarised in table 4.27.

4.6 SUMMARY

This chapter has presented the analysis and discussion of the study's findings. The next chapter will present the study's conclusions, limitations and recommendations. The synthesis of the research findings in relation to the research problem and objectives, the HBM, limitations of the study, recommendations and suggestions for future studies will also be addressed in the final (next) chapter of this thesis.

CHAPTER 5

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The chapter presents the synthesis of the research findings in relation to the research problem and objectives, the HBM, limitations of the study, recommendations and suggestions for future studies.

5.2 RESEARCH DESIGN AND METHOD

In this study, the researcher used a quantitative, descriptive design because it best met the aim of the research which was to establish and describe, levels of adherence of patients to their anti-hypertensive treatment regimens factors. The design accurately described the characteristics of patients and factors that influenced their treatment adherence according to the MMAS-8.

5.3 CONCLUSIONS

The conclusions will be presented according to the objectives of the study, as stated in section 1.3.2 of this thesis.

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5.3.1 Respondents' levels of adherence to anti-hypertension treatment

The first objective of the study was to establish patients' levels of adherence, measured by the MMAS-8. There were 42.7% (f=205) patients with low adherence, 39.6% (f=190) patients with medium adherence and 17.7 %(f=85) with high adherence. Computation of average of the three levels is 33.3%. Therefore treatment adherence at QECH hypertension clinic is 33.3%.

The positive findings of the study are that there are 17.7% (f=85) of high adherers at QECH hypertension clinic. But the majority of patients are living with uncontrolled blood pressures despite receiving treatment from the participating hypertension clinic.

5.3.2 Respondents' knowledge about hypertension

The major findings indicated that most patients were knowledgeable about hypertension. However, there was a gap between what the patients knew and their actual behaviours. The knowledge was not translated into practice. For example, in the current study, out of 480 respondents 51.2% (f=246) said hypertension runs in families, while 55.2% (f=265) said hypertension is a lifelong condition, 91.7% (f=440) said it can be controlled with adherence, 80.8% (f=388) said it has risk factors. However, from the same 480 respondents, 45.8% (f=220) stopped taking their anti-hypertensive medicines when they felt better and 43.1% (f=207) skipped some medication doses. This is a demonstration of knowledge that is not applied and it is as good as not knowing, because this knowledge did not benefit the individuals concerned.

Regarding the factors influencing hypertension 83.8% (f=402) said stress, 64.2% (f=308) external factors, others 47% (f=226) mentioned diet and 24.6% (f=118) mentioned salt intake. When asked about the complications of

hypertensions, 28.9% (f=139) said sudden death and 63.5% (f=305) mentioned strokes.

5.3.3 Respondents' perceived susceptibility to potential complications attributable to hypertension

The findings showed that respondents perceived themselves to be susceptible to complications because 94.0% (f=451) mentioned strokes as complications of hypertension.

5.3.4 Respondents' perceived severity of potential complications attributable to hypertension

The findings on perceived severity which were listed by the respondents were that someone can have a stroke but be unaware of his/her hypertension (97.5%; f=468) and complications are dangerous (97.3%; f=467).

5.3.5 Respondents' understanding of the benefits of treatment adherence

The findings on perceived benefits which were listed by respondents included exercise and weight reduction to prevent complications (91.9%; f=441), anti-hypertensive medicines stop symptoms (86.0% f=413), and salt reduction reduced heart palpitations (96.8%; f=465).

5.3.6 Barriers impacting negatively on respondents' adherence levels

Respondents perceived barriers to adhering to treatment regimens included long waiting times at clinics (69.3%; f=333), medicines' side effects (19.8%; f=95), the unavailability of prescribed drugs from the clinic's pharmacy (69.0%; f=327) while 76.9% (f=369) said they encountered no barriers.

5.3.7 Respondents' cues to action and self-efficacy for treatment adherence

The findings on perceived cues that were listed by respondents which motivated their adherent behaviour included the health education that they received (95.2%; f=457), advice from their families and friends (89.4%; f=429), fear of kidney failure (88.1% f=423), fear of heart attacks and strokes (91.7%; f=440).

5.4 RECOMMENDATIONS

The recommendations will be provided in relation to the conclusions (presented in terms of the study's objectives).

5.4.1 Enhancing patients' adherence levels to anti-hypertension treatment

An average adherence rate of 33.3% among patients attending the participating hypertension clinic must be improved, because this implies that 66.4% of these patients are non-adherent and do not benefit from their anti-hypertensive treatment. Ongoing adherence studies should be conducted and quarterly audits of patients' adherence levels should be conducted and published within the clinic.

5.4.2 Enhancing the translation of patients' knowledge into actions and behaviours

Health education on hypertension, treatment, importance of treatment adherence, complications and the dangers of hypertension should attempt to enable patients to apply their knowledge to enhance their anti-hypertension adherence rates. The clinic does provide effective health education for providing knowledge to patients, but means and ways should be found to help

patients to put their knowledge into action to enhance their adherence rates and reduce their risks of enduring complications from uncontrolled hypertension.

Strategies should be put in place to help patients change behaviour and sustain them. Adherence to treatment is a behaviour issue that requires to be addressed socially and psychologically including culturally and attitudinally. Similarly, adherence to treatment in hypertension requires time allowed to address all the adherence model elements such as the patient, disease, medications, healthcare workers, health care facility as a system, and the processes that take place within the health care facility. All the elements or factors of the model should be involved each one taking their roles and responsibilities to improve adherence.

5.4.3 Addressing respondents' perceived susceptibility to potential complications attributable to hypertension

Health education efforts should emphasise that hypertension patients' susceptibility to complications such as cardio-vascular incidents and strokes can be substantially reduced by adhering to their anti-hypertension treatment regimens. Patients who have experienced such complications, or who have witnessed other patients who suffered from such complications, should be invited to participate in health education sessions.

5.4.4 Respondents' perceived severity of potential complications attributable to hypertension

The fact that more than 90.0% of the respondents knew that hypertension could pose life-threatening complications, did not enable 66.7% of them to adhere optimally to their anti-hypertension treatment. The hypertension clinic should address this apparent discrepancy by conducting individual interviews with both adherent and non-adherent patients. In this way some differences between

adherers and non-adherers could be identified and addressed to improve the average anti-hypertension treatment adherence level from the 33.3% documented during the current study.

5.4.5 Respondents' understanding of the benefits of treatment adherence

Ideally patients who have benefitted from anti-hypertensive treatment should join the nurses during health education sessions to inform other patients about their positive experiences and enhanced sense of wellbeing since they are using the drugs correctly and consistently. Other aspects such as weight reduction and increased levels of physical activity and reduced intake of salt should also be addressed in similar ways.

5.4.6 Barriers impacting negatively on respondents' adherence levels

Two major service-related barriers were identified during the current study. Both these barriers could impact negatively on specific patients' anti-hypertensive treatment adherence levels.

The first barrier was posed by the long queues at the clinics that resulted from the clinic appointments being made for specific days without times. This necessitated patients to spend many hours and even entire days at the clinic, making it almost impossible for working patients to attend the clinic regularly. Means and ways should be investigated into the possibility of making appointments for specific times and for adhering to these scheduled appointments. This could enable a person to spend one hour at the clinic instead of six or more hours. Having to spend less time at the clinic, could enhance patients' adherence to clinic appointments, drug renewals and treatment efficacy.

The second major identified barrier was that the clinic's pharmacy could not always supply the prescribed anti-hypertensive medicines and the respondents were unable to pay for these medicines at private pharmacies. This shortcoming must be addressed as a matter of the greatest urgency because it defeats all efforts to ensure that patients' hypertension levels are controlled. Shortages of medicines nullify all health education attempts. The unavailability of relevant anti-hypertension medications must be investigated, addressed, audited and reported to the MoH on a monthly basis. Without medications, the hypertension clinic with its nurses and doctors and pharmacists actually fail to provide hypertension services and its very right to existence should be questioned.

Patients who waited in queues for six or more hours, listened to health education talks, and got prescriptions for unavailable medicines, wasted their time and might be demotivated to adhere to their future clinic appointments because it is impossible to adhere to unavailable medicines.

One specific person should be assigned to monitor the unavailability of medicines at the clinic's pharmacy. Every identified challenge must be reported at clinic meetings and joint solutions should be sought to avoid this problem from wasting patients' time and causing patients' deaths due to uncontrolled hypertension because the clinic could not supply the necessary pills.

5.4.7 Respondents' cues to action and self-efficacy for treatment Adherence

Although the respondents in this study had the knowledge and support systems to adhere to their anti-hypertension treatment regimens, research should be sustained to enhance these abilities of the patients attending the hypertension clinic.

5.5 CONTRIBUTIONS OF THE STUDY

The adherence levels for the QECH hypertension clinic patients are known: 42.7% (f=205) have low adherence, 39.6% (f=190) had medium adherence and 17.7% f=85 had high adherence. The adherence rate of patients to treatment at QECH hypertension clinic is known, 33%. There is a small number of patients with hypertension that are high treatment adherers. This is the small group of patients whose hypertension is controlled. This is the group that is protected from the potential complications of hypertension.

Many hypertension patients are low and medium adherers 82.3% (f=395). These are the patients whose blood pressures are not controlled. Therefore, they are at high risk for developing potential complications of hypertension despite receiving treatment for hypertension at the clinic.

These findings could provide useful inputs towards the finalisation of the national policy formulation in Malawi. The results could be used as a guide to set bench marks for anti-hypertensive treatment adherence outcomes.

5.6 LIMITATIONS OF THESTUDY

The study was conducted at one site only; multiple sites could have enriched the research findings and enabled generalisation of the findings. Only structured interviews were conducted with 480 hypertension patients. Individual in-depth interviews might have yielded richer data. These limitations resulted from time and financial constraints of the researcher as the study was a requirement for the fulfilment of the degree of doctor of literature and philosophy in health studies. As such the study had to be completed with limited financial resources.

5.7 CONCLUDING REMARKS

This adherence study has provided awareness to the QECH hypertension clinic, the hospital management, the college of medicine, the college of nursing and the patients with scientific and current information on treatment adherence among hypertensive patients at the participating hypertension clinic

The immediate action is to develop an intervention which will scale up the patients' adherence levels to their anti-hypertension treatment (Starichi et al 2011:28), using an adherence model with proven results. It is time to act against non-adherence. It is necessary to stress the type of condition, the importance of treatment, the dangers of not taking treatment, and the complications of hypertension.

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Table 4.15: Univariate and adjusted correlations with adherence to anti-hypertensive medications

Characteristic	f	Univariate† OR	95% CI	P-value	Adjusted†# OR	95% CI	*P*-value
Having malaria	4f6	0.70	0.47, 1.04	0.077	‡		
Had cancer in the last 3 months‡	473	0.54	0.11, 2.51	0.429	‡		
Had yellow fever in last 3 months	451	0.17	0.04, 0.75	0.019	‡		
Had either malaria, cancer or yellow fever	480	0.66	0.43, 0.99	0.046	0.89	0.52, 1.52	0.672
Mother alive	461	1.33	0.91, 1.96	0.143	‡		
Father alive	465	0.67	0.42, 1.08	0.099	‡		
Have either parent alive	463	1.05	0.73, 1.50	0.803	0.96	0.63, 1.47	0.867
Mother on htn drugs	133	2.09	1.02, 4.26	0.044	‡		
Father on htn drugs	79	4.58	1.45, 14.48	0.010	‡		
Either parent on htn drugs¶	168	2.76	1.45, 5.26	0.002	2.36	1.19, 4.67	0.014
Mixed herbs and drugs	366	1.99	1.31, 3.02	0.001	‡		
Taking herbs in the last 3 months	474	0.48	0.34, 0.69	<0.001	0.53	0.34, 0.81	0.004
Long waiting times put me off	473	0.49	0.33, 0.72	<0.001	0.62	0.38, 1.03	0.063
Affected by long distance to clinic	455	0.61	0.42, 0.89	0.011	0.84	0.50, 1.39	0.492
Htn drugs make me feel sleepy	429	0.70	0.49, 1.01	0.055	‡		
Htn drugs make me feel weak	426	0.75	0.49, 1.15	0.190	‡		
Htn drugs make me feel tired	425	0.74	0.48, 1.15	0.177	‡		
Htn drugs make me feel sicker	396	0.51	0.31, 0.84	0.008	‡		
Felt htn drugs made them feel side effects*	438	0.58	0.40, 0.84	0.004	0.88	0.55, 1.41	0.591
Had any other problems	451	1.41	0.92, 2.16	0.118	0.74	0.45, 1.23	0.810
Increasing level of htn knowledge**	446	1.43	1.15, 1.78	0.001	1.40	1.08, 1.81	0.012

*Side effects: sleepy, weak, tired, sick

**1=low, 2=moderate, 3=high defined using principal components (PCA) analysis and Cronbach's alpha

† From ordered logistic regression models. ‡Not included in the adjusted final model due to multico-linearity or $p>0.2$

¶Adjusted for taking herbs in the last 3 months, htn knowledge level and long waiting times at clinic (f=154)

#Adjusted for all other variables except either parent on BP drugs (f=358)

ANNEXURE A: Ethical Clearance Certificate from **UNISA**

UNISA university of south africa

UNIVERSITY OF SOUTH AFRICA
Health Studies Higher Degrees Committee
College of Human Sciences
ETHICAL CLEARANCE CERTIFICATE

HSHDC/82/2012

Date: 29 August 2012 Student No: 3251-854-4

Project Title: The effect of a nursing intervention program designed to mobilize self care resources on anxiety and high blood pressure in adults in Malawi.

Researcher: MM Katchingwe

Degree: D Litt et Phil Code: DIS890B

Supervisor: Prof E Potgieter
Qualification: D Litt et Phil
Joint Supervisor: Prof VJ Ehlers

DECISION OF COMMITTEE

Approved [√] **Conditionally Approved** [ ]

Prof L Roets
CHAIRPERSON: HEALTH STUDIES HIGHER DEGREES COMMITTEE

for **Dr MM Moleki**
ACTING ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

ANNEXURE B: Letter seeking permission to conduct study at QECH

PERMISSION LETTER TO CONDUCT RESEARCH

Kamuzu College of Nursing
P.O Box 415,
Blantyre
Malawi

The Hospital Director
Queen Elizabeth Central Hospital
P.0. Box 95
Blantyre

10th March, 2013

Dear Sir,

RE: PERMISSION TO CONDUCT RESEARCH

I am a member of staff in the Department of Medical and Surgical Nursing, University of Malawi, Kamuzu College of Nursing. I am currently a registered PhD student at the University of South Africa (UNISA) and I am required to conduct a study.

I wish to apply for permission to carry out a study on Factors influencing treatment adherence amongst hypertensive patients at Queen Elizabeth Hospital Hypertension Clinic. This is part of the requirement for my Doctor of literature and Philosophy in health studies.

To ensure the highest quality of health for hypertensive patients there is need to learn about hypertension and treatment adherence from them regarding the challenges they have in adhering to treatment, and control of hypertension.

It is my hope that the findings from this study will assist in understanding how adhering to treatment with hypertension is like. Furthermore the findings of the study will be disseminated to all stakeholders in health so that the data informs the development of policies, programmes and practices to improve treatment adherence in hypertensive patients.

I shall be very pleased if you can grant me the permission to carry out the study. Should you have any queries, please do not hesitate to contact me or my promoter on the contact details provided below.

Regards,

Mary Kachingwe-Sisya Mbeba (Researcher)
Mobile phone 265-888895764; Email- marymbeba@kcn.unima.mw or mmbeba@yahoo.com

Prof. VJ Ehlers (Promoter) Tel no 012 429-6731, Fax no 012 429-6688, ehlervj@unisa.ac.za

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ANNEXURE C: Permission letter from study site, QECH

Telephone: (265) 01 874 333 / 677 333
Facsimile: (265) 01 876928
Email: queenshosp@globemw.net

All communications should be addressed to:
The Hospital Director

In reply please quote **No.**

QUEEN ELIZABETH CENTRAL HOSPITAL
P.O. BOX 95
BLANTYRE
MALAWI

Ref No. QE/10

12 March, 2013

Mary Mbeba
Kamuzu College of Nursing
P.O. Box 415
BLANTYRE

Dear Madam

PERMISSION TO CONDUCT A RESEARCH STUDY

This is to inform you that management has no objection for you to conduct a research study on **"Factors influencing treatment adherence amongst hypertensive patients"** at Queen Elizabeth Central Hospital.

We will appreciate if a copy of your findings is shared with us.

All the best in your studies.

Yours faithfully,

T.N. Soko (Mrs.)
DEPUTY HOSPITAL DIRECTOR-NURSING
FOR: HOSPITAL DIRECTOR

Annexure D: Structured interview schedule English version

Research title: Factors influencing treatment adherence amongst hypertensive patients at Queen Elizabeth Central Hospital, Blantyre, Malawi.

Date_____ Researchers'/Assistants' name_____ Code_____

Check list: Instruction: Enter the following from the patient's health passbook:

Time	**B/P**	**Weight, height**	**BMI**	**Drug's Name Dose/tabs Frequency**
1. Current				
2. Previous 1st				
3. ,, 2nd				
4. ,, 3rd				
5. ,, 4th				
6. Year high blood pressure diagnosed___Age___				
7. Number of years patient has had high blood pressure and on treatment				
8. Year tested HIV _____ 9. Year started ART_____ 10. List all prescribed ARVs_____				

A. Demographic data

Q	**Questions**	**Possible responses**	**Code**	**Skip**
A.1.	Gender	Male …… Female ……	1 2	
A.2.	How old are you?	_____	1	
A.3.	What is your tribe?	Chewa …….. Ngoni …… Tumbuka …… Lomwe …… Yao…….. Other *(specify)*.....	1 2 3 4 5 6	
A.4.	What is your religion? What is your highest level of education that you have	Roman Catholic..... Presbyterian..... Anglican..... Pentecostal..... Muslim..... Other *(specify).....*	1 2 3 4 5 6	

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A.5.	achieved a certificate*?*	None……..….....	1	**Skips**
		Primary school.....	2	
		Secondary school...	3	
		College (Deg, Dip, Cert	4	
		University (Deg,Dip,Cert .	5	
A.6.	What is your occupation*?*	_____	1	
A.7.	What is your home district*?*	_____	1	
A.8.	Which health facility has referred you to QECH high blood pressure clinic*?*	_____	1	
A.9.	What is your marital status?	_____	1	
A.10.	How many children have you had*?*	_____	1	
A.11.	Did you encounter any of the following signs and symptoms during pregnancy	Fits.....	1	
		Oedema.....	2	
		Headache.....	3	
		Blurred vision.....	4	
		None……	5	
		Other *(specify).....*	6	
A12.	Did you ever suffer from high blood pressure in your previous pregnancy*?*	Yes.....	1	
		No.....	2	
A.13.	How many children are alive*?*	_____	1	
A.14.	How many children have died*?*	_____	1	
A.15.	What were the causes of deaths of the children*?*	_____	1	If none Skip A.15,
		_____		
		Don't know…….	2	
A.16.	Are you currently pregnant?	Yes……..	1	**If male skip A.16.**
		No……	2	
B. Knowledge about high blood pressure/ Kudziwa za nthenda-Bipii				

B.17.	Is it true that high blood pressure runs in families?	Yes..... No..... Don't know.....	1 2 3	
B.18.	Is it true that high blood pressure is a life-long condition, not curable?	Yes…… No…… Don't know.....	1 2 3	
B.19.	Is it true that high blood pressure can be controlled if patients accept it and adhere to their treatment?	Yes..... No..... Don't know.....	1 2 3	
B.20.	What complications can occur if high blood pressure is uncontrolled? *(Tick all that patient mentions)*	Stroke..... Heart attack..... Blurred vision..... Kidney failure..... Sudden death.....	1 2 3 4 5	
B.21.	Is it true that the reason why people get high blood pressure is not known but there are risk factors that contribute to it?	Yes..... No..... Don't know.....	1 2 3	
B.22.	What factors do you think contribute to high blood pressure? .	Cigarette smoking… Alcohol drinking…… Stress…… Obesity…… Lack of exercise….. Eating- salted foods (dried salted fish and meat). ,, too much salt.... ,, too much sugar. Other (*specify)*.....	1 2 3 4 5 6 7 8 9	
B.23.	Is it true that there are also external factors that contribute to high blood pressure?	Yes..... No..... Don't know.....	1 2 3	
B.24.	What external factors do you think contribute to high blood pressure? *(Tick all that patient mentions)*	Diet……... Physical exertion... Strange environment Stress.....	1 2 3 4	
B.25.	What factors (risks and external)	Cigarette smoking...	1	

	do you think contributed to your high blood pressure? *(Tick all the patient mentions)*	Alcohol drinking.... Stress…….. Obesity…….. Lack of exercise..... Eating- salted foods. ,, too much salt... ,, too much sugar.. Diet..... Physical exertion... Strange environment Other *(specify)*.....	2 3 4 5 6 7 8 9 10 11 12	**Skips**
B.26.	How was your high blood pressure diagnosed	Checked my B/P at Hospital outpatients. Antenatal clinic..... Job appointment..... Blood donation day. Buying insurance.... Other *(specify)*.....	1 2 3 4 5 6	
B.27.	What were your complaints when your high blood pressure was diagnosed? (Tick *all that patient mentions*).	Dizziness…….... Severe headaches. Bells in ears..... Heart palpitations... Fainting attacks..... Other *(specify)*.....	1 2 3 4 5 6	
B.28.	Have you ever received health education about high blood pressure?	Yes…….. No…….....	1 2	

C Knowledge about treatment of high blood pressure

C.29.	What high blood pressure medicines are you currently taking a, name b, dose c, frequency*?* (Tick *all that patient mentions)* .	Name	**Dose**	Freq.	Code
		Hydrochloro thiazide (HCT)			1a,b,c
		Frusemide			2a,b,c
		Propranorol			3a,b,c
		Atenoral			4a,b,c
		Nifedipine			5a,b,c
		Aldomet			6a,b,c
		Other *(specify) Description of pills: small round pink white pills*			7a,b,c
C.30.	What other medicines are you currently taking in addition to your high blood pressure pills/ *ndi* a, name b, dose c, frequency*?* (*Tick all that patient mentions)*	Panadol			1a,b,c
		Indocid			2a,b,c
		Diclofenac			3a,b,c
		Aspirin			4a,b,c
		Herbs			5a,b.c
		Nutrition supplements			6a,b,c
		Other *(specify)*			8a,b,c
C.31.	Do you take your high blood pressure pills with other medicine/pills at the same time?	Yes……. No…….			1 2
C.32.	What did you eat yesterday morning*?*	_____			1
C.33.	What did you eat yesterday midday*?* *(Probe for fats and salt content)*	_____			1
C.34.	What did you eat yesterday evening*?* *Probe !*	_____			1
C.35.	What were you advised to eat in relation to hypertension*?*	None…….. Less salt..... Less fats….....			1 2 3

	(Circle all mentioned)	Less spices..... Fewer carbohydrates..... Green vegetables..... Bananas..... Other *(specify)*.....	4 5 6 7 8
C.36.	What were you advised not to take or do*?* *(Tick all that patient mentions)*	Excess salt…..... Fatty Meat ……..... Spiced foods..... Excess carbohydrates..... Alcohol..... Cigarettes..... Other (*specify)*……....	1 2 3 4 5 6 7

36 a. Tell me about the type of food that your family eats most frequently for

Breakfast*:* _____ _____ _____ _____ 1

Lunch : _____ _____ _____ _____ 2

Supper : _____ _____ _____ _____ 3

D. Medical, social , cultural and reproductive health data

D.37.	Has someone prayed for your healing from high blood pressure*?*	Yes……..... No……....	1 2	**If no skip D. 38**
D.38.	If yes, did you get better from high blood pressure after the pastors prayers *?*	Yes……..... No……....	1 2	
D.39.	Have you ever suffered from malaria*?*	Yes……..... No……....	1 2	If no skip 40-41
D.40.	If yes, when (in years) was the last malaria attacks*?*	_____	1	
D.41.	How many courses of malaria medicines have you had in the last three months?	None…… One..... Two..... Three.....	1 2 3 4	
D.42.	Have you ever suffered from internal worms, if yes, how often*?*	None..... Once..... Other *(specify)*.....	1 2 3	**if no Skip 43, 44**

D.43.	Were you treated for internal worms in the last three months*?*			

_____

			1	
D.44.	Have you used medicines against worms during the last three months? If yes what medicines*?*	Yes..... No..... _____	1 2 3	
D.45.	Were you treated for cancer during the last three months? If yes, what treatment did you receive*?*	Yes..... No..... _____	1 2 3	
D.46.	Are you on (tuberculosis) TB treatment*?*	Yes…… No……..	1 2	
D.47.	Have you been treated for yellow eyes (liver disease) in the last three months/ ?	Yes..... No.....	1 2	
D.48.	Have you had bilharzias parasites in your bladder in the last three months*?*	Yes…… No…… Don't know	1 2 3	**If no skip D.49**.
D.49.	How many times have you had medicines for bilharzias*?*	1 time…… 3 times……. 6 times……. N/A.....	1 2 3 4	
D.50.	How many cigarettes do you smoke per day/ *?*	_____	1	
D.51.	How much alcohol do you drink per week? *(Probe for measure: bottles, packets, sachets or glasses)*	_____	1	

D.52.	How much extra salt do you add to your food when eating*?*	Nothing..……	1	
		Small pinch.....	2	
		Half teaspoon.....	3	
		Teaspoonful..…...	4	
D.53.	Is your mother alive*?*	Yes.....	1	If no skip 54-57
		No.....	2	
D.54	How old is she*?*	_____ years	1	
D.55.	Has she been taking high blood pressure medicines*?*	Yes.....	1	
		No.....	2	
D.56.	Has she ever suffered from a stroke*?*	Yes.....	1	
		No.....	2	
D.57.	Has she ever suffered from a heart attack*?*	Yes.....	1	
		No.....	2	
D.58.	If not alive what was the cause of death,	Stroke.....	1	
		Heart condition.....	2	
		Don't know…….	3	
		Other *(specify)*.....	4	
D.59	How old was she when she died*?*	_____years	1	
D.60.	Is your father alive*?*	Yes……	1	**If no, skip D.62-64**
		No….....	2	
D.61.	How old is he*?*	_____years	1	
D.62.	Has he been taking high blood pressure medicines*?*	Yes.....	1	
		No.....	2	
D.63.	Has he ever suffered a stroke?	Yes.....	1	
		No.....	2	
D.64.	Has he ever suffered a heart attack*?*	Yes.....	1	
		No.....	2	
D.65.	If no longer alive, what was the cause of his death?	Stroke.....	1	
		Heart attack.....	2	
		Don't know……	3	
		Other *(specify).....*		
D.66.	At what age did he die*?*	_____	1	
		Don't know		
D.67.	Have any of your sisters died/*?*	Yes……	1	**If no skip 68**
		No……..	2	

D.68.	a) At what age did the sisters die*?* b) What high blood pressure medicines		Ag	On	Cause of		

	was she taking*?* c) What was the cause of her death*?* *(Fill in appropriate boxes).*		e?	B/P drugs?	death?	
		1st				1a,b,c
		2nd				2a,b,c
		3rd				3a,b,c
		Other *(specify)*				4a,b,c
D.69.	Have any of your brothers*?*	Yes.....			1	
		No.....			2	
D.70.	a) At what age did your brother die*?* b) What high blood pressure medicines was he taking*?* c) What was the cause of his death*?* *(Fill in appropriate boxes).*	1st				1a,b,c
		2nd				2a,b,c
		3 rd				3a,b,c
		Other *(specify*				4a,b,c
D.71.	Have you used any herbs for high blood pressure during the last three months*?*	Yes…….....			1	
		No…….....			2	
		N/A…….....			3	
D.72.	Did you feel better when you used these herbs*?*	Yes……			1	
		No……			2	
		N/A			3	

D.72a. Please tell me how you took your prescribed high blood pressure pills during the last three days*/?*_____
_____

D.73.	Do you combine herbal and prescribed high blood pressure medicines*?*	Yes……..	1
		No……	2
		N/A……....	3
D.74.	What is your source of herbal medicine*?* *(Tick all the patient mentions)*	Parents……..	1
		Friend……..	2
		Neighbour ……..	3
		Herbalist……..	4
		Spouse……..	5

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		Self……. N/A……. Other *(specify)……*	6 7 8	

E. The Health Belief Model Concepts

Perceived susceptibility

Instruction: Read the following statements to patient and allow to rate according to own opinion and fill in the provided column for Esu.75-77a

Rating scale: Agree = 3 Disagree = 2 Don't know = 1 3 2 1 Code

No.	**Item**					
Esu.75.	Having high blood pressure puts me at risk of developing problems with my eyes if I do not take my prescribed high blood pressure medicines.				1	
Esu.76.	High blood pressure puts me at risk for developing heart conditions if I do not take my prescribed high blood pressure medicines.				1	
Esu.77.	High blood pressure might cause a stroke if I do not take my prescribed high blood pressure medicines.				1	

77a. Please, explain whether you feel that you are at risk of developing complications as a result of your high blood pressure?. _____
_____

Perceived severity

Instruction: Read the following statements to patient and allow to rate according to own opinion and fill in the provided column for Esev.78-80a

Rating scale: Agree = 3 Disagree = 2 Don't know = 1 3 2 1 Code

No.	**Item**					
Esev.78.	Some people can suffer from strokes and die without knowing that they had high blood pressure.				1	
Esev.79.	The complications of high blood pressure are dangerous in life.				1	
Esev.80.	The death of a relative or friend from a stroke motivated me never to miss taking my high blood pressure pills.				1	

80a. Explain how dangerous you think complications of high blood pressure are?
_____
_____
_____

Perceived benefits

Instruction: Read the following statements to patient and allow to rate according to own opinion and fill in the provided column for Ebe 81- 83

Rating scale: Agree = 3 Disagree = 2 Don't know = 1 3 2 1 Code

Ebe.81.	Regular exercises and weight reduction have helped me to prevent high blood pressure complications.				1	
Ebe.82.	The medicines that I am taking make me feel good and without high blood pressure symptoms.				1	
Ebe.83.	Reducing salt in my food helps to reduce my heart palpitations.				1	

Perceived barriers

Instruction: Read the following statements to patient and allow to rate according to own opinion and fill in the provided column for Eba.84-86, 86.1-86.10

Rating scale: Agree = 3 Disagree = 2 Don't know = 1 3 2 1 Code

Eba.84.	Long waiting times at the clinic put me off medication refills.				1	
Eba.85.	High blood pressure pills make me: sleepy …….				1	
85a.	weak				2	
85b.	Tired.....				3	
85c.	Sicker…….....				4	
85d.	Other/ *(specify)* …….....				5	
Eba.86.	The long distance to the high blood pressure clinic makes me miss my appointment when I have no bus fair.				1	

86.1 What unpleasant experience have you encountered after taking your high blood pressure pills during the last three months?_____

86.2 Have you had any headaches during the last three months?

____

86.3 At what time of the day did you have headaches?_____

86.4 What steps did you take to relieve your headache?_____

_____

86.5 Have you informed the high blood pressure clinic nurse/doctor about

your headaches?_____

86.6 What remedy did the doctor suggest?_____

86.7 Has the remedy worked for you?_____

86.8 Do you experience any other problems when you take your blood pressure pills?

_____

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86.9 Do you experience drug stock outs at the hypertension clinic?_____

86.10 What happens when drugs are not there?_____

Cues to action

Instruction: Read the following statements to patient and allow to rate according to own opinion and fill in the provided column for Eca.87-90

Rating scale: Agree = 3 Disagree = 2 Don't know = 1 3 2 1 code

Eca.87.	Health education about high blood pressure motivates me to adhere to treatment.					
Eca.88.	My family's and friends' advice motivates me to take my high blood pressure treatment regularly.					
Eca.89.	Fear of kidney failure as a complication motivates me to take my high blood pressure pills.					
Eca.90.	Fear of a heart attack motivates me to take my high blood pressure pills as prescribed.					

Self-efficacy

Instruction: Read the following statements to patient and allow to rate according to own opinion and fill in the provided column for Esef.91- 93, 93a-93b

Rating scale: Agree = 3 Disagree = 2 Don't know = 1 3 2 1 code

Esef.91.	I have the ability to manage my high blood pressure				1	
Esef.92.	I understand the importance of taking my high blood pressure treatment regularly and correctly to control my blood pressure.				1	
Esef.93	I am capable of keeping my blood pressure under control.				1	

93a.What gives you confidence to adhere to your high blood pressure treatment?

_____

93b.What physical activities have you done during the last one week?

_____

F. Morisky Medication Adherence Scale MMAS-8: F94-101.

©Morisky Medication Adherence Scale (MMAS-8-Item). This is a generic adherence scale and the name of the health concern can be substituted in each question item. You have said that you are taking medications for high blood pressure. Individual people have given several issues concerning their medication–taking behavior and we are interested in your experience. There is no right or wrong answer. Please answer each question according to your personal experience with your high blood pressure medication

(Please tick the correct number)

	No-1	**Yes-0**
1. Do you sometimes forget to take your high blood pressure pills*?*		
2. Sometimes individual persons skip their medication due to reasons other than forgetting. In the past two weeks were there any days when you did not take your high blood pressure medicine*?*		
3. Have you ever reduced, or stopped taking your medicine, without informing your doctor, because you felt worse when you took it*?*		
4. When you travel or leave home, do you sometimes forget to take with you your high blood pressure medicine*?*		
5. Did you take your high blood pressure medicine yesterday*?*		
6. When you feel that your high blood pressure is controlled, do you sometimes stop taking your medicine*?*		
7. Taking medication every day is a real disturbance for some people. Do you feel troubled about following your high blood pressure treatment plan?		

8. How often do you have difficulty, remembering to take all your medications*?*
(Please tick the correct number*)*

Never/rarely.....….....4

Once in a while.....3

Sometimes.....2

Usually.....1

All the time ....……..……….....0

Coding Instructions for the ©Morisky Medication Adherence Scale (8-Item)

You will need to reverse the code response in a positive direction for item number 5 and standardize the code for item 8 (0-4), resulting in a scale from low adherence to high adherence. Item 8 is divided by 4 when calculating a summated score. This procedure standardizes the 5-point Likert scale. The total scale has a range of 0 to 8.0. The eight-item compliance scale had an alpha reliability of 0.83 (n= 1367) among patients diagnosed with essential hypertension attending an outpatient clinic of a large teaching hospital. We have used a 75% completion criterion for establishing eligibility. The median value of all missing items would be substituted for the missing item for individuals meeting the eligibility criterion.

Re-codes:

If Item5 = 0 Item5r = 1 (high adherence)

If Item8=4 Item8r = 1 (highest adherence)

If Item8=3 Item8r = .75 (high adherence)

If Item8=2 Item8r = .50 (moderate adherence)

If Item8=1 Item8r = .25 (low adherence)

If Item8=0 Item8r = 0 (lowest adherence)

Adherence Level	**Percent**
Low Adherence (< 6)	32.1
Medium Adherence (6 to <8)	52.0
High Adherence (= 8)	15.9

Required citation and footnote for the 8-item MMAS are as follows:

Morisky DE, Ang A, Krousel-Wood M, Ward H. Predictive Validity of a Medication Adherence Measure for Hypertension Control. *Journal of Clinical Hypertension* 2008; 10(5):348-354.

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Department of Community Health Sciences, UCLA School of Public Health, 650 Charles E. Young Drive South, Los Angeles, CA 90095-1772.

Additional citation you may use to document criterion-related validity with pharmacy fills

Krousel-Wood MA, Islam T, Webber LS, Morisky DE, Muntner P. Concordance of Self-Reported Medication Adherence by Pharmacy Fill in Patients with Hypertension. Am J Managed Care 2009; 15(1):59-66.

Al-Qazaz HK, Hassali MA, Shafie AA, Sundram S, Morisky DE. The Eight-Item Morisky Medication Adherence Scale (MMAS-08):Translation and Validation of the Malaysian version. Diabetes Research and Clinical Practice 2010; 90:216-221.

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Name and contact information of Licensee: Mary Kachingwe-Sisya, Student # 3251-854-4, email: marymbeba@kcn.unima.mw or mmbeba@yahoo.co; Promoter: Prof E Potgieter, Department of Health Studies, University of South Africa.

Title of Research: Treatment Adherence amongst Hypertensive Patients at Queen Elizabeth Central Hospital Blantyre, Malawi.

Date: 29th December, 2012.

Signature of researcher : MMM.

Annexure E: Structured interview schedule Chichewa version.

Chikalata cha mafunso

Mutu wa kafukufuku: Zinthu zomwe zimaapangitsa kulondoloza mankhwala anthu odwala Biipi ku kiliniki ya Biipi pa Queen Elizabeth Central Hospital, Blantyre, Malawi.

Tsiku_____ Dzina la ofufuza_____ kodi namba_____

Zoyenela kucita: Kuchokera mu buku la umoyo, lowetsani izi pa chikalata cha mafunso molondola.

Nthawi	**Biipi**	**sikelo**	**BMI**	***Mankhwala*** **Dzina Mulingo Kangati**
1. Yalero				
2.Yakale yoyamba -				
3. Yakale yachiwiri				
4. Yakale yachitatu				
5. Yakale yachinayi				
6. Chaka anaidziwa Bipii ___ Age___				
7. Zaka zomwe amwa mankwala a Bipii_____				
8. Chaka ayezetsa HIV _____ 9. Chaka anayamba ART_____ 10 Lembani ma ARV____				

A. Mbiri ya oyankha

Q	**Mmafunso**	**Mayankho**	**Kodi**	**Mojo wa**
A.1.	munthu wanji	Male …… Female ……	1 2	
A.2.	Muli ndi zaka zingati?	_____	1	
A.3.	Ndinu Mtundu wanji?	Chewa …….. Ngoni ……. Tumbuka ……. Lomwe …… Yao…….... Zina (nenani).....	1 2 3 4 5 6	
A.4.	Ndinu a mpingo wanji?	Roman Catholic..... Presbyterian..... Anglican..... Pentecostal..... Muslim.....	1 2 3 4 5	

A.5.	Ndi sukulu yiti yomwe munapambana?	Zina (nenani)*.....* Ayi…….…….. Primary school..... Secondary school... College (Deg, Dip, Cert University (Deg,Dip,Cert .	6 1 2 3 4 5	**Mojo wa**
A.6.	Mumagwira nchito yanji?	_____	1	
A.7.	Boma la kwanu ndi liti?	_____	1	
A.8.	Mwatumizidwa ndi/ mwachokera chipatala citi?	_____	1	
A.9.	*Muli pa banja?*	_____	1	
A.10.	*Muli ndi ana angati?*	_____	1	
A.11.	*Nthawi ya mimba yanu munawonako izi?*	Kukomoka..... Kutupa..... Mutu..... Osawona bwino..... palibe…… Zina (nenani)*.....*	1 2 3 4 5 6	
A12.	*Nanga Bipii?*	Eya..... Ayi.....	1 2	
A.13.	*Ana anu amoyo ndi angati?*	_____	1	
A.14.	*Nanga anafa ndi angati?*	_____	1	
A.15.	A*nafa ndi chiani?*	_____ _____ Sindikudziwa….	1 2	A.15,
A.16.	*Ndinu woyembekezera?*	Eya…….. Ayi…….	1 2	**If male skip A.16.**

B. Kudziwa za Bipii

B.17.	Bipii imayenda mu mtundu, nzoona?	Eya..... Ayi..... Sindikudziwa.....	1 2 3
B.18.	Bipii ndi yosaciritsika, nzoona?	Eya…… Ayi…… Sindikudziwa.....	1 2 3
B.19.	Bipii ndiyotheka bora kuvome reza, n'kumamwa mankhwala.	Eya..... Ayi..... Sindikudziwa.....	1 2 3
B.20.	Ndi vuto lanji linga pezeke ngati Bipii ikukwerabe?	Sitoloko..... Kufa mtima..... Kusawona.bwino..... Impyo kufoka..... Kufa mwadzidzidzi.....	1 2 3 4 5
B.21.	Chimayambitsa Bipii sicidziwika, koma pali zoifulumizitsa, Nzoona?	Eya..... Ayi..... Sindikudziwa.....	1 2 3
B.22.	Ndi zinthu ziti zimene zimafulumizitsa chiyambi ca Bipii?	Kusuta fodya... Kumwa mowa Nkhawa…… Kunenepatsa…… Osachita fizo….. Kudya za mchere wambiri Somba za kapenta Kudya sugawambiri.... Zina (nenani).....	1 2 3 4 5 6 7 8 9
B.23.	Pali zinanso zofulumizitsa, Nzoona?	Eya..... Ayi..... Sindikudziwa.....	1 2 3
B.24.	Ndi ziti zinazo,culani	zokudya…….. Kutopa... Malo achilendo.. Nkhawa.....	1 2 3 4

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B.25.	Mwa izi, ndi ziti, zimene mukuganiza kuti zinakufulumizita kuyamba kwa Bipii yanu?	Kusuta fodya. Kumwa mowa... Nkhawa…….. Kunenepetsa…… Posacita fizo..... Kudya za mchere, Kudya za Suga Zokudya..somba za kapeta..... Kutopa.... Malo a chilendo Zina (nenani).....	1 2 3 4 5 6 7 8 9 10 11 12	**Mojowa**
B.26.	Kodi Bipii yanu anaizindikira bwanji?	Anandiyeza ku cipatala OPD. Ku sikelo..... Ndikukayamba ncito..... Ndikupereka magazi. Ndikugula insuransi... Zina (nenani).....	1 2 3 4 5 6	
B.27.	Kuti idziwike Bipii munkamva chiani mthupi?	Chizungurilre……... Mutu..... Mabalu nkhutu..... Mtima kuthamanga... Kukomoka..... Zina (nenani).....	1 2 3 4 5 6	
B.28.	Munalandilako uphungu wa Bipii?	Eya…….. Ayi……....	1 2	

C :Kudziwa mankhwala a Bipii.

C.29.	Panopa mukumwa mankwala ati a, dzina b, mlingo c, kangati? Chongani zonse achula).	Dzina	**mlingo**	Kangati	kodi
		Hydrochloro thiazide (HCT)			1a,b,c 2a,b,c
		Frusemide			3a,b,c
		PropraAyirol			4a,b,c
		AteAyiral			5a,b,c
		Nifedipine			6a,b,c
		Aldomet			7a,b,c
		Zina (nenani) *Description of pills: small round pink white pills*			
C.30.	Ena ndi ati,amene mukumwaso a,dzina b, mlingo c, kangati?	Panadol			1a,b,c
		Indocid			2a,b,c
		Diclofenac			3a,b,c
		Aspirin			4a,b,c
		Herbs			5a,b.c
		Nutrition supplements			6a,b,c
		Zina (nenani)			8a,b,c
C.31.		Eya…… Ayi……			1 2
C.32.	Dzulo munadya chiyani m'mawa?	_____			1
C.33.	Nanga masana?Probe! mgaiwa	_____			1
C.34.	Nanga madzulo?Probe !	_____			1
C.35.	ndi zakudya ziti anati muzidya kulingana ndi	Palibe…….. Mchere wochepa.....			1 2

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	bipii?	Zopanda mafuta….. Zopanda sipaisi..... Zosakhutitsa kwambiri..... Za Masamba..... Nthochi..... Zina (nenani).....	3 4 5 6 7 8
C.36.	Ndi zakudya ziti anati musadye? (Chongani zonse achula*)*	Mchere wambiri…..... Nyama ya mafutat ……..... Zakudya za sipaisi..... Zokhutitsa kwambiri..... Mowa..... Fodya..... Zina (nenani)….....	1 2 3 4 5 6 7

36 a. Tandiuzeni zomwe mumakonda kudya pabanja panu nthawi zambiri:

M'mawa: _____ _____ _____ _____ 1

Masana : _____ _____ _____ _____ 2

Madzulo : _____ _____ _____ _____ 3

D. Za umoyo chikhalidwe ndi uchembere

D.37.	A pasta anakupemphereranipo Bipii?	Eya……..... Ayi…….....	1 2	**Ayi jowa D. 38**
D.38.	Ataku pempererani munapezako bwanji?	Eya……..... Ayi…….....	1 2	
D.39.	Munadwalapo malungo?	Eya……..... Ayi…….....	1 2	**Ayi jowa 40-41**
D.40.	Ngati munadwalapo, ndi chaka chiti?	_____	1	
D.41.	Mwamwa kangati mankhwala a malungo pa miyezi itatu yapitayi?	Ayi…… Kmodzi .kawiri..... Katatu.....	1 2 3 4	
D.42.	Munadwalapo njoka za m'mima?	Ay.....	1	**Ayi**

	kangati?	.Kamodzi..... Zina (nenani).....	2 3	**Jowa 43, 44**
D.43.	munadwalako njoka za m'mimba miyezi itatu yapitayi?	_____	1	
D.44.	Munamwako mankhwala a njoka myezi itatuyi, ngati e! mankwala anji?	Eya..... Ayi..... _____	1 2 3	
D.45.	Munalandilako mankhwala a kansa miyezi itatu yapitayi, mtundu wanji?	Eya..... Ayi..... _____	1 2 3	
D.46.	Mukulandila mankhwala a tibii?	Eya…… Ayi……..	1 2	
D.47.	Mwalandilako mankhwala a chikasu m'maso miyezi itatuyi?	Eya..... Ayi.....	1 2	
D.48.	Mwadwalako likodzo miyezi itatuyi?	Eya…… Ayi…… Sindikudziwa	1 2 3	**Ayi jowa D.49**.
D.49.	Ndi kangati mwalandila mankhwala a likodzo?	1 time…… 3 times…… 6 times…… N/A.....	1 2 3 4	
D.50.	Mumasuta ndudu zingati pa tsiku?	_____	1	
D.51.	Mumamwa mowa ungati pamulungu?	_____	1	
D.52.	Mumawonjezera mcere oculuka bwanji mu zakudya?	Ayi……... Pangono Tisipuni hafu Tisipuni	1 2 3 4	
D.53.	Mai anu alipo?	Eya..... Ayi.....	1 2	**Ayi jowa**
D.54	Ali ndi zaka zingati?	_____ years	1	**54-57**
D.55.	Amamwa mankhwala a Bipii?	Eya..... Ayi.....	1 2	

D.56.	Anayamba afa ziwalo?	Eya..... Ayi.....	1 2	
D.57.	Anakomokapo, hati ataki?	Eya..... Ayi.....	1 2	
D.58.	Ngati anali palibe anamwalira ndi chiyani?	Stroke.....Sitoloko..... heart condition.....Kufa mtima..... Other *(Specify)*.....Sindikudziwa ….…. Zina (nenani).....	1 2 3 4	
D.59	Anamwalira ali ndi zaka zingati?	_____Zaka	1	
D.60.	Nanga bamboo alipo?	Eya…… Ayi…….....	1 2	**Ayi, jowa D.62-64**
D.61.	Ali ndi zaka zingati?	_____years	1	
D.62.	Amamwa mankhwala a Bipii?	Eya..... Ayi.....	1 2	
D.63.	Anayamba afa ziwalo?	Eya..... Ayi.....	1 2	
D.64.	Anakomokapo, hati ataki?	Eya..... Ayi.....	1 2	
D.65.	Ngati bambo palibe, anafa ndichani?	Sitoloko..... Kufa mtima..... Sindikudziwa……. Zina (nenani).....	1 2 3	
D.66.	Anafa pa zaka zingati?	_____ Sindikudziwa	1	
D.67.	Azilongo anu ena anafa?	Eya…… Ayi……..	1 2	**Ayi jowa**
D.68.	a)Anafa pa zaka zingati? b) Ama mwa mankhwala anji a Bipii? c) Anafa ndi chani? .			
D.69.	Pali abale anu ena omwe anafa?	Eya.....	1	

	Age?	On B/P drugs?	Anafa ndi ciani?	
1st				1a,b,c
2nd				2a,b,c
3rd				3a,b,c
Zina (nenani)				4a,b,c

		..... Ayi.....	2	
D.70.	a)Anafa pa zaka zingati? b) Mankhwala anji a Bipii? c) Anamwalira ndi chiyani? .	1st		1a,b,c
		2nd		2a,b,c
		3 rd		3a,b,c
		Other *(specify*		4a,b,c
D.71.	Mwamwako mankhwala a makolo athu pa miyezi itatuyi?	Eya……..... Ayi……..... N/A…….....	1 2 3	
D.72.	Munapeza bwiAyi mutamwa a makolo?	Eya…… Ayi…… N/A	1 2 3	

D.72a. Tandifotokozeleni m'mene mumamwera mankhwala anu a Bipii pa masiku atatu?_____
_____

D.73.	kodi Mumaphatikiza a zitsamba ndi a ku kiliniki?	Eya…….. Ayi…… N/A……..	1 2 3
D.74.	Mumawapeza bwanji mankhwala a zitsamba?	Parents…….. Friend…… Neighbour …….. Herbalist…… Spouse…… Self…… N/A…… Zina (nenani)……	1 2 3 4 5 6 7 8

E. The Health Belief Model Concepts

Perceived susceptibility

Zochita: Awerengereni, iwo aziyankha mafunso Esu.75-77a

Sikelo: Inde = 3 aYI = 2 Sindikudziwa = 1 3 2 1 Kodi

	Item					
Esu.75.	kukhala ndi Bipii kukundiika pa ciopysezo cobvutika maso ngati sindimwa mankhwala.				1	
Esu.76.	Bipii ikundiika pa ciopysezo cobvutika mtima ngati sindimwa mankhwala				1	
Esu.77.	Bipii ikhoza kundi pangitsa ciopysezo cozizila ziwalo ngati sindimwa mankhwala.				1	

77a. Fotokozani ngati mukuwona kuti mukhoza kupeza mavuto kamba ka Bipii.

_____

_____

Perceived severity

Zochita: Awerengereni, iwo aziyankha mafunso Esev.78-80a

Sikelo: Inde = 3 Ayi = 2 Sindikudziwa = 1 3 2 1 Kodi

	Item					
Esev.78.	Anthu ena amafa ziwalo mpaka kumwalira osadziwa kuti ali ndi Bipii.				1	
Esev.79.	Zotsatila zake za Bipii ndi zooAyinga moyo.				1	
Esev.80.	Imfa ya abale ndi abwenzi atafa ziwalo imandi fulumiza kumwa mapilisi anga a Bipii.				1	

80a. Mukuganiza kuti zotsatila za Bipii ndi zoopsya bwanji?

_____

_____

_____

Perceived benefits

Zochita: Awerengereni, iwo aziyankha mafunso Ebe 81- 83

Sikelo: Inde = 3 Ayi = 2 Sindikudziwa = 1 3 2 1 Kodi

Ebe.81.	*Maekisasaizi orimbisa thupi ndi kucepe tsako sikelo zandithandiza kuti ndipewe zotsatila za Bipii.*				1	
Ebe.82.	*Mankhwala amene ndikumwa ndimamva nawo bwiAyi opanda vuto.*				1	
Ebe.83.	*Kucepetsa mchere kumandithandiza kucepetsa kuthamanga kwa mtima.*				1	

Perceived barriers

Zochita: Awerengereni, iwo aziyankha mafunso Eba.84-86, 86.1-86.10

Sikelo: Inde = 3 Ayi = 2 Sindikudziwa = 1 3 2 1 Kodi

Eba.84.	*Kudikila kwa nthawi yaitali ku kiliniki kumandipangitsa zoti ndisakatenge ena mankwala akatha.*				1	
Eba.85. 85a. 85b. 85c. 85d.	Tulo..... ……. *Mankhwala a Bipii amandipangitsa* weak/*kuzizila m'nkhongoAyi* K*utopa.*.....K K*udwala kwambiri*…… *Ziina nenani* …….				1 2 3 4 5	
Eba.86.	*Kutalika kwa ku kiliniki/ kumandijombetsa,ngati ndilibe ya basi.*				1	

86.1 *Mwapezana ndi zovuta zanji mutamwa mankhwala a Bipii pa myezi itatu yapitayi?*_____

*86.*2 Munamvako mutu kupweteka pa miyezi itatu yapitayi?_____

86.3 Mutuwo umawawa nthawi yake yiti-yiti?_____

86.4 Munachita chiyani kuti mutuwo usiye?_____

86.5 Munawawuza za mutuwu a dotolo ndi a nesi aku kiliniki?_____

86.6 Adotolo anathandizapo bwanji?_____

86.7 Thandizolo lakukwanilani?_____

86.8 Pali mabvuto enanso, amene mumaaona mukamwa mapilisi a Bipii?

_____

86.9 Kodi kumatheka kuti mankhwala amatha ku kiliniki?_____

86.10 Ndiye mumatani zikatere, fotokozani?_____

Cues to action

Zochita: Awerengereni, iwo aziyankha mafunso Eca.87-90

Sikelo: Inde = 3 Ayi = 2 Sindikudziwa = 1 3 2 1 Kodi

Eca.87.	Health education about high blood pressure motivates me to adhere to treatment/ Uphungu wa za Bipii umandisuntha kutsatila mankhwala anga bwiAyi-bwiAyi.				1	
Eca.88.	Uphungu kucokera kwa abale ndi abwenzi, umandithandizira kumwa mankhwala anga moyenerela.				1	
Eca.89.	Mantha poopa bvuto la imphyso limandipangitsa kumwa mankhwala anga moyenerela.				1	
Eca.90.	Mantha, poopa bvuto la kugwa ndi mtima, amandipangitsa kumwa mankhwala anga moyenerela.				1	

Self-efficacy

Zochita: Awerengereni, iwo aziyankha mafunso Esef.91- 93, 93a-93b

Sikelo: Inde = 3 Ayi = 2 Sindikudziwa = 1 3 2 1 Kodi

Esef.91.	Ndiri nako kuthekera, kusamalira Bipii yanga.				1	
Esef.92.	Ndikumvetsa kufunikira kwa kumwa mankhwala a Bipii moyenerera kuti ndisamalire Bipii yanga.				1	
Esef.93	Ndikhonza kukwanitsa kusamalira Bipii yanga.				1	

93a. Chima kulimbikitsani ndi chiyani kuti muzilondoloza bwiAyi kamwedwe ka mankhwala anu?

_____

93b.Kodi mwapanga masewero otani, olimbitsa thupi, mulungu wapitawu?

_____

F. Morisky Medication Adherence Scale MMAS-8: F94-101.

©Morisky Medication Adherence Scale (MMAS-8-Item). This is a generic adherence scale and the name of the health concern can be substituted in each question item. You have said that you are taking medications for high blood pressure. Individual people have given several issues concerning their medication–taking behavior and we are interested in your experience. There is Ayi right or wrong answer. Please answer each question according to your personal experience with your high blood pressure medication

(Please tick the correct number)	**Ayi-1**	**Eya-0**
2. Kodi nthawi zina mumaiwala kumwa mapilisi anu a Bipii?		
5. Anthu nthawi zina amadumphitsa kumwa mankhwala awo pa zifukwa zina osati kuiwala. Polingalira pa masabata awiri apitawa, panali masiku ena omwe simunamwe mankhwala anu a Bipii?		
6. Modi munayamba mwachepetsapo, kapena kusiya kumwa mankhwala anu, musanamuuze dotolo wanu, chifukwa choti munabva kudwalika kwambiri mutamwa mankhwalawo?		
7. Mukakhala paulendo kapena kuchoka pa nyumba, nthawi zina mumaiwala kunyamula mankhwala anu a Bipii?		
5. Munamwa mankhwala a Bipii dzulo?		
6. Mukamva ngati kuti nthenda yanu ya Bipii, yasinthako, kodi nthawi zina mumasiya kumwa mankhwala anu?		
7. Kumwa mankhwala tsiku ndi tsiku ndizosowetsa mtendere ndithu kwa anthu ena. Kodi inuyo mumamva kubvutika, kuti mutsatire ndondomeko yomwela mankhwala anu a Bipii?		

8. Ndi kangati mumabvutikila, kukumbukila, kumwa mankhwala anu onse?
Chonde zungulitsani nambala yokhoza)

Sindinaiwalepo/ mwa nthawi yake…….....4

Mwakamodzi-kamodzi.....3

Nthawi zina.....2

Kawiri-kawiri.....1

Nthawi zonse 0

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Annexure F: Participant information for consent

Participation information sheet

Factors influencing treatment adherence in hypertensive patients at Queen Elizabeth Central Hospital, Blantyre, Malawi

Dear Participant,

I wish to invite you to participate in a research study on **Factors influencing treatment adherence in hypertensive patients at Queen Elizabeth Central Hospital, Blantyre, Malawi**

I am Mary Kachingwe-Sisya Mbeba, a PhD in Health Studies student at University of South Africa. In fulfillment of my PhD, I am conducting a research study on," **Factors influencing treatment adherence in hypertensive patients at Queen Elizabeth Central Hospital, Blantyre, Malawi".**

The study will investigate the treatment adherence levels and the factors influencing treatment adherence in hypertensive patients at Queen Elizabeth Central Hospital, Blantyre. The study will provide information that may enable nurses to identify treatment adherence levels in hypertension patients and factors that influence treatment adherence. This might assist nurses with development of strategies to help hypertensive patients prevent complications of hypertension, strokes, heart failure and sudden deaths. Your participation in the study will provide information about what factors influence hypertensive patients' treatment adherence and their level of adherence hence develop strategies to assist them.

You have been selected to participate in the study because you have hypertension, you are taking anti-hypertensive drugs and you are attending the QECH hypertension clinic.

Your participation in the study is voluntary. You may withdraw from participating at any time you feel so and there will be no penalty or loss of benefits to which the subject is otherwise entitled. Withdrawal will not affect your care in anyway.

The study and its procedures have been approved by the appropriate people and research committee at, University of South Africa, College of Medicine, Kamuzu College of Nursing and Queen Elizabeth Central Hospital. The study procedures do not have any foreseeable risks to you and your family. If at all a certain question in the questionnaire makes the patient uncomfortable, will be told not to answer it and go to the next, if the patient seems disturbed the interview will be discontinued and patient withdrawn from participation. The researcher will provide a researcher developed pamphlet on "Basic information about hypertension" to the subjects after the research as a benefit.

The procedure and expected duration of the subject's participation in the research

The study procedure includes the researcher asking you questions from the questionnaire and you responding, there is no experiment no other procedure. The interview will take approximately 45 minutes. Code numbers will be used for identification so that data is not linked to your name. The gathered information will be kept by the researcher and only those people who are directly involved in the study, researcher and supervisor will have access. After data analysis the gathered information will be destroyed by burning them.

You are free to ask any questions about the study or about being a participant and you may call: The Chairperson,
College of Medicine Research and Ethics Committee
Private Bag 360,Chichiri, Blanytre 3.Tel: 01 871 911

Mary Kachingwe-Sisya Mbeba
Kamuzu College of Nursing,
P.O. Box 415, Blantyre
Cell: 0888895764

Prof. VJ. EHlers (1)
University of South Africa,
P.O. Box 0003
Tel: (012) 4296731

Dr. M. Hami (2)
Kamuzu College of Nursing,
P.O. Box 415, Blantyre
Cell: 088851485

Consent form

I have read / been explained about this consent form and I voluntarily agree and consent to take part in this study.

Participant signature/ thumb print..... Date.....

I have explained the study information to the participant above and have sought her understanding for informed consent.

Investigator's signature.....Date.....

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List of research project topics and materials

Afukunnexure G: Uthenga kwa olowa mukafuku

MUTU: Zinthu zokhudza kalondolozedwe ka kamwedwe ka mankhwala ka anthu odwala nthenda ya Biipi-(yothamanga magazi) pa Queen Elizabeth Central Hospital.

Ine Mary Kachingwe-Sisya Mbeba ndine wophunzira ku sukulu ya ukachenjede ku South Africa ndipo ndikupanga maphunziro a udotolo. Muli kuyitanidwa kuti mutenge nawo mbali pa kafukufuku wofuna kufufuza zinthu zokhudza kalondolozedwe ka kamwedwe ka mankhwala ka anthu odwala nthenda ya biipi-(yothamanga magazi) pa Queen Elizabeth Central Hospital.

Musanapange chiganizo chotengapo mbali pa kafukufukuyu ndipofunika kuti mumvetsetse cholinga cha kafukufukuyu kuti chidzafunike ndichani. Mukhoza kutifunsa ngati pali china chake chimene simunamvetsetse kapena ngati mukufuna kudziwa zambiri.

Cholinga cha kafukufuku ndi kufuna kudziwa zinthu zomwe zimakhudza kalondoledwe ka mankwala ka anthu odwala nthenda ya Biipi pa Queen Elizabeth Central Hospital. Ndipofunika kufufuza kuti odwala Biipiwa kwenikweni amalondola bwanji kamwedwe ka mankhwala awo ndipo zimawathandiza kutheka kapena kulephela ndi chiyani. Zotsatira za kafukufukuyu zidzathandiza kupeza njira zomwe zingathandizire odwala Biipiwa pamodzi ndi anamwino kuti palembedwe ndondomeko zoyenera zothandiza kalongosoledwe ka kamwedwe ka mankhwala, kuti matenda a Biipiwa asamafike povuta kuti mpaka achite stroke kapena kupezekanso ndi nthenda ya mtima kapena kukomoka mpaka kufa kumene .

Inuyo mwasankhidwa kutenga mbali mukafukufukuyu chifukwa mukudwala nthenda ya Biipi, mukumwa mankhwala komanso muma samalidwa ndi kupeza chithandizo ku kiliniki ya Biipi ya pa Queen Elizabeth Central Hospital.

Ndikufuna kwanu kusankha kutenga mbali pa kafukufukuyu kapena ayi. Muli ndi ufulu wosiya kutengapo mbali nthawi iliyonse popanda kupereka zifukwa, ndipo simuzalipitsidwa ayi. Ndipo izi sizingasokoneze konse chithandizo chomwe inu mukulandila.

Kafukufukuyu anawunikidwa bwino lomwe ndi akadaulo a sukulu ya ku South Africa komanso College of Medicine, awa ndi mabungwe omwe amayimilira ndi kuteteza anthu odzipereka kutenga mbali mu kafukufuku, ndipo palibe kuopsya kwina kulikonse mukatengapo mbali. Koma muzangofunsidwa mafunso pa nthenda iyi ya Biipi. Ndipo pakakhala funso limene mwina inu simukufuna kuyankha cifukwa coti lakuipilani muzangonena tizalisiya limenelo. kaya ngati pali funso loti lakuipilani kwambiri muzangonena ndiye kuti tizangolekelathu kupitiliza mafunsowo.

Mukavomereza kutenga nawo mbali pa kafukufukuyu mudzafunsidwa mafunso okhudzana ndi matenda a Biipi, komanso mankwala omwe mukumwa nkumalemba mayankho pa cipepala . Muli kupemphedwa kuyakha mafunso mmene mukudziwira ndi moona mtima. Opangitsa kafukufuku azilemba papepara la mndandanda wa mafunso, ndipo mafunsowa adzatenga nthawi yokwana pafupifupi mpindi 45. Pa chipepara cha mayankho anu tizalembapo nambala osati dzina lanu ayi. Pakutero sitidzanena kuti izi ananena ndi auje chifukwa pakhala palibe dzina lanu. Komanso mapepala oyankhidwawo adzatsekeledwa ndi

kuagwira okhaokha amene akucita kafukufukuyu. Tikadzamaliza kafukufuku ndi kulemba lipoti zimapepala zonsezi tizaziocha .

Ngati muli ndi mafunso okhudza kafukufukuyu muli omasuka kufunsa mafunso anu kwa;
A pa Mpando a Komiti ya ku College of Medicine Research and Ethics Committee
Private Bag 360, Chichiri

Mary Kachingwe-Sisya Mbeba
Kamuzu College of Nursing,
P.O. Box 415, Blantyre
Cell: 0888895764

Prof. VJ. EHlers (1)
University of South Africa,
P.O. Box 392; 0003
Tel: (012) 4296731

Dr. M. Hami (2)
Kamuzu College of Nursing,
P.O. Box 415, Blantyre
Cell: 088851485

Kalata ya chilorezo kutengapo mbali mukafukufuku

Ndamvetsetsa za kafukufukuyu ndipo ndavomereza kutengapo mbali mu kafukufukuyu mwakufuna kwanga ndi popanda kukakamizidwa.

....

Chizindikiro cha wotenga mbali Tsiku.

Ndafotokoza za kafukufukuyu kwa wotengapo mbali ndipo wamvetsetsa zokhudza bwino lomwe zonse zokhudza kafukufuku.

....

Mwini kafukufuku Tsiku.

Zikomo potengapo mbali mukafukufukuyu.!!!

ANNEXURE H: Approval of MMAS-8 Translation to Chichewa version

RESUBMISSION OF MMAS-8, FORWARD TRANSLATION AND BACKWARD TRANSLATION, 27th February 2012

Inbox

mary mbeba Mon, Feb 27, 2012 at 10:01 PM

Sat, Mar 3, 2012 at 7:16 PM

Donald E. Morisky

<dmorisky@ucla.edu>

To: mary mbeba <marymbeba@kcn.unima.mw>

Reply | Reply to all | Forward | Print | Delete | Show original

Hi Mary and hope you are doing well. Please write the name of the language in the respective document and confirm that it is indeed Chichewa (National language) of Malawi. The backward translation is almost perfect and very rarely do I get an exact replicate of the original English version. I approve of this version and please let me know if there are other languages that you have translated the MMAS-8 scale so I can review.

Best wishes

Dr. Morisky

- Show quoted text -

ANNEXURE I: Permission to use MMAS-8

Re: Greetings

Inbox

Thu, Jan 5, 2012 at 12:49 AM

Donald E. Morisky

<dmorisky@ucla.edu>

To: Fahad Saleem <fahaduob@gmail.com>, marymbeba@kcn.unima.mw

Reply | Reply to all | Forward | Print | Delete | Show original

Greetings Fahad and Mary and I am so sorry that you had to go through so much trouble in trying to reach me. I am thankful to Fahad who sent me this note and I really commend you Mary for your diligence and perseverence in pursuing my approval of your dissertation project. I give you permission to use the copyrighted MMAS-8 in your doctoral studies, provided you abide with the copyright laws, cite our research, and send me a report of your findings upon completion of your research. I wish you the very best of success in your adherence research. You have an outstanding Mentor, Dr. Fahad Saleem, and I know you will have an outstanding performance.

Best wishes,
dmorisky

*Donald E. Morisky, Sc.D., M.S.P.H., S*c.M.
Professor and Program Director, Doctoral Training in the Social and Behavioral Determinants of HIV/AIDS Prevention
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Box 951772
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Los Angeles, CA 90095-1772
email: dmorisky@ucla.edu
Phone: (310) 825-8508
Fax: (310) 794-1805

ANNEXURE J: Letter of support and recognition from Kamuzu College of Nursing

University of Malawi
KAMUZU COLLEGE OF NURSING - BLANTYRE CAMPUS

T0: The Chairperson COMREC

From: Mrs M. Mula

Date: 11th March 2013.

Subject: Factors influencing treatment adherence amongst hypertensive patients at Queen Elizabeth Central Hospital, Blantyre, Malawi.

I write in support of the above captioned study which Mrs Mary Kachingwe-Sisya Mbeba wishes to conduct. Mrs Mary Kachingwe-Sisya Mbeba is a member of staff in the Medical and Surgical Nursing Department of Kamuzu College of Nursing. She is currently registered with University of South Africa pursuing a degree of doctor of philosophy in health studies. Her projected thesis is entitled **"Factors influencing treatment adherence amongst hypertensive patients at Queen Elizabeth Central Hospital, Blantyre, Malawi"**.

She has been granted ethical clearance certificate to conduct this study by University of South Africa Health Studies Higher Degrees Committee, College of Human Sciences, No.HSHDC/82/2012.

The department staff sees this research as relevant and timely because the Malawis' national survey of 2009 revealed a hypertension prevalence of 32.9%. This treatment adherence study might assist the hypertensive patients to have their hypertension controlled using evidence based strategies that the research might recommend. The study is fully supported.

Mrs. C. Mula
Deputy Head of Medical-Surgical Nursing Department

ANNEXURE K: QECH Protocol for hypertension: diagnosis and treatment

1. Measure the blood pressure correctly

Ensure patient has rested for 10 minutes before measurement.

Use correct cuff size, a fat patient may need a large cuff.

Hypertension is only diagnosed if the blood pressure (BP) is >140/90 mmHg on 3 separate occasions.

2. Classify (grade) hypertension and make a treatment plan

Mild = systolic BP of 140-159 mmHg and diastolic BP of 90-99 mmHg;

Treatment is change of lifestyle for 3 months then review.

Moderate = systolic BP of 160-179 mmHg and a diastolic BP of 100-109 mmHg

Treatment is change of lifestyle and drugs.

Severe = systolic BP of >180 mmHg and a diastolic BP of >110 mmHg.

Treatment is change of lifestyle and drugs.

3. General advice for all patients with hypertension

Lifestyle changes

-Avoid Blufen and others like Indocid and Diclofenac

Stop smoking + reduce alcohol intake

Increase exercise + reduce salt intake

Remember the three C's

Come to clinic regularly; **comply** with treatment, **continuous supply** of tablets

4. Medication for hypertension-follow in sequence, increase drugs to achieve target BP of <130/80 mmHg

HCT-12.5mg Once daily (Do not increase above 25mg

Nifedipine- Slow release (SR) 20mg twice daily

Lisinopril- 10-20mg once daily (Max dose 80mg OD)

Propranolol- 40-80mg BD

If already on HCT +Propranolol, add Nifedipine then Lisinopril etc

Medication for use in difficult hypertension (Consult senior doctor)

METHYLDOPA - 500mg TDS MAX

Spironolactone - 25mg OD IF K+ >5MMOL/I

5. Investigating hypertension

Patients <40 years old or any age with BP persistently >160/100 and compliant with 3 or more drugs should have the following tests:

Urine dips for blood/protein

Na, K, BUN, Creatinine

Renal ultrasound

Consult a senior doctor if results abnormal

6. Follow up

Stable hypertension (Compliant and good control)-see 3 monthly

Poor control or compliance-review in 1 month or sooner if indicated

Ensure reliability access to medications via QECH or local health centre.

Dreyer 2011, September.

ANNEXURE L: Training program for research assistants

Training for two days on a Wednesday and a Thursday pending Friday

Wednesday: Day one morning: will cover objectives of the training, research title, purpose, objectives and research ethics, thus, informed consent, confidentiality, privacy, anonymity, and respect for people respondent, recruitment and selection, communication skills, welcoming respondents, creation of rapport, verification of eligibility, starting and ending the actual interview, listening skills.

Day one afternoon: understanding the items in the questionnaire, interviewing skills, coding, and documentation of data.

Methods of training: Discussions, Questions and answers, Practice of one-on-one, role plays on good interviewer.

Thursday: Day two morning: Field trip to Ndirande to do pre-tests.

The researcher and nine assistants will use Ndirande health centre, out patients department with permission to do a pre-test of the questionnaire on two respondents each. This will be done during the two days training. Respondents with similar characteristics set out in the inclusion criteria will be selected with the help of the nurse-in-charge of the Ndirande Health Centre. The flaws that will be identified during the pre test will be used to refine the questionnaire.

Day two afternoon: Plenary and feedback on questionnaire.

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ANNEXURE M: Ethical Clearance Certificate 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.03/13/1370 – Factors Influencing Treatment Adherence amongst Hypertensive Patients at QECH by Mrs Mary Mbeba

On 16th May 2013

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

Approved by
College of Medicine
16 MAY 2013
(COMREC)
Research and Ethics Committee

Dr. G. Kalanda - Chairperson of COMREC

16 May 2013
Date

ANNEXURE N: Permission from pre-test site

From: The District Health Officer, P/Bag 66, Blantyre.

To : Health Centre In-Charge, Ndirande Health Centre.

Cc : Mary Kachingwe-Sisya Mbemba, Kamuzu College of Nursing, Blantyre.

Date: 3rd July 2013

PERMISSION TO CONDUCT A PRE-TEST OF THE STUDY INSTRUMENT AT NDIRANDE HEALTH CENTRE

This is to inform you that Mary Kachingwe-Sisya Mbeba has been given permission to conduct a pre-test of the study instrument at Ndirande Health Centre. She is a PhD student at the University of South Africa. The study topic is "Factors influencing treatment adherence amongst hypertensive patients at QECH Hypertension Clinic."

Please give her all necessary support to make her data collection smooth.

Thank you.

District Health Officer
JUL 2013
Private Bag 66
Blantyre

Dr. Owen U. U. Malema
DISTRICT HEALTH OFFICER

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List of research project topics and materials

ANNEXURE O: Altman's Nomogram (1991:459) for calculating sample size

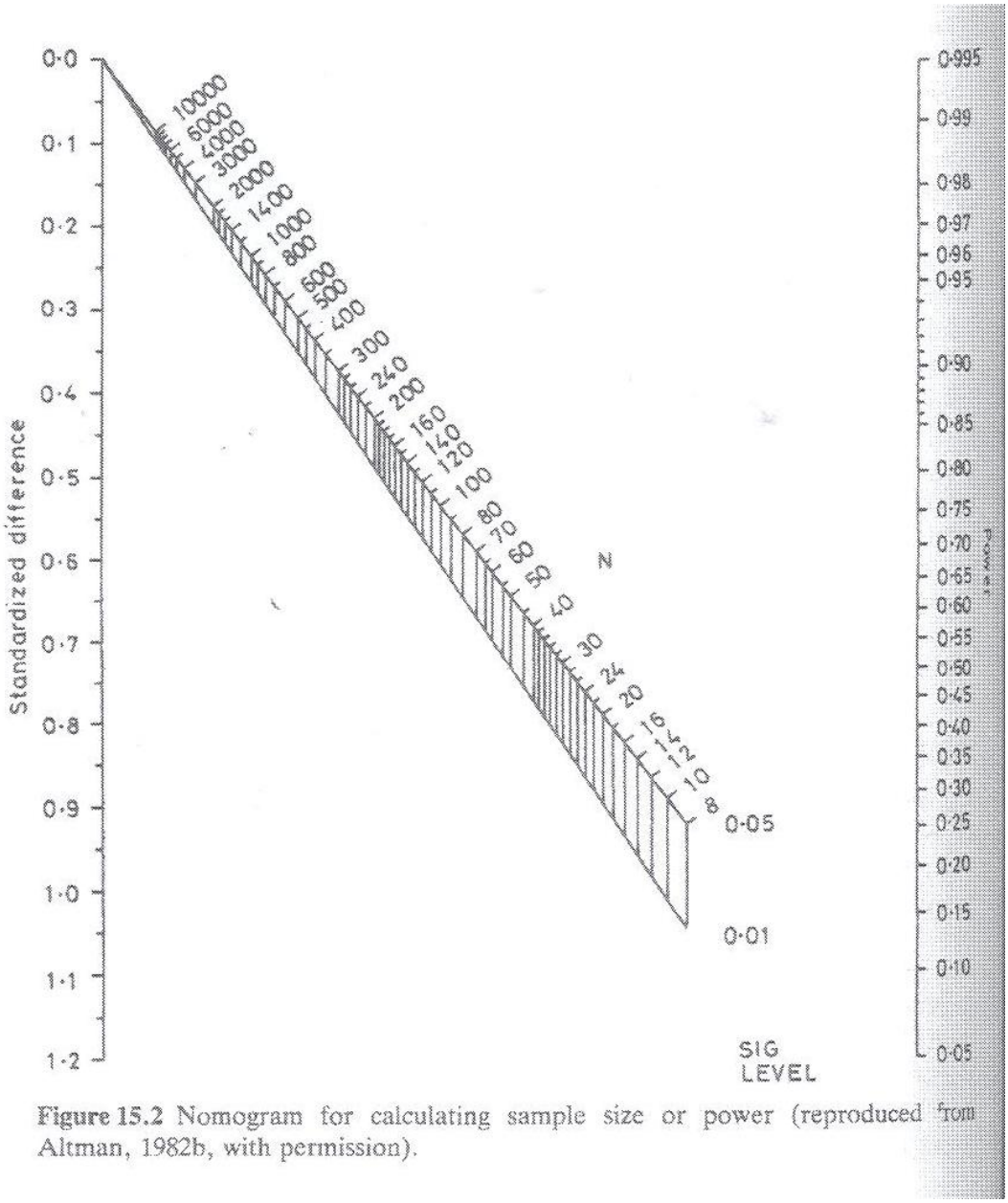
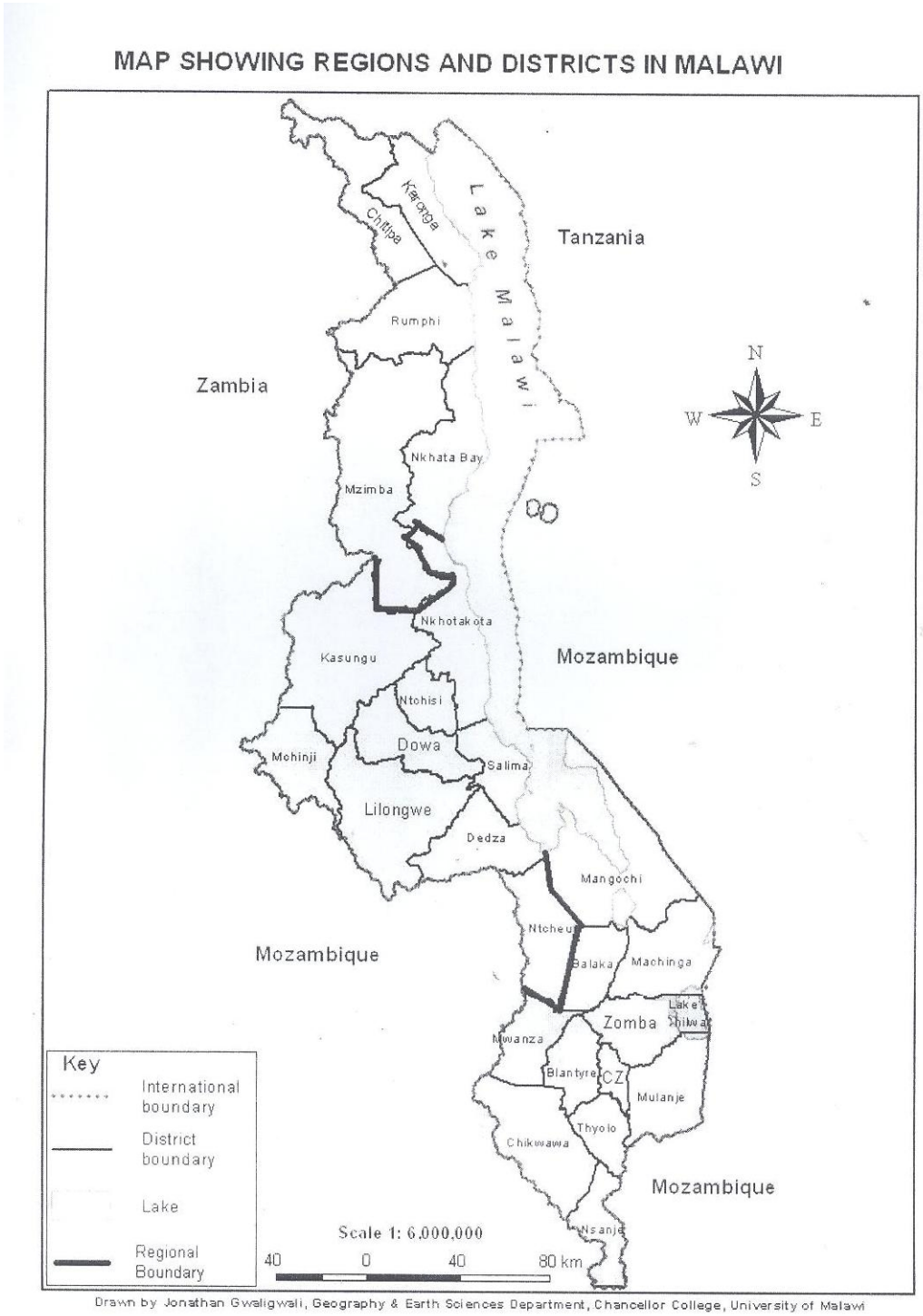


Figure 15.2 Nomogram for calculating sample size or power (reproduced from Altman, 1982b, with permission).

ANNEXURE P:



ANNEXURE O, Source: Malawi/WHO STEPS Survey (2010:8)