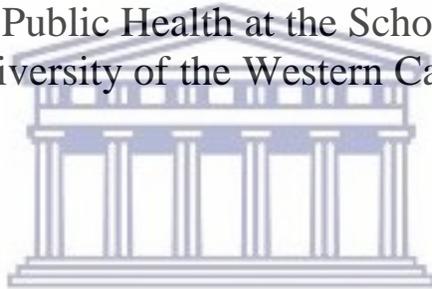


# **ADHERENCE TO LIFESTYLE MODIFICATION RECOMMENDATIONS IN HYPERTENSIVE PATIENTS AT PARIRENYATWA HOSPITAL**

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A mini-thesis submitted in partial fulfilment of the requirements for the  
degree of Master in Public Health at the School of Public Health,  
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November 2018

## Abbreviations

BP	:	Blood Pressure
BMI	:	Body Mass Index
CVD	:	Cardiovascular Disease
CHEP	:	Community Health Education Project
CC	:	Correlation Coefficient
DASH	:	Dietary Approaches to Stop Hypertension
HTN	:	Hypertension
IFPM	:	International Federation of Pharmaceutical Manufacturers
MRCZ	:	Medical Research Council of Zimbabwe
NBPEP	:	National Blood Pressure Education Program
NHFA	:	National Health Foundation of Australia
SSA	:	Sub-Saharan Africa
SPSS	:	Statistical Package for Social Scientists
WHO	:	World Health Organisation

**Keywords:** Hypertension, adherence, physical activity, dietary modification, obesity, cardiovascular disease



## Acknowledgments

I would like to thank my supervisor Ms L. Tsolekile for her contributions and guidance in completing my mini-thesis. My gratitude also goes to the University Of Western Cape School Of Public Health for their support throughout my studies. My gratitude also goes to my research assistant Victor Ndanda, and the Parirenyatwa Hospital Medical Clinic staff who were involved in the data collection process. I would also like to acknowledge the participants for sparing their time to participate in the study. Finally, my gratitude goes to God and my family for their continued support throughout the project.

Rulani Makondo

University of Western Cape, 2018



## Abstract

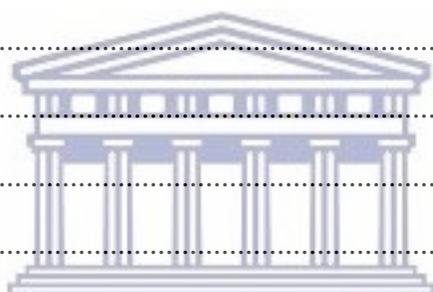
**Background:** Hypertension (HTN) complications are one of the leading causes of disability and mortality worldwide, with increasing trends noted in Africa. The most neglected causes of uncontrolled HTN and its complications are unhealthy diets, excess alcohol consumption and physical inactivity. Adherence to recommended lifestyle modifications remains low in Zimbabwe. This study seeks to explore the factors influencing adherence to World Health Organisation (WHO) lifestyle modification recommendations in patients with hypertension at Parirenyatwa Hospital, Harare.

**Methodology:** An analytic cross-sectional study design was utilized. 328 hypertensive patients aged at least 18, receiving care at Parirenyatwa Hospital were recruited into the study. A self-administered questionnaire was used to collect information on demographics, knowledge and adherence to WHO recommended lifestyle modifications from participants. Statistical Package for Social Scientists (SPSS) version 20 was used for data analysis. The Spearman test was used to test for linear correlation among variables and the 5-point Likert Scale was utilized to categorize the extent of practice of dietary and physical activity recommendations by WHO.

**Results:** Approximately 21.6% of the participants had a normal BMI, and 2.1% had blood pressure within the normal ranges. Almost a third (30.6%) were compliant with physical activity recommendations and less than a tenth (8.2 %) with recommended dietary modifications. Knowledge on recommended lifestyle behaviours was low, and misconceptions existed. Various reasons for non-adherence to lifestyle modifications were cited, with illness (48.5%) and financial constraints (68.3%) being the major for physical activity and dietary modifications respectively. No significant correlation was observed between adherence to exercise and static demographic factors {gender (CC -0.039), age (CC 0.083), marital status (CC -0.016), educational level (CC -0.007), employment status (CC -0.056)} as well as to dietary recommendations {gender (CC -0.023), age (CC -0.116), marital status (CC -0.084), educational level (CC -0.124), employment status (CC -0.085)}.

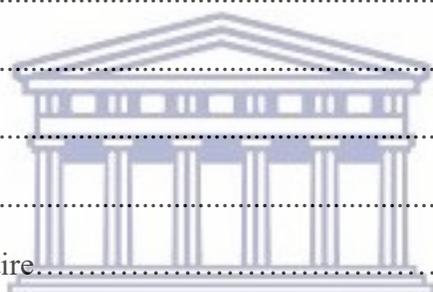
**Conclusion:** Financial constraints and illness were the main barriers to adherence to recommended dietary and physical activity modifications respectively. Dissemination of health education messages on recommended lifestyle modifications and significance in hypertension management must be heightened to improve adherence and reduce cardiovascular mortality.

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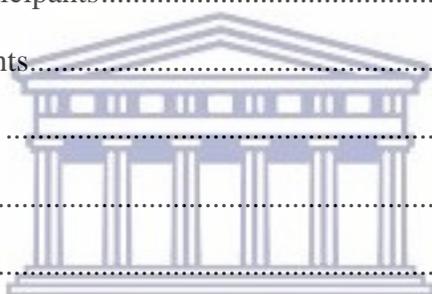
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## Chapter 1

### BACKGROUND

#### 1.1 Introduction

Hypertension is a chronic medical condition characterised by blood pressure (BP) that is consistently elevated above normal (Canadian Hypertension Education Program: CHEP 2014). Normal blood pressure levels are essential for the functioning of vital organs such as the brain, kidneys and the heart (WHO 2013). Uncontrolled hypertension, however, can permanently damage the heart, kidneys, eyes, and brain resulting in disability or loss of life (National Blood Pressure Education Program: NBPEP 2003). A linear relationship exists between blood pressure and the risk of occurrence of a cardiovascular incident such as stroke, myocardial infarction, kidney disease and peripheral vascular disease (NBPEP 2003). This relationship is continuous, consistent and independent of other risk factors (van de Vijver et al. 2013).

Due to the continuous relationship between blood pressure and cardiovascular risk, distinct cut-off points for normotension and hypertension do not exist, and cut-off points for BP categorisation vary across international guidelines, however categorisation assists in the clinical management and public health programming (National Heart Foundation of Australia: NHFA 2016).

The Guideline for the prevention, detection, evaluation and management of high blood pressure in adults by Whelton et al. (2017) classifies hypertension into four categories; normal, elevated, stage 1 and stage 2 depending on the systolic and diastolic blood pressure reading as shown in Table 1. These guidelines are based on evidence from several observational studies and meta-analysis that demonstrated a linear relationship between cardiovascular risk and increasing BP levels from those classified as normal.

Table 1: Blood Pressure Categorisation in Adults

<b>BP category</b>	<b>Systolic BP</b>		<b>Diastolic BP</b>
Normal	Less than 120mmHg	and	Less than 80mmHg
Elevated	120-129mmHg	and	Less than 80mmHg
<b>Hypertension</b>			
Stage 1	130-139mmHg	or	80-89mmHg
Stage 2	Greater than or equal to 140mmHg	or	Greater than or equal to 90mmHg

Adapted from Whelton et al. (2017: 22)

Hypertension management consists of pharmacologic interventions and lifestyle modification also known as non-pharmacologic management. Pharmacologic management entails the use of drugs from different classes to lower blood pressure (NHFA 2016). Unhealthy lifestyle choices characterised by unhealthy diets, heavy alcohol consumption, excess weight and physical inactivity are the main risk factors for hypertension. Modification of these factors is associated with reductions in blood pressure (WHO 2013). Lifestyle modification is thus an indispensable component in the management of hypertension; it lowers the blood pressure, improves drug potency and may even reduce or even abolish the need for antihypertensive drugs (NBPEP 2003). The WHO recommended lifestyle modifications for hypertensive patients encompass weight reduction in those with a body mass index (BMI) greater than or equal to 25kg/m<sup>2</sup>, physical activity for at least 30 minutes on most days of the week moderate alcohol intake, cessation of smoking and adoption of Dietary Approaches to Stop Hypertension (DASH) eating plan (WHO 2005). The DASH eating plan is low in sodium, dairy fat, red meats and rich in fruit, vegetables, potassium, calcium, fish, and poultry (NBPEP 2003). The protective effects of lifestyle modification span across all NCDs and delay the need for pharmacotherapy which is associated with adverse effects and is more costly (WHO 2016). In Zimbabwe, healthcare service providers recommend lifestyle modification for all patients with hypertension, regardless of drug therapy. Patients diagnosed with hypertension are encouraged to adopt the DASH eating

plan, reduce weight if overweight or obese, engage in regular physical activity, consume alcohol in moderation and quit smoking as per the WHO lifestyle modification recommendations .

## **1.2 Global Picture of Hypertension**

Hypertension is one of the leading public health problems globally due to its significant contribution to cardiovascular mortality and morbidity (WHO 2014). It is the single leading risk factor for death and disability globally (IFPMA 2016), contributing more than half to the total cardiovascular mortality (WHO 2013). Its complications are estimated to be responsible for 9.4 million deaths globally every year (WHO 2014) and for 3.7% disability-adjusted life years (WHO 2011). More than 1 billion people in the world are living with hypertension, with an estimated prevalence of 40% in those above 25 years of age in 2008 (WHO 2014). The number of hypertension cases in the world increased from 600 million in 1980 to 1 billion in 2008, an increase approximate to 15% of the world's population. Hypertension prevalence remains on the rise; it is estimated that by 2025, 1.5 billion people globally will be living with hypertension (IFPM2016).

## **1.3 Hypertension in Sub-Saharan Africa**

Hypertension is the single leading risk factor for cardiovascular disease in Sub-Saharan Africa (SSA) (Hendriks et al. 2012). In 2010, it resulted in 500 000 deaths and 10 million disability-adjusted years. In SSA, hypertension accounts for almost half of the ischaemic heart disease cases, a third of the heart failure cases, and a five-fold risk increase for stroke. The consequent economic implications are enormous, with 7.3% of the healthcare spending in SSA being expended on hypertension and its complications (Echouffo-Tcheugui et al. 2015).

In the previous years, SSA was burdened by communicable diseases while non-communicable diseases were more prevalent in high-income countries. SSA has been experiencing an epidemiologic shift, from a predominance of mainly communicable diseases to a comparable rise in the prevalence of non-communicable diseases including hypertension. Hypertension prevalence over the past three decades has been on a drastic increase in SSA. The prevalence of hypertension rose by 67% between 1990 and 2010 (Echouffo-Tcheugui et al. 2015). In the year 2000, 80 million people in SSA were living with hypertension. It is projected that by 2025, this figure would have risen to 150 million in SSA alone (van de Vijver et al. 2013). A meta-analysis done by Ataklte et al. (2014) based on studies done between 2000 and 2013 in SSA found the

range of hypertension prevalence in these countries to be between 15 – 70 % and the pooled prevalence to be 30%. The noted increase in hypertension prevalence in SSA has been attributed to urbanisation, which has fostered a change in behavioural and environmental determinants of health. Urbanisation has contributed to the adoption of unhealthy dietary practices, smoking, physical inactivity and increased alcohol consumption (van de Vijver et al. 2013). The higher prevalence of hypertension in urban versus rural communities is attributed to the differences in behavioural and environmental determinants that exist between these communities and further demonstrates the significance of these determinants on hypertension management (Addo et al. 2007). Despite the scarcity of information on hypertension prevalence and trends in Zimbabwe, a meta-analysis done over a 14 year period from 1997 to 2010 by Mutowo et al. in 2015 showed a rising hypertension prevalence and a crude pooled prevalence of 30%.

#### **1.4 Problem Statement**

Uncontrolled hypertension is estimated to be responsible for 45% and 51% of the global heart disease and stroke mortality respectively (WHO 2013). Unhealthy lifestyle choices associated with globalisation in low to middle-income countries has fuelled an increase in hypertension prevalence (WHO 2013). Complications of hypertension such as stroke, renal and heart disease are also on the rise (WHO 2005). If not addressed, the hypertension prevalence is projected to subsequently lead to an increase in CVD mortality (WHO 2013). The cost of managing complications of hypertension that result from uncontrolled blood pressures is high, implying a massive economic burden on the country, family, and individual (IFPM 2016). Despite the wealth of evidence over the years linking hypertension with lifestyle choices and demonstrating the positive effects of adoption of a healthful lifestyle on blood pressure, adherence to the recommended physical activity and dietary recommendations remains poor in Zimbabwe. Informal interactions with both the providers and patients at Parirenyatwa hospital showed that lifestyle modification amongst hypertensive patients remains poor. Despite the increase in hypertension prevalence in Zimbabwe, very little data exists on the extent and factors related to adherence to the WHO recommended physical activity and dietary modifications, hence the need to investigate these.

## **1.5 Study Rationale**

It was aimed that the study will help identify barriers hindering adherence to dietary and physical activity recommendations in stable hypertensive patients. The findings will provide a platform for strategic expansion and decision making for hypertensive patients as well as medical practitioners and consultants in the field of health.

## **1.6 Setting of the Study**

The study was conducted at Parirenyatwa hospital, which is the biggest tertiary hospital in Zimbabwe with a bed capacity of 1800. The hospital services mainly an urban population, which is the population that is mainly affected by hypertension as well as a subset of patients, referred from several district hospitals. The hospital offers tertiary curative, preventive and rehabilitative health services to both inpatients and outpatients (Parirenyatwa Group of Hospitals 2018). Health service providers at the tertiary hospital report that hypertensive patients with uncomplicated hypertension are followed up at the outpatient department five days a week, and on average 20 hypertensive patients attend the clinic. Each patient is reviewed at the clinic monthly, or more frequently, depending on individual blood pressure control with a higher frequency for poorly controlled blood pressure. Services rendered to these patients include individual consultation from a medical practitioner, who at the first consultation provides counselling on the recommended lifestyle modifications for hypertensive patients as per the WHO guidelines. On subsequent visits, the medical practitioner, monitors the blood pressure and adherence to pharmacologic therapy and lifestyle modification recommendations and reinforces using health education messages as appropriate.

## **1.7 Thesis Outline**

Chapter 2 of the thesis will present and discuss literature published on the study topic

Chapter 3 will define the methods used to collect and analyse the data on adherence to lifestyle modification recommendations amongst hypertensive patients at Parirenyatwa hospital

Chapter 4 will present the results of the study

Chapter 5 will discuss the findings of the study

Chapter 6 will provide a summary of the findings and provide recommendations

## Chapter 2

### LITERATURE REVIEW

#### 2.1 Introduction

Blood pressure (BP) refers to the force that is exerted on the walls of blood vessels by the blood flowing. This pressure is essential for blood to circulate throughout the body and results from the interplay between myocardial contractility and peripheral vascular resistance. It is described as two figures; the numerator is the systolic BP which represents the highest pressure reached in the vessels when the heart contracts. The denominator is the diastolic BP and represents the minimum pressure reached when the heart is at rest (Siyad 2011). Blood pressure is a continuous variable as such no strict numerical values exist demarcating normal versus elevated blood pressure. Thus, generally, hypertension is said to exist when the blood pressure has reached levels where its attributable risk to cardiovascular mortality has doubled (WHO 2005). The Guideline for the Prevention, Detection, Evaluation and Management of High blood pressure in adults, by Whelton et al. (2017) describe hypertension as a minimum systolic or diastolic blood pressure of 130mmHg and 80mmHg respectively.

Two-thirds of the global hypertensive population are from developing countries (IFPMA 2016). The worldwide prevalence of hypertension is estimated to have increased by 5.2% from 2000 to 2010. However striking differences exist in LMICs versus high-income countries, the former seeing a 7.7% increase in prevalence during this period, while the latter had a 2.6% decrease. The hypertensive population in LMICs countries is almost thrice that in high-income countries (Bloch 2016). Low and middle-income countries consistently show higher hypertension prevalence rates of about 40% for both males and females while high-income countries have lower rates of approximately 36% (WHO 2011). Recent statistics show that 1 in every five individuals is hypertensive in LMICs with a projection that by 2015, three out of every four individuals will be hypertensive (van de Vijver et al. 2013). The prevalence of hypertension is highest in the African region, estimated to be 46% (WHO 2014). America is least affected, with a hypertension prevalence of 35% (WHO 2014). Currently, in Sub-Saharan Africa (SSA), hypertension is the leading risk factor for the development of cardiovascular disease (Hendriks et al. 2012).

The rising hypertension prevalence in low-income countries and particular SSA is attributed to urbanisation, which has fostered unhealthy dietary practices, excess weight, increased alcohol consumption and reduced physical activity levels. This shift in lifestyle choices has resulted in increasing hypertension prevalence (van de Vijver et al. 2013). Lifestyle modification is an indispensable component of hypertension management. It is thus critical to understand the various factors that influence the adoption of healthy lifestyle recommendations amongst hypertensive patients and to use this information to guide programs targeted at hypertension control (Ghezelbash and Ghorbani 2012).

## **2.2 Aetiological classification of Hypertension**

Hypertension is classified into two groups depending on the cause, namely primary and secondary hypertension. Primary also known as idiopathic or essential hypertension, accounts for 90-95% of the total global hypertension cases (Nandhini 2014). It tends to be familial and is believed to result from the interaction between certain genetic factors and environmental risk factors culminating in the failure of blood pressure regulatory systems (Nandhini 2014). Several genetic expressions and mutations have so far been identified in research to have an association with hypertension. However, further investigation is still needed to elucidate these expressions (Whelton 2017). Essential hypertension is not only four times more common in the black population versus the white population but is associated with worse prognosis and faster progression if unmanaged (Nandhini 2014).

Secondary hypertension is much less common, accounting for 5-10% of all hypertension cases. It is characterised by an underlying identifiable and thus potentially reversible disorder resulting in elevated blood pressures (Viera and Neutz 2010). The causes are varied and range from drugs to co-morbid conditions, the most familiar being renal disorders (Siyad 2011). Uncomplicated primary or secondary hypertension is usually asymptomatic. Thus the disease can go undiagnosed for years. The onset of symptoms usually coincides with the development of hypertension complications. In the few instances where symptoms do occur, they depend on several factors such as the age, blood pressure levels, co-morbidities and general wellbeing of the affected person (Siyad 2011).

## **2.3 Hypertension Risk factors**

Risk factors for hypertension fall into two broad categories; permanent or non-modifiable and modifiable. Non-modifiable risk factors include increasing age, male gender and genetic predisposition as evidenced by a positive family history of hypertension (Whelton 2017). Modifiable risk factors include excess weight or obesity, unhealthy diets and physical inactivity, tobacco use and excess alcohol consumption. The following section will explore these behavioural factors in the context of hypertension.

### **2.3.1 Modifiable Risk Factors**

Several environmental risk factors exist; these determinants if altered can result in a reduction in the risk of developing hypertension. These factors include unhealthy dietary habits, excess alcohol consumption, physical inactivity and increased body mass index (Whelton 2017).

#### **Excess weight**

The prevalence of excess weight has been showing an upward trend globally (Harsha and George 2008). Overweight is defined as a body mass index (BMI) of 25.0 to 29.9 kg/m<sup>2</sup>, while obesity is a BMI of 30 kg/m<sup>2</sup> or higher. Excess body weight is an established risk factor for hypertension (Harsha and George 2008). Nahdhini (2014) reported that excess weight accounts for up to two-thirds of all hypertension cases, with 85% of hypertension cases occurring in people with BMIs above 25 kg/m<sup>2</sup>. Moreover, obesity can increase the risk of hypertension to five-fold. The incidence of hypertension increases threefold at a BMI of 26 kg/m<sup>2</sup> as compared to a BMI of 21 kg/m<sup>2</sup> (Black and Hawks 2005).

Several studies over the years have confirmed the linear correlation between excess weight and blood pressure (Harsha and George 2008). The Framingham Heart study after a 26-year follow-up of 5209 men and women indicated that obesity is a significant risk factor for cardiovascular disease (Hubert et al. 1983). The multivariate relative risk for hypertension in normal weight adult men and women during the study's follow-up period were 1.48 and 1.70 respectively while for overweight men and women the risk was significantly higher at 2.23 and 2.63 respectively

(Landsberg et al. 2012). The study also demonstrated that hypertension is about twice as prevalent in the obese versus the non-obese in both sexes (Harsha and George 2008).

The Community Hypertension Evaluation Clinic screened over a million people in America and found the prevalence rates of hypertension in the overweight to be 50% to 300% higher compared to any other screenings. The frequency of hypertension in overweight persons aged 20 to 39 years was double that of normal weight and triple that of underweight persons. Among those aged 40 to 64 years, the overweight group had a 50% higher hypertension prevalence rate than the normalweight group and 100% higher than the underweight group. With each higher degree of blood pressure elevation, the relative frequency of hypertension, with excess weight, was higher (Aronow 2017).

### **Physical Activity**

Regular physical activity drives autonomic and hemodynamic changes whose effect on the cardiovascular system culminates in a reduction in peripheral resistance to blood flow and ultimately a fall in blood pressure (Monteiro and Filho 2004). Several studies have demonstrated the inverse relationship that exists between physical activity and blood pressure levels as well as hypertension (Whelton et al. 2017). In an article review by Kokkinos et al. (2009), the relative risk of developing hypertension was found to be 35% to 75% in adult men and women who live a sedentary lifestyle versus those who engage in the regular physical activity. The Coronary Artery Risk Development in Young Adults (CARDIA) study, is a longitudinal study which assessed the development of cardiovascular risk factors in 5115 adults residing in various American cities over a 20 year period from 1985-1986 (Carnethon et al. 2010). Physical fitness was found to have a significant inverse association with hypertension, even after adjustments for covariates. Also, high physical fitness levels offered 34% protection against the development of hypertension in the studied group with variations between sexes and race (Carnethon et al. 2010). The Aerobics Center Longitudinal Study followed 16 601 men over a period of 32 years to investigate the incidence of hypertension about physical activity. Hypertension incidence was highest in men with a sedentary lifestyle versus those who engaged in regular physical activity even after adjusting for age, body mass index, smoking, alcohol consumption, resting systolic blood pressure, baseline health status and family history of the disease (Chase et al. 2009).

## **Dietary intake**

Unhealthy diets rich in saturated fat, cholesterol and salt while low in fruit, vegetables and fish are associated with increased cardiovascular disease risk. In addition, high-calorie diets compounded by sedentary lifestyles result in obesity, which is an established risk factor of hypertension (WHO 2011). Regular intake of fruits and vegetables is associated with reductions in blood pressure and cardiovascular disease risk (John et al. 2002).

**High saturated fat intake:** Foods high in animal fats and full cream dairy products contain large amounts of saturated fats which increase cholesterol levels in the blood stream. The cholesterol in turn deposits on the walls of arteries, narrowing them and increasing the force needed for blood flow (NHFA 2013). High consumption of saturated fatty acids is associated with higher odds for the development of hypertension and other cardiovascular diseases (Wang et al 2010). Consumption of unsaturated fats found in foods such as fish, soya bean and sunflower oil is associated with reductions in blood pressure and overall lower cardiovascular disease risk (Sabour et al. 2016)

**Sodium intake:** The magnitude of salt consumption is an essential determinant of hypertension (WHO 2011). Salt is involved in the regulation and balance of fluids and electrolytes in the body, and the kidneys are responsible for sodium excretion (He and MacGregor 2012). Consumption of salt above the recommended 5g per day exceeds the capacity of the kidneys to excrete the sodium contained in salt. Sodium retention, in turn, affects fluid balance and increases the blood pressure (He and MacGregor 2012). In addition, salt is an independent risk factor for other non-communicable diseases such as stroke and renal disease (He and MacGregor 2009). Some populations are more sensitive to salt than others (Charlton and Jooste 2001). The Black population, older adult- population, and individuals with co-morbidities such as diabetes mellitus are particularly salt-sensitive, with increases in salt consumption resulting in higher elevations in blood pressure compared to other populations (Whelton et al. 2017). Methods to identify an individual's salt sensitivity remain unclear and research on the subject continues (Charlton and Jooste 2001). The health benefits associated with the reduction of salt consumption support programs targeted at salt restriction for the entire general population (Charlton and Jooste 2001). Modest reductions in salt consumption do not result in adverse

effects of public health significance (Campbell et al. 2012). Limiting salt intake to 5-6g per day results in a decrease in cardiovascular morbidity and mortality (Ha 2014). To achieve this patients are advised to substitute salt with other seasoning options such as herbs which contain less sodium and more potassium, to avoid processed foods and to limit the amount of salt they add to food. Dietary modification in line with the Dietary Approaches to Stop Hypertension (DASH) eating plan is associated with even greater blood pressure reductions versus salt restriction on its own. The DASH eating plan advises a diet rich in fruit and vegetables, lean meat, moderation of alcohol intake, low-fat diet, in addition to the low salt diet (WHO 2005). A diet solely rich in fruits and vegetables results in reductions in blood pressure (Charlton and Jooste 2001). Fruits, vegetables and nuts are solely responsible for about half of the blood pressure lowering effects of the DASH eating plan (WHO 2005). For a 2000 calorie diet, the DASH eating plan advises 4-5 servings of fruits, a maximum of 6 servings of lean meat, poultry and fish as well as 4-5 servings of vegetables daily (National Institutes of Health: NIH 2006).

**Alcohol consumption:** Regular alcohol consumption regardless of the type of alcoholic beverage consumed is associated with a 16% risk of developing hypertension. Every 10g of alcohol consumed results in a 1mmHg increase in blood pressure. This increase is reversible with massive reductions in quantities of alcohol consumed or total abstinence (Puddey and Beilin 2006). Low to Moderate alcohol consumption defined as 10-20g of alcohol in men and 10g in women, has been shown in some studies to reduce blood pressure and decrease the incidence of coronary heart disease (Husain et al. 2014). However, Puddey and Beilin (2006) argue that these benefits should be dealt with consciously, bearing in mind the possible unmeasured confounders such as dietary choices and patterns of drinking as well as the adverse health consequences associated with alcohol consumption. They concur that health benefits occur at very low levels of alcohol consumption, approximately 1-2 drinks (10-20g) of alcohol in men and one drink (10g) in women. In another study by Sesso and colleagues (2008), the protective benefits of low-moderate alcohol consumption were found in women who consumed less than four drinks per day while in man the risk of hypertension increased with just one drink per day. The mechanism behind alcohol-induced hypertension remains unclear with research pointing to a multi-systemic effect that culminates in elevated blood pressure (Husain et al. 2014).

## **2.4 Complications of Hypertension**

Long-standing elevated blood pressure results in target organ damage effected by continual damage to blood vessels by the elevated pressure (Siyad 2011). Uncontrolled high blood pressure results in coronary heart disease, cerebrovascular disease, heart failure, renal impairment, peripheral vascular disease and visual impairment and even death (WHO 2011). Symptoms resulting from complications of hypertension are varied; some are resulting from hypertension itself while others are specific to organs affected (Siyad 2011). Various factors have been identified to be related to the development of hypertension complications. In a study by Zhang et al. (2011), the factors found to be associated with the development of hypertension complications in a rural Chinese population included being of female sex lack of knowledge on the effects of elevated blood pressure, low educational status, smoking and poorly controlled hypertension. Similarly, a study done by Noblat et al. (2004) found the prevalence of some hypertension complications to vary between sexes; however, the differences were dependant on the complication being studied. Left ventricular hypertrophy and renal failure were predominant in males while stroke was more prevalent in women for the White population.

## **2.5 Management of Hypertension**

The overall goal of hypertension management is to effectively lower blood pressures to avert cardiovascular complications (Whelton et al. 2017). Hypertension management consists of two main parts, pharmacological therapy and lifestyle modifications (NHFA 2016). Lifestyle modification can prevent and control hypertension as well as act as an adjunct to pharmacotherapy contributing to blood pressure control and in some instances abolishing the need for drug therapy (NHFA 2016). The higher the blood pressure, the higher the associated cardiovascular risk and the intensity of treatment that must be provided to avert cardiovascular complications (Whelton et al. 2017).

### **2.5.1 Pharmacologic Management**

Since blood pressure is a result of the interplay between myocardial contractility and peripheral vascular resistance; drugs targeted at one or both factors can lower blood pressure (Siyad 2011). Anti-hypertensive drugs fall into three broad groups depending on their mechanism of action.

**Diuretics:** Diuretics are used widely in the management of hypertension, is the second most commonly prescribed antihypertensive drug class (Roush and Sica 2016). They are also the recommended first-line pharmacologic therapy on most hypertension management guidelines (WHO 2005). Following short-term use, drugs in this group cause a reduction in the total circulating blood volume and hence a fall in the cardiac output. With long-term use, they also result in a decrease in peripheral vascular resistance (WHO 2005). The use of diuretics averts the development of hypertension complications and related mortality (Roush and Sica 2016). This ability remains unmatched by other drug classes (NBPEP 2003). Diuretics are particularly effective in the management of hypertension in salt-sensitive populations. However, their use is recommended even in populations that are not salt sensitive as their combined benefits of effectiveness, affordability and accessibility still surpass those of other drug classes (Roush and Sica 2016).

**Adrenergic Inhibiting drugs:** Adrenergic antagonists block sympathetic nervous system receptors which otherwise if stimulated result in elevated blood pressure (WHO 2005). Their ability to reduce blood pressure is comparable to that of other antihypertensive drug classes (Sica 2005). Most hypertension guidelines recommend them for use in combination therapy specifically as an addition to the management of resistant hypertension (Sica 2005). They are also particularly useful in the management of hypertension in individuals where their other effects such as lipid profile improvement and control of benign prostatic hyperplasia symptoms is desirable (WHO 2005).

**Direct vasodilators:** These drugs act directly on smooth muscles, resulting in their relaxation and thus a decrease in the blood pressure (WHO 2005). These are amongst the first of anti-hypertensive drugs to be discovered and used in the management of hypertension. Despite being as effective as other antihypertensive drug classes and their side effects limited their use as first-line hypertensive pharmacotherapy to mainly being reserved for use in combination with other drugs in refractory hypertension and pregnancy (McComb 2016). Direct vasodilator use may cause headaches, weight gain, limb swelling and incontinence (Jackson and Bellamy 2015).

Antihypertensive drugs can be used alone, or as combinations of these drugs from different classes, in the instance when monotherapy fails to achieve desired reductions in blood pressure

(WHO 2005). A combination of antihypertensive drugs from different classes often result in desired outcomes in blood pressure control versus monotherapy, particularly in those whose initiating blood pressure levels are above 20/10mmHg of the normal factor (NBPEP 2003).

### **2.5.2 Non-pharmacologic management**

Adoption of healthy lifestyles is an important component in the prevention and management of hypertension. Lifestyle modification alone can be adequate to normalise BP in individuals in their pre-hypertensive stage while for those with higher BP, it acts as an adjunct to pharmacotherapy, increasing the effectiveness of drugs and reducing the required dosage (WHO 2005).

Recommended lifestyle modifications that have been shown to contribute to BP control include; weight reduction in those with excess weight, adoption of the DASH eating plan, alcohol restriction, and regular exercise. A combination of several healthful options is more useful in reducing cardiovascular risk than a significant reduction in one risk factor (NBPEP 2003).

**Weight reduction:** Individuals with hypertension who have BMIs of 25 and above are encouraged to lose weight by balancing their diet, reducing salt intake, and engaging in regular exercise (Black and Hawks 2005; Kaplan 2002). For every one kilogram of weight loss, the BP is lowered by approximately 1.6 or 1.1mmHg (WHO 2005). The inverse relationship between blood pressure and weight has been demonstrated by multiple studies (Bacon et al. 2004). In a study by Blumenthal et al. (2000), an average of 7.8kg body weight loss in participants with mild hypertension was found to be associated with reductions of approximately 7.4mmHg and 5.6mmHg for the systolic and diastolic blood pressure respectively. Similarly, Winnick et al. (2006) found that modest reductions in body weight of less than 13% of the initial were associated with non-linear reductions in blood pressure ( $P=0.007$ ). Participants who lost at most 13% of initial body weight recorded lower systolic (6.2mmHg,  $P=0.06$ ) and diastolic blood pressures (3.6mmHg;  $P=0.37$ ) at the end of the study versus those that did not lose weight.

**Dietary management:** The Dietary Approaches to Stop Hypertension (DASH) guidelines demonstrated that modification in diet could aid in controlling BP (WHO 2005) The DASH

eating plan emphasises a diet rich in fruit and vegetables and low in saturated and total fat (Chen et al. 2006). The plan promotes the consumption of natural foods such as fruits and vegetables, which naturally contain less sodium and more potassium, magnesium and calcium (NIH 2006). Following the DASH eating plan in the presence or absence of other therapies effectively lowers blood pressure (Tyson et al. 2012) by approximately 11mmHg in hypertensive patients and 3mmHg in normotensive patients (Whelton 2017).

**Sodium restriction:** About 40% of people with hypertension are sodium sensitive (Black and Hawks 2005). A moderate restriction in sodium intake can on its own, effectively control or reduce the medication dosage required to achieve blood pressure control, particularly in the salt-sensitive population such as the Blacks and older adult population (Whelton 2017). The therapeutic effects of sodium reduction on blood pressure occur with reductions of salt intake to less than 6 grams of sodium chloride per day or lower (Black and Hawks 2005).

**Alcohol restriction:** Alcohol consumption should be limited to 2 drinks per day for men and one drink per day for women and lightweight persons (NBPEP 2003). Intake beyond these limits is associated with higher hypertension incidence and poor adherence to antihypertensive therapy (Black and Hawks, 2005). A dose-dependent inverse relationship exists between blood pressure and alcohol consumption (Santana et al. 2017). Reduction in alcohol intake in those who consume more than two alcoholic drinks per day results in reductions in the systolic (mean difference -5.50mmHg, 95% CI -6.70 to -4.30) and diastolic blood pressure (-3.97, 95% CI -4.70 to -3.23), this effect is particularly enhanced with intake of less than half the amount in those who would ordinarily consume more than six drinks per day (Roerecke 2017). MacFadden et al. (2005) noted that the effect of alcohol on blood pressure depends on the time since exposure, with blood pressure being reduced in the hours following exposure and significantly increased by 2.7mmHg and 1.4mmHg after a day post-consumption.

**Smoking cessation:** Although smoking is not linked directly to blood pressure control, smoking cessation in hypertensive patients could provide a reduction on mortality risks similar to a permanent reduction of 40mmHg in blood pressure, over and above any antihypertensive medications (Wen et al. 2008). Smoking cessation has also been found to gradually reduce

arterial stiffness and thus 1 blood pressure (Takami and Saito, 2011). Smoking cessation is thus strongly recommended to reduce the risk for cardiovascular disease (Black and Hawks 2005).

**Exercise:** Physical activity is related to health benefits in a linear dose-dependent manner, suggesting that every bit of exercise counts towards better health; with greater benefits seen at higher energy expenditures (Warburton et al. 2010). The mechanisms through which exercise lowers BP remain unclear possibly due to the multifactorial causes whose interaction to culminate in elevated BP is also unclear (Diaz 2013). The effect of exercise on blood pressure differs between individuals; as such exercise prescriptions should be individualised, stating the required frequency, intensity and duration (Wallace 2003; Ghadieh and Saab 2015). Exercise that results in an increase in the heart rate such as walking and jogging is more effective at lowering BP than resistance training targeting muscular strength and endurance (Wallace 2003). In general, hypertensive patients are encouraged to engage in at least 30 minutes of moderate intensity exercise, mainly aerobic with components of resistance training on three to five days a week (Ghadieh and Saab 2015) or on most days of the week as part of BP control (NBPEP 2003).

## **2.6 Adherence to recommended lifestyle modification recommendations**

The World Health Organization (WHO) Adherence Project in 2001 defined adherence as “the extent to which a person’s behaviour, taking medication, following a diet, and/ or executing lifestyle changes corresponds with agreed recommendations from a health care provider” (WHO 2003: 17). Despite the abundance of evidence highlighting the profound role of modification of lifestyle choices such as dietary preferences and physical activity levels on hypertension control and overall reductions in cardiovascular risk (Hamer 2010), adherence to these recommendations remains suboptimal in Zimbabwe (Katena et al. 2015). Poor adherence to recommended lifestyle modifications in Zimbabwe and SSA is at the centre of the rising hypertension prevalence (Guwatudde et al. 2015).

Studies on the prevalence of non-adherence to lifestyle modification recommendations globally and more specifically in Africa have demonstrated sub-optimal adherence levels. Illoh and colleagues in their 2014 study found adherence to recommended lifestyle modification

recommendations to be as low as 16.4%. Physical activity was the least adhered to, while compliance was 100% for smoking cessation. Elbur in 2015 found even lower adherence levels; only 4.2% of participants were found to adhere to all study domains (diet, exercise and medications), exercise and dietary adherence was found to be only 20.1% and 11.8% respectively. Uzun et al. (2009) similarly identified sub-optimal adherence levels, with only a third of the participants found to be exercising and 35% non-compliant with dietary recommendations. The trend has remained the same in Zimbabwe, where a study done by Katena et al. (2015) on a rural population in Zimbabwe, found adherence to be generally sub-optimal and varying across the studied factors. Poor adherence was found to be highest for the consumption of fruit at 89.6% and lowest for alcohol consumption at 8.6%.

Several factors affect adherence to recommended lifestyle modifications, and these can be grouped into four categories including; patient, provider, therapy or environmental-related factors, based on their dependency Scisney-Matlock et al. (2015). The factors related to the environment are mainly driven by socioeconomic status and service access while the therapy-related factors are hinged on access to the prescribed treatment and tolerability to the associated adverse events. On the other hand, the patient-related factors are diverse and include age, health beliefs, health literacy, socioeconomic status and social support. Adherence may also be a result of a health provider not providing adequate information on recommendations because they either lack information, are slow in adopting changes in management or have a different opinion from what is being recommended in the guidelines as shown in Fig 1 below.

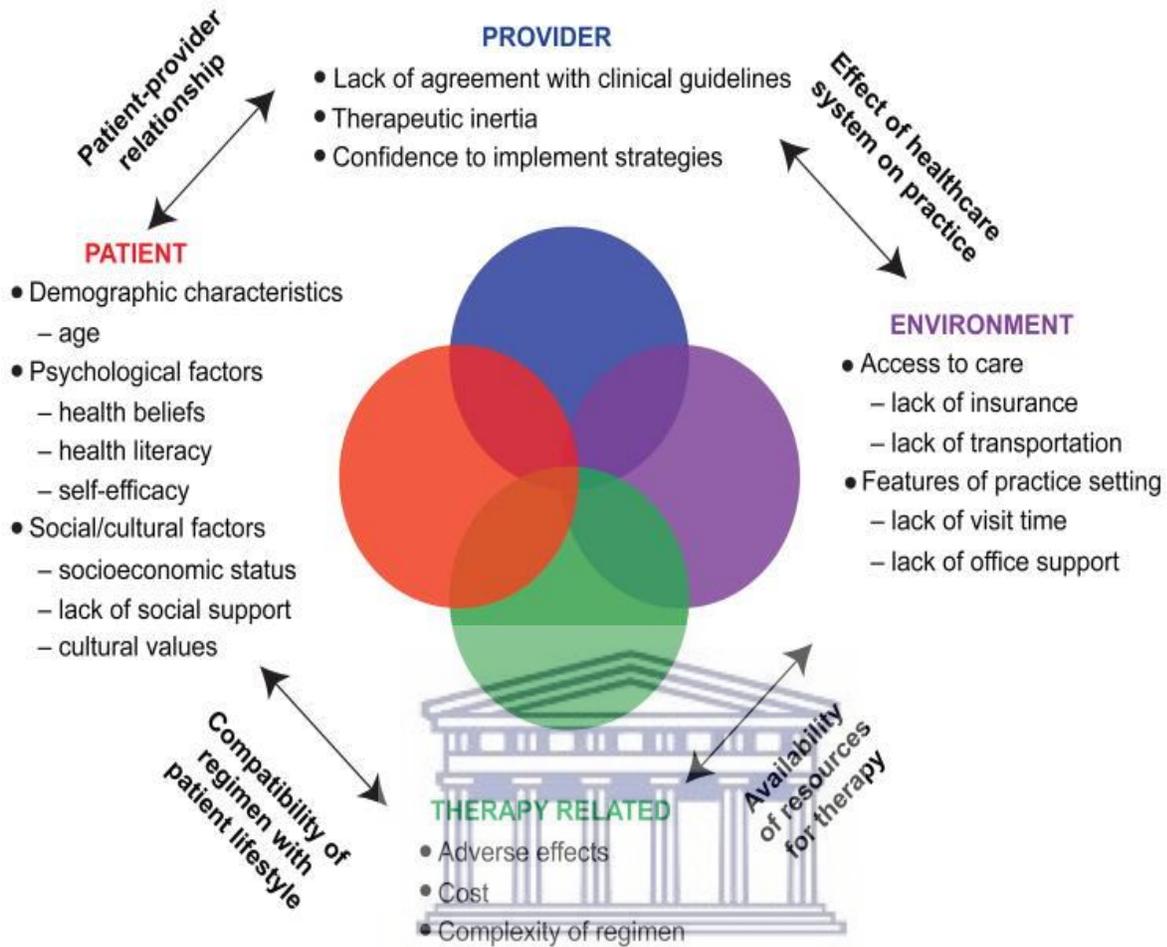


Figure 1: Barriers to Therapeutic Lifestyle changes

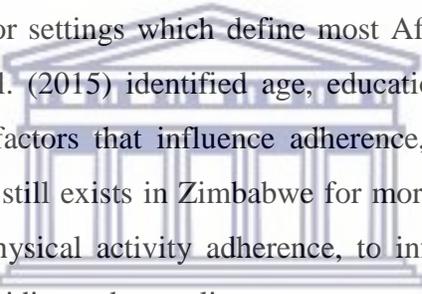
Adapted from: Scisney-Matlock et al. (2015: 147-159)

Studies done on adherence to recommended lifestyle modifications in hypertensive patients have demonstrated diversity in the determinants of compliance. The next section will describe some of these studies.

In a study done by Levesque et al. (2012), the factors related to patient adherence to lifestyle change recommendations were assessed from questionnaire responses provided by 296 recruited participants aged between 18-74, the majority (56%) being female from one town in Canada. A significant relationship between participant's age and adherence to medication was found. This relationship was found to be U shaped, with greater adherence noted in those below 30 and above 40 years of age and less for the middle-aged patients (30-40 years) in the study, although the association was more accentuated in those above 40. The researchers postulated the

association to be due to older patients feeling more vulnerable to illness and thus adhering to lifestyle recommendations more. However, no correlation was observed with other static demographic factors. Elbur (2015) similarly discovered a correlation between adherence and age, educational status, comorbidity as well as socioeconomic status. Uzun et al. (2009) noted more barriers to adherence with lower socioeconomic status and educational levels. In contrast, however, Elbur (2015) found poor health common with comorbidity to be associated with non-compliance to adherence recommendations.

A gap in knowledge on recommended lifestyle modification recommendations has in most studies been associated with suboptimal adherence levels (Illoh et al. 2014; Katena et al. 2015). Knowledge of hypertension risk factors however in another study by Okwounu et al. (2014) did not result in improved adherence levels. Other determinants of adherence include misconceptions and socio-cultural beliefs in poor settings which define most African communities (Illoh et al. 2014). A study by Katena et al. (2015) identified age, educational level, employment status, family support and gender as factors that influence adherence, with men adhering less to a reduction in salt intake. A need still exists in Zimbabwe for more studies to explore the factors related to dietary intake and physical activity adherence, to inform programs targeted at the reduction of cardiovascular morbidity and mortality.



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## Chapter 3

### METHODS

#### 3.1 Introduction

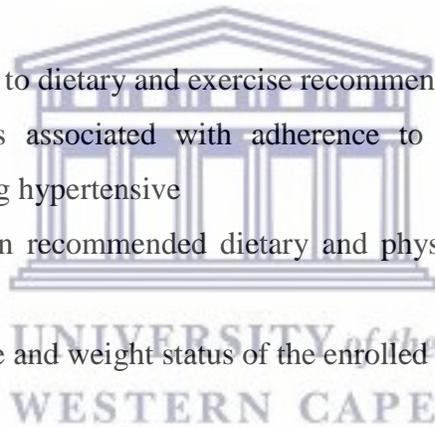
This chapter describes the methods used in this study that sought to determine the factors related to adherence to lifestyle modification recommendations in hypertensive patients at Parirenyatwa hospital.

#### 3.2 Aim

The study aimed to determine the factors related to adherence to dietary and physical activity recommendations in hypertensive patients at Parirenyatwa Hospital, Harare, Zimbabwe.

#### 3.3 Objectives

- To determine adherence to dietary and exercise recommendations among hypertensive
- To identify the factors associated with adherence to dietary and physical activity recommendations among hypertensive
- To assess knowledge on recommended dietary and physical activity recommendations among hypertensive
- To assess blood pressure and weight status of the enrolled participants.



#### 3.4 Study Design

An analytic cross-sectional study design was utilised. The study design enabled the researcher to determine adherence to lifestyle modification recommendations and to identify its determinants

#### 3.5 Study Setting

The study was conducted at Parirenyatwa hospital, which is the biggest tertiary hospital located in Zimbabwe's capital city Harare. The hospital services mainly an urban population, as well as a subset of patients, referred from several district hospitals across the country, with a bed capacity of 1800 (Parirenyatwa Group of Hospitals 2018). Patients with uncomplicated hypertension are provided with routine follow-up care at the hospital's outpatient medical clinics which run five days a week. Approximately 20 patients are attended to at each medical clinic. About 98% of

hypertensive patients managed at these clinics are on pharmacotherapy (Parirenyatwa Group of Hospitals 2018). Health service providers have implicated poor adherence to lifestyle modification recommendations as one of the reasons behind elevated blood pressures that necessitate early commencement and reduced potency of drug therapy.

### **3.6 Study Population and Sample**

The hypertensive outpatient clinics at Parirenyatwa hospital provide care to patients with confirmed hypertension, referred from other departments within the hospital such as admissions and emergency as well as those referred from district and provincial hospitals. On first consultation at the hypertensive medical clinic, these patients receive counseling from a medical practitioner on the recommended lifestyle modifications to adopt as part of hypertension management. Following the 1<sup>st</sup> counseling, education on lifestyle modification is re-inforced by the consulting medical practitioner combined with an assessment of progress made, challenges faced and brainstorming possible solutions with the patient. The counseling provided is in line with the WHO recommended lifestyle modifications for hypertensive patients which are; weight reduction, adoption of the DASH eating plan, physical activity and reduction of dietary sodium (WHO 2005). The sample for this study was drawn from this population regardless of duration in the hospital hypertensive program.



#### **3.6.1 Inclusion Criteria**

The following individuals were included in the study;

- Literate
- Aged 18 years and above
- Individuals of either sex, receiving follow-up medical care for uncomplicated hypertension at the Parirenyatwa hospital's outpatient medical clinics
- Individuals with hypertension for any period of time and had received counselling from a health service provider at Parirenyatwa Hospital on the WHO recommended lifestyle modifications to adopt
- Individuals who had consented to study participation

### 3.6.2 Exclusion Criteria

The following individuals were excluded from the study;

- Age less than 18
- Individuals unable to read or write
- Individuals diagnosed with one or more hypertension complications
- Individuals receiving care from hospital departments other than outpatient medical clinics
- Individuals who did not give consent to participate in the study.

### 3.7 Sample Size

The Dobson Formula (Charan and Biswas 2013) was used to calculate the minimum sample size as follows;

$$n = z^2 p (1-p) / d^2$$

As follows;

n – Minimum sample size

z – Z statistic, 1.96 in this case

d - 5% significance level used

p – Prevalence of hypertension in Zimbabwe, 30, 9% used (WHO, 2008)

The calculated minimum sample size was equal to 328 participants.

A total of 328 participants were recruited into this study.

#### 3.7.1 Sampling procedures

Convenience sampling was used to recruit participants into the study. Hypertensive individuals were approached while awaiting routine follow-up care at the outpatient medical clinics. They were provided with information pertaining to the study and consent to participate was sought from eligible individuals. Patient file numbers for the selected patients were recorded or cross-referencing to avoid multiple recruitments of the same individuals. Successive consenting participants replaced those who were eligible but refused to participate until the minimum sample size was reached.

### **3.8 Data Collection**

A self-administered questionnaire was used to collect data from participants. The questionnaire comprised of multiple choice closed-ended questions formulated from a combination of literature models on adherence and consultations with local physicians to contextualize the issues to Zimbabwe. The questionnaire was pilottested before use, and the necessary adjustments were made. Respondents completed the questionnaires in the hospital waiting room and it took them an average of 20 minutes to complete. A research assistant who is a practicing nurse, trained in the study distributed questionnaires to those who consented to participation and clarified any questions patients had while completing the questionnaire Prior to consultation by a medical practitioner, hospital nurses record patient blood pressure and weight in medical files, the height being measured only at 1<sup>st</sup> consultation. The research assistant recorded the weight and blood pressure for each participant for the day and the height at 1<sup>st</sup> consultation for each participant to enable BMI calculation. A digital scale was used to measure the weight while a wall mounted measuring board was used for height. Questionnaires were provided in English and in Shona, the local language.

Adherence to lifestyle modification recommendations was measured against the WHO recommendations for physical activity and diet modifications. A respondent was considered to be adherent if they reported exercise lasting a minimum of 30 minutes at a time for at least four times a week. Adherence to the Dietary Approaches to Stop Hypertension (DASH) eating plan which is low in salt, starch, total and dairy fat while rich in fruit and vegetables; at least four times a week was considered as adherence to the dietary recommendations. e. Data was collected over three months from December 2017 to March 2018.

#### **3.8.1 Measures: Questionnaire**

The self-administered questionnaire used was divided into three sections. Section A captured the demographics, namely; patient sex, age, marital status, educational level, employment status and length of time since diagnosis with hypertension. Section B had a single question that assessed knowledge on the WHO recommended lifestyle modification recommendations. Various options of correct and incorrect responses were provided. Section C had questions designed to assess adherence to WHO recommendations on physical activity and dietary plans. The study made use of the 5 point Likert Scale for those who reported adherence as per WHO recommendations,

whereby, the extent of practice of either dietary or exercise habits were ranked as very low, low, fair, high and very high. Various options for perceived barriers to either exercise or dietary habits were provided and patients could select what applied to them.

### 3.9 Data Analysis

The data were analysed using the Statistical Package for Social Scientists (SPSS), Version 20 program for Windows 8. Frequencies and proportions were generated for all the variables on the questionnaire. Binary binning in SPSS was used to group and categorise data for BP and BMI into classes. For blood pressure, binning was used to classify the participants' BP as normal, elevated, Stage 1 hypertension or Stage 2 hypertension, see Table 1. For weight, binning was used to classify the data into underweight, normal, overweight or obese. The study also made use of Spearman's test to test for the linear correlation amongst the variables. Table 2 shows the meanings derived from the Spearman's correlation tests.

Table 2: Interpretation of correlation coefficients

Coefficient Level	Interpretation
-1	Perfect negative linear relationship
-0.7	Strong negative linear relationship
-0.5	Moderate negative linear relationship
-0.3	Weak negative linear relationship
0	No linear relationship
+0.3	Weak positive linear relationship
+0.5	Moderate positive linear relationship
+0.7	Strong positive linear relationship

### 3.10 Reliability and Validity

The following measures were employed to ensure internal validity and reliability of the study;

- Selection bias was reduced by use of inclusion and exclusion criteria, avoiding multiple enrolments by using patient file numbers as identifiers as well as excluding participants with complicated hypertension as the co-morbidities had potential to influence the factors under study.
- Reduction of measurement bias through the use of a standardised questionnaire to ensure uniformity. The questionnaire was pre-tested before utilisation in the study to ensure questions were clear and interpreted correctly; ambiguous questions were removed or rephrased. Participants involved in the pilot were excluded from the survey. The questionnaire was also translated from English to Shona and back-translated by two independent translators to ensure uniformity in the meanings of the two questionnaires.

### **3.11 Ethical Considerations**

Ethical approval for this study was obtained from the University of Western Cape Biomedical Science Research Ethics Committee (See Annexe 8) and the Medical Research Council of Zimbabwe (See Annexe 9). Permission for Data Collection was sought and granted from Parirenyatwa Hospital (See Annexe 7). Participation in the study was voluntary. Eligible participants were provided with a Participant Information Sheet describing the research, its nature, purpose, and objectives before giving informed consent. The researcher ensured confidentiality throughout the study. Participant informed consent sheets, and completed questionnaires were stored separately under lock and key.

## Chapter 4

### RESULTS

#### 4.0 Introduction

In this chapter, the findings of the study are presented. Initially presented are the findings on the response rates obtained in the use of the research questionnaires and interviews. The results of the demographic characteristics are presented, followed by the general health statuses of the participants. Lastly, the results on the objectives of the study are presented before the chapter is concluded.

#### 4.1 Response Rate

As presented in Table 3, the response rate for this study was 100%. The response rates were therefore good enough to warrant the validity and reliability of the findings as Lyons and Doueck (2010) suggest that appreciable questionnaire response rates must be at least 80% while those for interviews should not be below 60%.

Table 3: Response rate



Instrument	Sent out(n)	Responded to (n)	Percentage Response
Questionnaire	328	328	100

#### 4.2 Participant Demographics

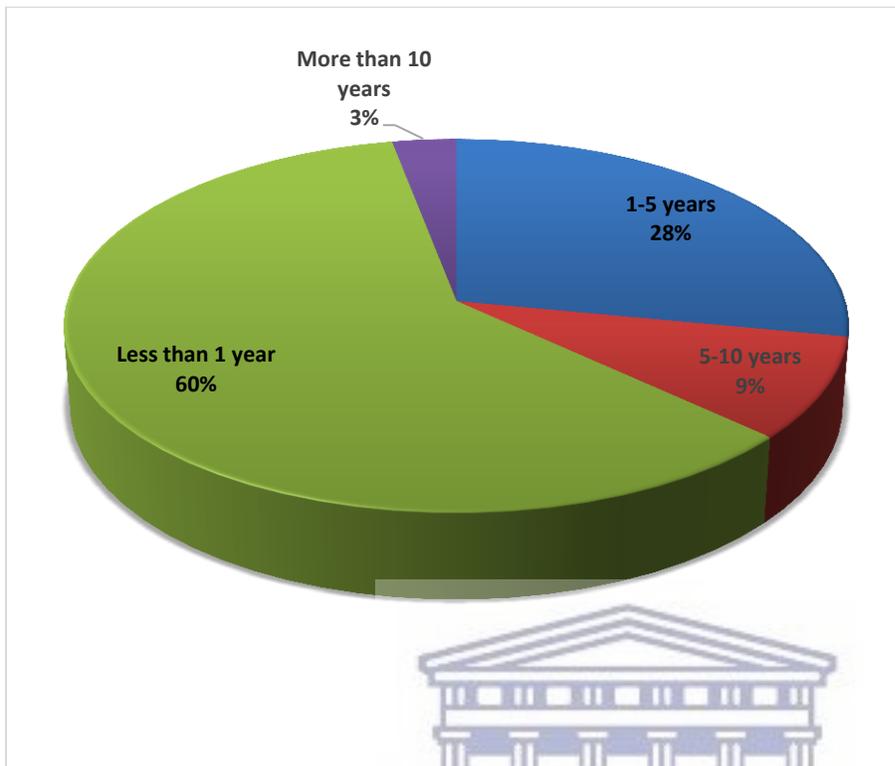
The study recruited slightly more males (54%) than females (46%), with the majority of participants falling between 36 and 45 years of age and married. Despite over half of the participants reporting they had a tertiary qualification, the majority were still unemployed.

Table 4: Socio-demographic characteristics of study participants (n=328)

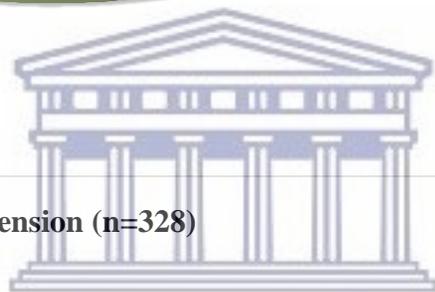
		<b>Frequency</b>	<b>Percentage</b>
Gender	Female	151	46.0
	Male	177	54.0
Age	26-35 years	58	17.7
	36-45 years	153	46.6
	46-55 years	38	11.6
	56-65 years	49	14.9
	66 and older years	30	9.1
Marital Status	Divorced	40	12.2
	Married	199	60.7
	Single	75	22.9
	Widowed	14	4.3
Education status	None	21	6.4
	Primary	35	10.7
	Secondary	88	26.8
	Tertiary	184	56.1
Employment status	Employed	88	26.8
	Pensioner	27	8.2
	Unemployed	213	64.9

#### 4.2.1 Duration with hypertension

The length for which the participants have had hypertension was also assessed. Figure 2 shows that majority (60%) of the participants had had hypertension for less than one year. While 28% of the participants reported that having had hypertension for between 1 to 5 years. Only 3% of the participants reported having had hypertension for more than 10 years.



**Figure 2: Length with Hypertension (n=328)**



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#### **4.3 Patient knowledge on recommended lifestyle modification**

Participant knowledge on the various elements that are part of lifestyle modification recommendations for hypertensive patients was investigated.

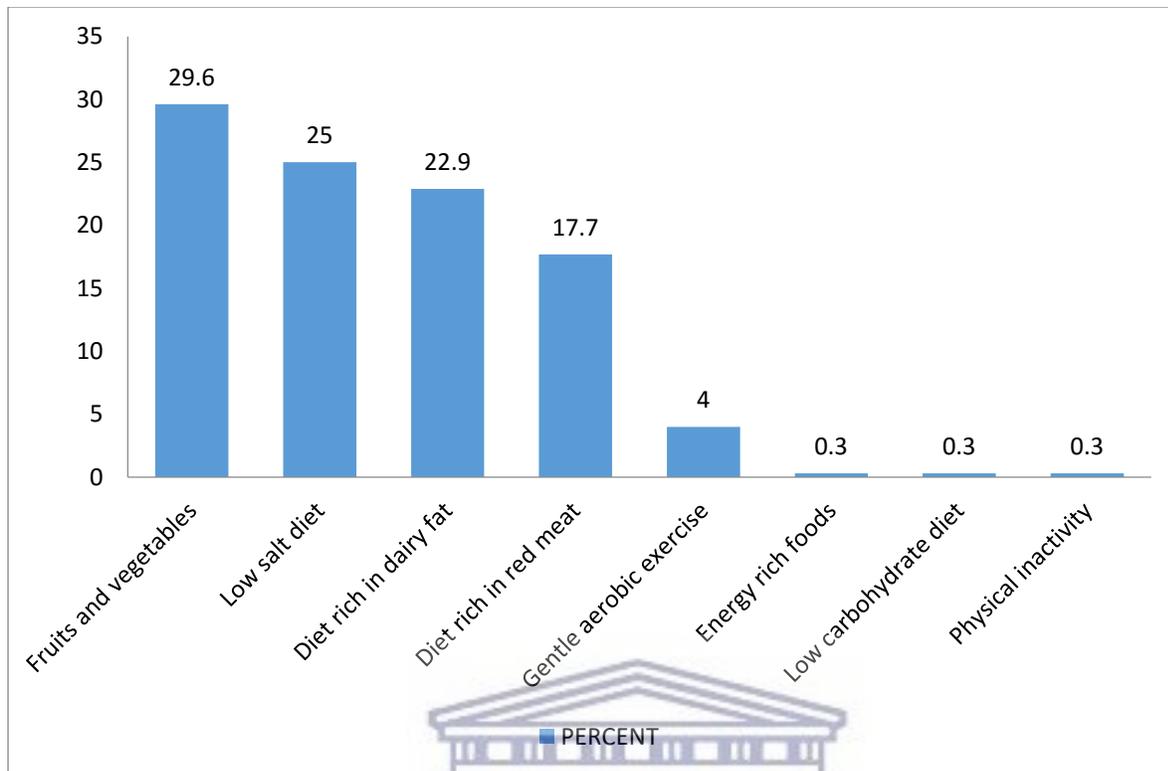


Figure 3: Ways of controlling blood pressure (n=328)

To assess knowledge on ways to control blood pressure, correct and incorrect responses were presented. Consumption of fruit and vegetables, low salt diet, gentle aerobics, and a low carbohydrate diet were the correct responses that were provided. Four incorrect response options were also provided, and these were a diet rich in dairy fat, consumption of red meat, a diet rich in energy-rich foods and physical inactivity. As presented in Figure 3, 29.6% of the participants correctly identified the intake of fruits and vegetables as a way of controlling blood pressure. A diet low in salt was the second most mentioned way of controlling blood pressure. On the other hand, consumption of a diet rich in dairy fat, red meat, energy-dense foods and physical inactivity were incorrectly perceived as contributing to hypertension control by 22.9%; 17.7%; 0.3% and 0.3% of the participants respectively. Misconceptions on ways of controlling blood pressure were quite high; an incorrect response was selected 42% of the times versus a correct response (58%).

#### 4.4 Patient adherence to lifestyle modification recommendations

In this section, the findings made on the patients' adherence to lifestyle modification recommendations are presented. The section includes findings made on patient adherence to exercise for 30 minutes a day for at least four days a week and adherence to dietary recommendations.

##### 4.4.1 Exercising for 30 minutes a day for at least four days a week

The findings on whether or not the participants in the study exercise for a minimum of 30 minutes per day and at least four days a week are as presented in Table 5

Table 5: Participant engagement in exercise for a minimum of 30 minutes per day at least four times weekly (n=328)

	Frequency	Percentage
Exercised as recommended	99	30.2
Did not exercise as recommended	229	69.8

As shown in Table 5, 30.2% of the participants in the study said they trained for at least 30 minutes a day and at least four days a week, while the majority of participants (69.8%) did not exercise as recommended.

#### 4.4.2.1 Exercise recommendations adhered to

Figure 4 shows the findings made on the type of exercise recommendations that the participants in the study engaged in.

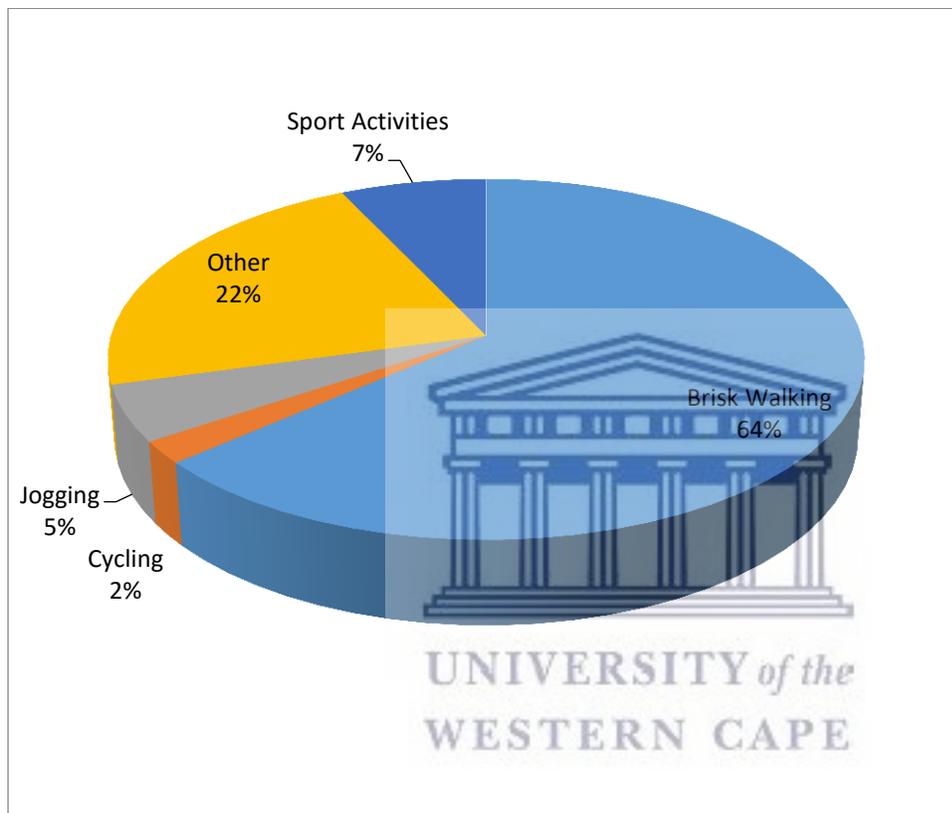


Figure 4: Types of exercise participants adhered to (n=99)

As shown in Figure 4, of the 99 participants who exercise as recommended, the most common type of exercise participants reported was brisk walking (64%), and the least common was cycling (2%).

#### 4.4.2.2 Reasons for non-adherence to exercise recommendations

The findings made on the reasons for the non-adherence of the participants to their exercise recommendations are presented in Table 6.

Table 6: Reasons for poor adherence to exercise recommendations (n=229)

<b>Exercise Type</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Illness</b>	111	48.5
<b>Weather</b>	43	18.8
<b>No exercise education</b>	30	13.1
<b>Lack of family support</b>	18	7.9
<b>Fatigue</b>	9	3.9
<b>Lack of time</b>	9	3.9
<b>Negative physical reactions</b>	6	2.6
<b>Fear of criticism</b>	2	0.9
<b>Laziness</b>	1	0.4
<b>Total</b>	229	100

As presented in Table 6, of the participants who reported that they were not exercising as recommended, almost half (48.5%) stated that they do not exercise due to illness. Other most cited reasons included weather (18.8%), no exercise education (13.1%) and lack of family support (7.9%).

#### 4.4.2.3 Impact of demographic factors on exercise adherence

Table 7 shows the findings of the correlation between demographic factors and adherence to exercise.

Table 7: Relationship between demographic factors and exercise adherence

	Exercise adherence	
	Pearson Correlation	Sig. (2-tailed)
<b>Gender</b>	0.039	0.646
<b>Age</b>	0.083	0.327
<b>Marital status</b>	-0.016	0.853
<b>Educational level</b>	-0.007	0.938
<b>Employment status</b>	-0.056	0.509

As presented in Table 7, the correlation coefficients obtained show that no significant relationship existed between exercise adherence and gender, age, marital status, educational level and employment status as they were very close to zero.

#### 4.4.3 Adherence to dietary recommendations

Table 8 shows, 74.1% of the participants said they do not adhere to dietary recommendations while only 25.9% stated that they do adhere to the recommendations.

Table 8: Adherence to dietary recommendations (n=328)

	<b>Frequency</b>	<b>Percentage</b>
No	243	74.1
Yes	85	25.9
Total	328	100.0



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#### 4.4.3.1 Dietary recommendations adhered to

Table 9: Dietary recommendations adhered to (n=85)

Dietary Recommendation	Frequency	Percentage
Low salt diet	42	49.4
Low sugar diet	18	21.2
Diet rich in fruit and vegetables	12	14.1
Diet low in total fat	9	10.6
Low starch diet	3	3.5
Consumption of lean meat	1	1.2
Total	85	100

Table 9 shows that of the 85 participants that adhered to dietary recommendations, a low salt diet (49.4%) was the most adhered recommendations followed by a low sugar diet (21.2%). The participants who stated that they adhere to a diet rich in fruits and vegetables were 10.6% while those who said that they prioritize a low starch diet and consumption of lean meat were 3.5% and 1.2% respectively.

#### 4.4.3.2 Frequency of adherence to healthy dietary habits

Table 10 shows responses on the question regarding the frequency of adherence to healthy dietary habits. The participants who reported having at least four times a week of healthy dietary habits were 8.2% while 11.8% stated that they have one once daily. Those who stated adhering to a healthy diet once monthly were 24.7% of the participants while the majority, 31.8% said they adhered to a healthy diet once a week. Participants who stated having other adherence rates were 23.5%.

Table 10: Frequency of adherence to dietary habits (n=85)

Variables	Frequency	Percentage
At least four times weekly	7	8.2
Once daily	10	11,8
Once monthly	21	24.7
Once weekly	27	31.8
Other	20	23.5
Total	85	100.0

#### 4.4.3.3 Reasons for non-adherence to dietary prescriptions

As presented in Figure 5, the major reason for non-adherence to the dietary recommendation was financial constraints (68.3%). Participants who stated that they do not adhere to their dietary prescriptions because of situations that do not permit at home were 10.7% while 5.5% and 3.7% cited poor self-control and self-permission respectively.

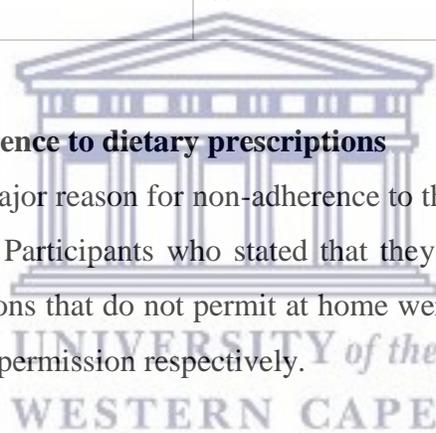




Figure 5: Barriers to dietary adherence (n=243)

#### 4.4.3.4 Effect of demographic factors on adherence to dietary recommendations

Table 11 presents the correlation findings on the effect of demographic factors on adherence to dietary recommendations.

Table 11: Relationship between demographic factors and adherence to dietary recommendations

	Exercise adherence	
	Pearson Correlation	Sig. (2-tailed)
<b>Gender</b>	0,039	0,646
<b>Age</b>	0,083	0,327
<b>Marital status</b>	-0,016	0,853
<b>Educational level</b>	-0,007	0,938
<b>Employment status</b>	-0,056	0,509
<b>Length with hypertension</b>	0,88	

As shown Table 11 The correlation coefficients obtained for gender, age, marital status, educational level and employment status showed no significant relationship between these demographic factors and adherence to recommended dietary plans.

#### 4.4 Proportion of hypertensive patients with optimal body mass indexes (BMI)

In this section, the findings on the proportion of hypertensive patients with optimal body mass indexes (BMIs) are presented. The findings on the general health statuses of the participants are presented in the first sub-section and the BMI findings are presented in the following sub-section.

##### 4.4.1 BMI of the participants at time of data collection

The Body mass index (BMI) of the participants was also assessed from the data on their height and weight. As shown in Table 12, 21.6% of the participants had normal BMIs whilst 46.6% of them were overweight. Those who were classified as obese were 29.3% of the participants whilst 2.4% were underweight.

Table 12: Body mass indexes of study participants (n=328)

BMI Range	Frequency	Percentage
Underweight (less than 18.5)	8	2.4
Normal (18.5 to 24.9)	71	21.6
Overweight (25 to 29.9)	153	46.6
Obese (30 and above)	96	29.3
Total	328	100.0

Adapted from WHO 2004

#### 4.4.2 BP of the participants at time of data collection

The findings on the blood pressure (BP) status of the participants are presented in Table 13.

Table 13: Blood Pressure at time of data collection (n=328)

Blood Pressure	Frequency	Percent
Normal	7	2.1
Elevated	272	80.9
Stage 1	43	13.1
Stage 2	6	3.9
Total	328	100.0

From the analysis of the participants' BPs contained in Table 13, 2.1% of them had normal blood pressure whilst 80.9% had elevated BPs. Participants with stage 1 hypertension were 13.1% of the total participant whilst those with stage 2 hypertension were 3.9% of the total.

#### 4.5 Strengths and Limitations

The study is amongst the first to investigate this essential yet under-researched topic in Zimbabwe. The results will inform future studies and inform practitioners about the problems in adherence as well as how well or poorly education on lifestyle modification is being applied. Furthermore, the study has the potential to influence policies programs targeted at improving adherence to lifestyle modification recommendations, with the goal of reducing cardiovascular disease morbidity and mortality.

However, the study was not without its limitations. The study sample was drawn from a population with uncomplicated hypertension; hence, the findings might not be generalizable to all patients with hypertension as those with complications were excluded. Parirenyatwa hospital mainly offers outpatient medical services to an urban population drawn from its catchment area, the outcomes of interest might be different for the rural population again limiting generalization

of the results to this population. In addition, socio-cultural influences which may have an effect on adherence to lifestyle recommendations were not assessed.

Finally, the cross-sectional study design utilized does not allow for the cause-effect relationship to be explored as variables are measured at the same point (Hemed 2015), hence the effect of weight, diet and physical activity levels on blood pressure in this study could not be ascertained.

#### **4.6 Chapter Summary**

In this chapter, the findings made in the study were presented. Initially presented in the chapter were the findings on the response rates followed by those on the participants' demographic profiles or characteristics. The chapter also contained presentations of the findings on the general health status of the participants as well as those on the main research objectives. In the next chapter, these findings are discussed.



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## Chapter 5

### DISCUSSION OF FINDINGS

#### 5.0 Introduction

The previous section focused on the presentation of the findings made in the study. In this chapter, the focus is on the analysis of the study's significant findings. This chapter, therefore, presents a discussion of the results made on patient knowledge on recommended lifestyle modification; patient adherence to lifestyle modification recommendations; adherence to exercise recommendations and adherence to dietary recommendations.

#### 5.1 General health statuses of study participants

At the time of data collection, the study established the following about participant BMIs; 21.6% of the participants had normal BMI; 46.6% were overweight; 29.3% were obese, and 2.4% were underweight. The results concur with those of other studies done in LMICs, in a study done by Alhalaiqa in 2017, over half the participants had excess weight. Excess weight is associated with poorly controlled blood pressure and thus the development of hypertension complications. (Zhang et al 2011; Yang et al 2017). Given that the majority of the participants in this study had a BMI above 25kg/m<sup>2</sup>, they remained vulnerable to the development of complications such as stroke and myocardial infarction (Black and Hawks 2005).

Furthermore, at the time of data collection, the study established that only 2.1% of the participants had blood pressure within the normal ranges according to the classification by Whelton et al. (2017). Low to middle-income countries have been found in previous studies to have lower hypertension control rates versus high income countries. In 2010 only approximately 26.3% of hypertensive individuals in LMICs had well-controlled blood pressures versus 56.4% in HICs (Constanzo 2016). Similarly, Chow et al 2013 found blood pressure control in hypertensive patients on treatment to be lowest in Africa versus all the regions, with control in LMIC being only approximately 12.7%. . Despite specialist outpatient medical care with exposure to pharmacologic therapy and counseling on lifestyle modification recommendations at a tertiary hospital, the majority of participants had elevated blood pressures at the time of data collection and thus at risk of a cardiovascular event such as stroke, myocardial infarction and

kidney disease (WHO 2005). Non-adherence to recommended hypertension treatment modalities or inadequate treatment are the two reasons most likely responsible for poorly controlled blood pressures amongst hypertensive patients. The low rates also indicate the need for improvement in hypertension treatment programs to increase the effectiveness of blood pressure control measures offered to patients.

## **5.2 Knowledge of lifestyle modification recommendations**

Health literacy is an essential determinant in patient adherence to lifestyle modification recommendations (Scisney-Matlock et al. 2015). Lack of knowledge can result in poor adherence to dietary and physical activity recommendations (Illloh et al. 2014). The study established that there was a general understanding amongst the participants that hypertension management involves an element of dietary control. However, there was mixed knowledge of the factors that have positive and negative consequences on blood pressure control. Only a third (29.6%) and a quarter (25%) were aware that adoption of a diet rich in fruits and vegetables as well as a low salt diet respectively contributes to blood pressure control. Knowledge of the contribution of exercise to hypertension control was lower compared to dietary control. This could be a result of more emphasis put on the consumption of healthy diets compared to physical activity. Also, the study established that misconceptions exist on recommended lifestyle modifications with approximately 22.9% and 17.7% of the participants incorrectly suggesting that a diet rich in fat and red meat respectively is associated with reductions in blood pressure and thus useful in hypertension control. Various dietary plans exist in modern day society, and some of these dietary plans present different dietary recommendations to the community as well as different perceptions on what constitutes a healthful diet from what the DASH eating plan advises. The Atkins diet, for example, emphasizes a very low carbohydrate diet with unlimited protein and fat intake (Bjarnadottir 2016) while the Banting diet promotes a high fat and low carbohydrate diet (Schreuder 2013). More research is still needed on low carbohydrate and high fat diets to assess impact on cardiovascular risk factors and other health consequences. Several studies have unanimously shown that a low carbohydrate diet results in a reduction in cardiovascular disease risk (Hu and Bazzano 2014, Hu et al. 2012), although the duration of his reduction is not clear. The effect of a high fat diet on the other hand remains largely understudied, as such the impact this would have on hypertension control is unclear.

### **5.3 Adherence to lifestyle modification recommendations**

Adherence to healthful lifestyle options in the study was found to be low, with just approximately a third (30.2%) and below a tenth (8.2%) of participants reporting adherence to physical activity and dietary recommendations respectively. The findings of sub-optimal adherence to lifestyle modification recommendations concur with the results of similar studies done in Africa (Okwounu et al. 2014; Iloh et al. 2014; Uzun et al 2009; Elbur 2015). In a study done in 2015 by Elbur, adherence to exercise recommendations amongst male hypertensive patients in Saudi Arabia was found to be only 20.1% and 11.8% for exercise and dietary recommendations respectively (Elbur 2015) Iloh et al in their study done in Nigeria in 2014 found overall adherence to recommended lifestyle modifications to be 16.4%. Various factors have long been identified in different studies to be determinants of adherence to lifestyle modification recommendations (Scisney-Matlock et al. 2015; Magobe et al 2017). Societal beliefs and myths regarding lifestyle options compounded by inadequate knowledge on scientifically proven healthful dietary and exercise options are contributing factors to low adherence rates in LMICs communities like Zimbabwe (Iloh 2014).

The subgroup of participants in this study, who reported adherence to physical activity recommendations, identified brisk walking (64%) as the most adhered to form of physical activity. Very few of the participants stated that they engage in some form of sport as a form of exercise (7% of the total), with jogging and cycling being used the least. The lack of variability in the forms of exercise engaged in might be a result of a gap in knowledge on what might constitute exercise and yet be socially acceptable and feasible in the context of each participant. In addition, health care provider perceptions on socio-culturally appropriate forms of exercise might influence the health care messages they give hypertensive patients. In some Zimbabwean communities particularly the rural ones, it is frowned upon for women to engage in sport. Despite being aware that physical activity contributes to hypertension control, participants might still not engage in exercise due to perceived barriers such as pain one may feel post-exercise and

fatigue (Magobe 2017). Health care providers should, therefore, tailor physical activity messages to each patient, probe for perceived barriers, monitor adherence and counsel accordingly.

Of those who adhere to dietary recommendations, adherence is highest to a low salt diet followed by a low sugar diet and a diet rich in fruit and vegetables respectively. However, there was a minimal emphasis on other important dietary components like low fat and low starch diets. Similar studies have also previously found that adherence to a low salt diet is the most adhered to lifestyle modification recommendation (Okwounu 2014). In LMICs financial constraints are a huge hindrance to the practice of some dietary recommendations such as consumption of lean meat, salt restriction, however, it is easier and non-costly to participants (Elbur 2015; Alhalaiqa 2017), resulting in more individuals being able to adopt it. In addition, only 8.2% of participants adhere to the recommended dietary recommendations on most days of the week, a frequency which will not enable significant healthful benefits nor contribute to blood pressure control. Provision of health messages in a non-specific manner results in different interpretations, some incorrect. The effect being the improper practice of recommended lifestyle changes such as the frequency of practice (Alhalaiqa 2017). The availability of a wide array of dietary plans, all being regarded as healthy also impacts on the options what hypertensive patients adopt.

#### **5.4 Factors related adherence to recommended physical activity recommendations**

Illness was cited by nearly half (48.5%) as the major barrier to exercise recommendation compliance. This finding is consistent with other studies, where vulnerability to illness has been cited as a major barrier to exercise (Levesque et al 2012; Magobe 2017). A perception that exercise exacerbates certain disease states in some individuals results in total abstinence from any form of physical activity (Magobe 2017). A study by Elbur (2015) however had contradictory findings, where illness was found to be positively associated with adoption of lifestyle recommendations, possibly as a result of illness acting as a motivator to restore health and preserve life. The extent of illness, therefore, might be the decisive factor on whether illness acts as a barrier or motivator. There is a need for continual education and emphasis on recommended exercise for hypertensive patients. This education must be contextualized to suit each patient to address personal barriers. Lack of knowledge has been identified in other studies as contributing to non-compliance to recommended lifestyle behaviours (Illoh 2014). The significance of other factors leading to non-adherence is also consistent with literature which

suggests that there are diverse factors which cause non-adherence, chief among them being psychological and socio-cultural factors (Scisney-Matlock 2015). In the context of the present study, such psychological factors included the fear of criticism, fear of fatigue and fear of provoking symptoms . While socio-cultural factors were found to include the lack of family support. These factors have been identified as barriers to exercise in previous studies. Joint pains, chest pains and fatigue were verbalised by participants in a study by Magobe (2017) as reasons why they do not engage in physical activity. Family perceptions regarding treatment have also been identified as influencing adherence, with compliance found to be low in individuals who prioritise the views of family and friends on their recommended treatment modalities (Levesque 2012).

The study deduced no linear correlation between adherence to recommended exercise recommendations and the study's static demographic factors, which were age, gender, educational level, marital status and employment status. Findings from similar studies have produced mixed results on the relationship that may exist between demographic factors and adherence. Illoh et al (2015) found gender to be the only static demographic factor significantly related to adherence with  $\chi^2 = 8.63$  ( $P = 0.45$ ). In contrast, Elbur (2015), found patients with low income status to be less likely to adhere to exercise recommendations versus the high income {OR 0.08 (0.01-0.4,  $P = 0.004$ )}, while patients who suffered from other related non-communicable diseases were more likely to adhere than those who did not. {OR 4.7 (1.2-18.8)  $P = 0.028$ }. No relationship was shown to exist with length of time post-diagnosis, employment status, educational level and age.

### **5.5 Factors related to adherence to dietary recommendations**

About 71.3% of the study participants cited financial constraints as one of the reasons they failed to adhere to recommended dietary prescriptions. Indeed, some aspects of the recommended diet are dependent on patients being able to afford the recommended foods which might be more costly than alternative non-healthier options, for example, lean meat is more costly versus fatter meat in Zimbabwe. However, adherence to diets that are healthful while widely available at lower cost such as some types of vegetables and seasonal fruits was still sub-optimal in this study. The role played by financial challenges in adherence is supported by other studies that

found socioeconomic status to have a bearing on adherence (Levesque 2012 and Elbur 2015). Apart from financial constraints, other reasons cited to be resulting in non-adherence included poor self-control and home situations. In a study by Bertoni et al. (2011) patients mentioned a variety of barriers to adoption of a healthy diet. Among those mentioned was, the cost of a healthy diet particularly lean meat, perishable nature of fruits and vegetables making it essential to buy produce frequently and the need to cook two meals to accommodate other family members who might not be comfortable with the recommended diet eating plan, all culminate in increased food expenditure. In addition, the study identified other barriers such as the inferior taste of recommended foods as well as home situations which do not promote adoption of the recommended diet; such as family preferring other diets and the recommended diet being perceived as traditionally and socio-culturally unacceptable.

Adherence to dietary recommendations in this study did not correlate with any of the studied demographic factors, which were age, gender, educational level, employment level, and marital status. A study by Epstein et al (2012) deduced similar results pertaining to, gender  $\{\beta 0.2 (-0.16, 0.26) P=0.843\}$  age  $\{\beta 0.01 (-0.20, 0.21) P=0.989\}$  and level of education  $\{\beta 0.03 (-0.20, 0.20)\}$ . Elbur (2015) similarly found no relation between dietary adherence and length of time post-diagnosis, employment status and educational level. However an association was identified with age less than 65  $\{OR 4 (1.5 - 10.5), P= 0.007\}$ , income level  $\{OR 0.4 (0.2 - 1.0), P value 0.046\}$  and comorbidity  $\{OR 0.2 (0.07 - 0.7), P=0.012\}$ .

Levesque et al in their study in 2012 found a significant association between adherence to lifestyle modifications and age as evidenced by a regression coefficient of 0.04 (95% CI: -0.01; 0.01), with the older and younger age groups more compliant than the middle-aged. However other demographic factors such as education, gender, and income status had no significant correlation with regression coefficients of -0.01 (95% CI: -0.11; 0.11), 0.15 (95% CI: -0.05; 0.360 and 0.02 (95% CI: -0.05; 0.36) respectively.

## 5.6 Chapter Summary

This chapter focused on the discussion of the findings from the study. This chapter contained discussions on the study's major findings which included the patient knowledge on recommended lifestyle modification and patient adherence to lifestyle modification recommendations in which results on the adherence to exercise recommendations and adherence to dietary recommendations were discussed.



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## Chapter 6

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.1 Conclusion

Blood pressure control was found to be poor, with almost 98% of participants with abnormally elevated blood pressures, also over a quarter of the participants had excess weight than recommended. There is a need for health care service providers to strengthen both pharmacologic and non-pharmacologic treatment modalities to improve blood pressure control and promote weight loss. There is a gap in knowledge on recommended lifestyle changes, with misconceptions existing on healthful dietary options. Adherence to both physical activity and dietary recommendations was found to be suboptimal; however dietary non-adherence was more prevalent. Although the various forms of exercise exist, brisk walking was the predominant type used by those who adhere to physical activity recommendations. Despite adherence to dietary recommendations being low, a diet low in salt as well as a diet rich in fruit and vegetables were the most adhered to. The commonest barriers to exercise and dietary recommendation adherence were illness and financial constraints respectively. No significant relationship existed between adherence to the recommended lifestyle modifications and static demographic factors.

#### 6.2 Recommendations

- 1) Health education on the lifestyle modification recommendations must be provided to all patients on diagnosis with hypertension, and these messages must be re-enforced at every clinic visit. Health care providers must discuss and document progress on recommended lifestyle modifications at each visit. Emphasis must be placed on making patients aware of the effect lifestyle modification has on controlling blood pressure, averting hypertension complications and acting in symbiosis with pharmacologic management. These health messages should be provided in writing as pamphlets or documented in the patient's outpatient hospital card so that patients have a reference point in future.
- 2) Health messages on lifestyle modification must be individualised to improve feasibility (Elbur 2015), taking into account each patient's educational level, economic status, employment status and exercise facilities available to them. Context-specific examples of recommended forms of

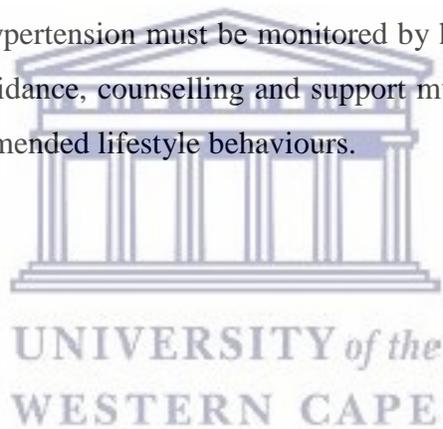
physical activity and locally available foods must be discussed with participants during health education sessions (Bertoni et al. 2011). Patients must be allowed to ask questions where they seek clarity.

3) Health education messages must be made simple, clear, easily accessible and available in different formats such as posters, pamphlets and over a wide array of media platforms to attract and be easily understandable to a broader audience.

4) Pharmacologic and non-pharmacologic treatment must be tightened in patients with poorly controlled blood pressures to normalise blood pressures and avert the development of complications (Echouffo-Tcheugui et al. 2015).

5) Health promoters must seek volunteers who have successfully modified their lifestyles to share experiences with other patients and discuss the benefits they have gained from their transformations.

6) Modifiable risk factors of hypertension must be monitored by health service providers (Yang et al. 2017) and appropriate guidance, counselling and support must be provided accordingly to promote adoption of the recommended lifestyle behaviours.



## References

- Addo, J., Smeeth, L. and Leon, D. A. (2007) Hypertension in sub-Saharan Africa: a systematic review. *American Heart Association* 50(6), 1012-1018
- Alhalaiqai, F., Al-nawafleh, A., Batiha, A. M., Masa'deh, R. and Al-razek, A. (2017) A descriptive study of adherence to lifestyle modification factors among hypertensive patients. *Turkish Journal of Medical Sciences* 47, 273-281
- Aronow, W. S. (2017) Association of obesity with hypertension. *Annals of Translational Medicine* 5(17), 350. doi:10.21037/atm.2017.06.69.
- Ataklte, F., Erqou, S., Kaptoge, S., Taye, B., Echouffo-Tcheugui, J. B. and Kengne, A. P. (2014) The burden of undiagnosed hypertension in sub-Saharan Africa: A systematic review and meta-analysis. *American Heart Association* 65(2), 291-298
- Bacon, S. L., Sherwood, A., Hinderliter, A. (2004) Effects of Exercise, Diet and Weight Loss on High Blood Pressure. *Sports Medicine* 34(5), 307-315: 307. <https://doi.org/10.2165/00007256-200434050-00003>
- Bertoni, A. G., Foy, C. G., Hunter, J. C., Quandt, S. A., Vitolins, M. Z., and Whitt-Glover, M. C. (2011) A multilevel assessment of barriers to adoption of Dietary Approaches to Stop Hypertension (DASH) among African Americans of low socioeconomic status. *Journal of health care for the poor and underserved* 22(4), 1205-20.
- Bjarnadottir, A. (2016) 9 Popular Weight Loss Diets Reviewed by Science <https://www.healthline.com/nutrition/9-weight-loss-diets-reviewed>. Accessed 26 October 2018
- Black, J. M. and Hawks, J. H. (2005) *Medical-surgical nursing: Clinical management for positive outcomes*. 7th edition. St. Louis, Mo: Elsevier Saunders.
- Bloch, J. M. (2016) Worldwide prevalence of hypertension exceeds 1, 3 billion. *Journal of the American Society of Hypertension* 10(10), 753-754
- Blumenthal, J. A., Sherwood, A., Gullette, E.C.D., Babyak, Michael., Waugh, R., Georgiades, A., Craighead, L., Tweedy, D., Feinglos, M., Appelbaum, M., Hayano, J. and Hinderliter, A. (2000) Exercise and Weight Loss Reduce Blood Pressure in Men and Women With Mild

Hypertension Effects on Cardiovascular, Metabolic, and Hemodynamic Functioning. *Archives of Internal Medicine* 160(13), 1947–1958. doi:10.1001/archinte.160.13.1947

Campbell, N. R. C., Johnson, J. A. and Campbell, T. S. (2012) Sodium Consumption : An Individual's Choice. *International Journal of Hypertension* 2012.

Carnethon, M. R., Evans, N. S., Church, T. S., Lewis, C. E., Schreiner, P.J., Jacobs, D. R. Jr., Sternfeld, B. and Sidney, S. (2010) Joint associations of physical activity and aerobic fitness on the development of incident hypertension: coronary artery risk development in young adults. *American Heart Association* 56, 49–55. doi: 10.1161/HYPERTENSIONAHA.109.147603

Charan, J., & Biswas, T. (2013). How to calculate sample size for different study designs in medical research?. *Indian journal of psychological medicine* 35(2), 121-6.

Charlton, K. E. and Jooste, P. L. 2001, 'East salt sparingly - sprinkle, don't shake!'. *South African Journal of Clinical Nutrition* 14(3), S55-S64.

Chase, L. N., Sui, K., Lee, D. and Blair, N. S. (2009) The Association of Cardiorespiratory Fitness and Physical Activity With Incidence of Hypertension in Men. *American Journal of Hypertension* 22(4), 417–424

CHEP (2014) *Understanding and Managing your blood pressure*. Markham: CHEP

Chow, C.K., Teo, K.K., Rangarajan, S., Islam, S., Gupta, R., Avezum, A., Bahonar, A., Chifamba, J., Dagenais, G., Diaz, R., Kazmi, K., Lanus, F., Wei, L., Lopez-Jaramillo, P., Fanghong, L., Ismail, N.H., Puoane, T., Rosengren, A., Szuba, A., Temizhan, A., Wielgosz, A., Yusuf, R., Yusufali, A., McKee, M., Liu, L., Mony, P., Yusuf, S. and PURE (Prospective Urban Rural Epidemiology) Study investigators (2013) Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *JAMA* 310 (9), DOI: <https://doi.org/10.1001/jama.2013.184182>

Costanzo, S., de Gaetano, G., & Iacoviello, L. (2016) Put pressure worldwide on blood pressure control. *Journal of thoracic disease* 8(12), E1610-E1613.

Diaz, K. M. and Shimbo, D. (2013) Physical activity and the prevention of hypertension. *Current hypertension reports* 15(6), 659-68.

Echouffo-Tcheugui, B. J., Kengne, A., Erqou, S. and Cooper, S. R. (2015) High Blood Pressure in Sub-Saharan Africa: The Urgent Imperative for Prevention and Control. *Journal of Clinical Hypertension* 17(10), 751-755

Elbur, I. A. (2015) Level of Adherence to lifestyle changes and Medications among male hypertensive patients in two hospitals in Taif, Kingdom of Saudi Arabia. *International Journal of Pharmacy and Pharmaceutical Sciences* 7(4), 168-172

Epstein, D. E., Sherwood, A., Smith, P. J., Craighead, L., Caccia, C., Lin, P. H., Babyak, M. A., Johnson, J. J., Hinderliter, A., Blumenthal, J. A. (2012) Determinants and consequences of adherence to the dietary approaches to stop hypertension diet in African-American and white adults with high blood pressure: results from the ENCORE trial. *Journal of the Academy of Nutrition and Dietetics*, 112(11), 1763-73.

Ghadieh, S. A. and Saab, B (2015) Evidence for exercise training in the management of hypertension in adults. *Canadian Family Physician* 61, 233-9

Ghezelbash, S. and Ghorbani, A. (2012) Lifestyle modification and hypertension prevention. *ARYA Atherosclerosis Journal* 8 (Special Issue), S202-S207

Guwatudde, D., Nankya-Mutyoba, J., Kalyesubula, R., Laurence, C., Adebamowo, C., Ajayi, I., Bajunirwe, F., Njelekela, M., Chiwanga, F.S., Reid, T., Volmink, J., Adami, Hans-Olov, H., Michelle, D., Dalal, S. (2015) The burden of hypertension in sub-Saharan Africa : a four-country cross sectional study. *BMC Public Health* 15(1211). doi:10.1186/s12889-015-2546-z.

Ha, S. K. (2014). Dietary salt intake and hypertension. *Electrolyte Blood pressure* 12(1), 7-18.

Hamer, M. (2010) Adherence to a healthy lifestyle in hypertensive patients: ample room for improvement? *Journal of Human Hypertension* 24, 559-560. doi: 10.1038/jhh.2010.61

Harsha, W. H. and George, A. B. (2008) Hypertension. *American Heart Association* 51 (6), 1420-1425

He, F. J. and MacGregor, G. A. (2009) A comprehensive review on salt and health and current experience of worldwide salt reduction programmes. *Journal of Human Hypertension* 23, 363-384

He, F. J. and MacGregor, G. A. (2012) Salt intake, plasma sodium and worldwide sodium reductions. *Annals of Medicine* 44 (1), S127-S137

Hemed, M. (2015) *Cross-sectional Studies*. Training Course on Sexual Reproductive Health Research. Geneva

Hendriks, E. M., Ferdinand, W. N. M. W., Marijke, T. L. R., Lizzy M. B., Tanimola, M. A., Ingrid, H. B., Sayoki, G. M., Amos, M. K., Peter, G., Gert Van Rooy, Wendy, J., Judith, L., Berber, K., Igna B., Eseguel, G., Jacques van der Gaag, Tobias F. Rinke de Wit, Joep, M. A. L., Constance, S.(2012) Hypertension in Sub-Saharan Africa: Cross-Sectional Surveys in Four Rural and Urban Communities. *Plos journal* <https://doi.org/10.1371/journal.pone.0032638>

Hu, T. and Bazzano, L. A. (2014). The low-carbohydrate diet and cardiovascular risk factors: evidence from epidemiologic studies. *Nutrition, metabolism, and cardiovascular diseases : NMCD* 24(4), 337-43. Hu, T., Mills, K. T., Yao, L., Demanelis, K., Eloustaz, M., Yancy, W. S., Kelly, T. N., He, J. and Bazzano, L. A. (2012). Effects of low-carbohydrate diets versus low-fat diets on metabolic risk factors: a meta-analysis of randomized controlled clinical trials. *American journal of epidemiology*, 176 Suppl 7(Suppl 7), S44-54.

Hubert, H. B., Feinleib, M., McNamara, M. P. and Castelli, W. P. (1983) Obesity as an independent risk factor for cardiovascular disease: a 26-year follow-up of participants in the Framingham Heart Study. *American Heart Association* 67,968-977. <https://doi.org/10.1161/01.CIR.67.5.968> Accessed 20 February 2018

Husain, K., Ansari, A. R. and Ferder, L. (2014) Alcohol-induced hypertension: mechanism and prevention. *World Journal of Cardiology* 6(5), 245–252. doi: 10.4330/wjc.v6.i5.245

Iloh, P. U. G., Amadi, N. A., Okafor, C. O. G., Odu, U.F., Ikwudinma, O. A. and Godswill-Uko., U. E. (2014) Adherence to lifestyle modification among adult hypertensive Nigerians with essential hypertension in a primary care clinic of a tertiary hospital in a resource poor environment of Eastern Nigeria. *British Journal of Medicine and Medical Research* 4 (18), 3478-3490

International Federation of Pharmaceutical Manufacturers (2016) Hypertension: *Putting the pressure on the silent killer*. International Federation of Pharmaceutical Manufacturer Jackson, R.

E.and Bellamy, M. C. (2015) Antihypertensive drugs. Continuing Education in Anaesthesia Critical Care and Pain 15 (6), 280-285

John, J. H., Ziebland S., Yudki, P., Roe, L.S.and Neil, H.A. (2002) Effects of fruit and vegetable consumption on plasma antioxidant concentrations and blood pressure: a randomized controlled trial. *The Lancet* 359(9322), 1969-74

Kaplan, N. M. (2002) *Kaplan's clinical hypertension*. 8th edition. Philadelphia: Lippincott Williams and Wilkins.

Katena, A. N., Maradzika, J. C. and January, J. (2015) Correlates of compliance with lifestyle modifications among hypertensive patients in Mazowe District, Zimbabwe. *International Journal of Health Promotion and Education*. 53(6), 315-327. doi: 10.1080/14635240.2015.1037462).

Kokkinos, F. P., Giannelou, A., Manoli, A. and Pittaras, A. (2009) Physical Activity in the Prevention and Management of High Blood Pressure. *Hellenic Journal of Cardiology* 50, 52-59,

Landsberg, L., Aronne, J. L., Beilin, J.L., Burke, V., Igel I. L., Lloyd-Jones, D. and Sowers, M. J (2012) Obesity-Related Hypertension: Pathogenesis, Cardiovascular Risk, and Treatment: A Position Paper of the Obesity Society and the American Society of Hypertension. *The Journal of Clinical Hypertension* 15(1), 14-33

Levesque, A., Li, Z. H. and Pahal, S. J. (2012) Factors related to patients' adherence to medication and lifestyle change recommendations: data from Canada. *International Journal of Psychological Studies* 4(2), 42-55.

Lyons, P. and Doueck, J. H. (2010) *The Dissertation: From Beginning to End*. New York: Oxford University Press

Magobe, N., Poggenpoel, M.,and Myburgh,C. (2017)Experiences of patients with hypertension at primary health care in facilitating own lifestyle change of regular physical exercise. *Curationis* 40(1), e1-e8. doi:10.4102/curationis.v40i1.1679

McComb, M. N., Chao, J. Y., & H., T. M. (2016). Direct Vasodilators and Sympatholytic Agents. *Journal of Cardiovascular Pharmacology and Therapeutics* 21(1), 3–19. <https://doi.org/10.1177/1074248415587969>

McFadden, C. B., Brensing, C. M., Berlin, J. A. and Townsend, R. R. (2005). Systematic review of the effect of daily alcohol intake on blood pressure. *American Journal of Hypertension* 18 (2), 276–286. <https://doi.org/10.1016/j.amjhyper.2004.07.020>

Monteiro, M. and Filho, C. D. (2004) Physical exercise and blood pressure control: A Review Article. *Rev Bras Med Esporte* 10 (6). [http://www.scielo.br/pdf/rbme/v10n6/en\\_a08v10n6](http://www.scielo.br/pdf/rbme/v10n6/en_a08v10n6) Accessed 18 February 2018.

Mutowo, P. M., Mangwiro, C. J., Lorgelly, P., Owen, A. and Renzaho, N. M. A. (2015) Hypertension in Zimbabwe: A meta-analysis to quantify its burden and policy implications. *World Journal of Meta-Analysis* 3(1), 54-60.

Nandhini, S. (2014) Essential Hypertension: A Review Article. *Journal of Pharmaceutical Sciences and Research* 6(9), 305-307

National Blood Pressure Education Program (2003) *The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure*. Bethesda: National Institutes of Health

NHFA (2013) *Cholesterol*. Melbourne. NHFA

NHFA (2016) *Guidelines for the diagnosis and management of hypertension in adults*. Melbourne: NHFA

NIH (2006) *Your guide to lowering your blood pressure with DASH*. Bethesda: NIH

Noblat, A. C., Lopes, M. B. and Lopes, A. A. (2004) Complications of hypertension seen in a referral outpatient care unit. *Arq Bras Cardiol* 83(4), 314-319

Okwuonu, C. G., Emmanuel, C. I. and Ojmadu, N. E. (2014) Perception and practice of lifestyle modification of hypertension among hypertensives in south east Nigeria. *International Journal of Medicine and Biomedical Research* 3(2), 122-131, [www.ijmnr.com/reviewed/3.2.8.pdf](http://www.ijmnr.com/reviewed/3.2.8.pdf) Accessed 04 October 2016

Parirenyatwa Group of Hospitals (2018) *Parirenyatwa Group of Hospitals*. <https://parihosp.org/>  
Accessed 25 June 2018

Puddey, B. I. and Beilin, J. L. (2006) Alcohol is bad for blood pressure. *Clinical and Experimental Pharmacology and Physiology* 33, 847–852. doi: 10.1111/j.1440-1681.2006.04452.x

Roerecke, M., Kaczorowski, J., Tobe, S. W., Gmel, G., Hasan, O., and Rehm, J. (2017) The effect of a reduction in alcohol consumption on blood pressure: a systematic review and meta-analysis. *The Lancet. Public health* 2(2), e108-e120.

Roush, G. C. and Sica, D.A. (2016) Diuretics for Hypertension: A Review and Update. *American Journal of Hypertension* 29(10), 1130–1137, <https://doi.org/10.1093/ajh/hpw030>

Sabour, H., Norouzi-Javidan, A., Soltani, Z., Mousavifar, S. A., Latifi, S., Emami-Razavi, S. H., and Ghodsi, S. M. (2016). The correlation between dietary fat intake and blood pressure among people with spinal cord injury. *Iranian journal of neurology*, 15(3), 121-7.

Santana, N. M. T., Mill, J. G., Velasquez-Melendez, G., Moreira, A. D., Barreto, S. M., Viana, M. C. and Molina, M. C. B. (2018) Consumption of alcohol and blood pressure: Results of the ELSA-Brasil study. *PLoS ONE* 13(1)

Sarki, A. M., Nduka, C. U., Stranges, S., Kandala, N. B., & Uthman, O. A. (2015) Prevalence of Hypertension in Low- and Middle-Income Countries: A Systematic Review and Meta-Analysis. *Medicine* 94(50), e1959.

Schreuder, K. (2013) *Banting Plan Appropriate for a person weighing 81-100kg*. <http://www.sleekgeek.co.za/wp-content/uploads/2017/08/banting-plan-3.pdf> Accessed 26 October 2018

Scisney-Matlock, M., Bosworth, B. H., Giger, N. J., Strickland, L. O., Harrison, V. R., Coverson, D., Shar, R. N., Dennison, R. C., Dunbar-Jacob, M. J., Jones, L., Ogedegbe, G., Battis-Turner, L. M., Jamerson, A. K. (2009) Strategies for implementing and sustaining therapeutic lifestyle changes as part of hypertension management in African Americans. *Postgrad Med* 121 (3), 147-149

- Sesso, H. D., Cook, N. R., Buring, J. E., Manson, J. E. and Gaziano, J. M. (2008) Alcohol consumption and the risk of hypertension in women and men. *American Heart Association* 51(4) 1080-1087. doi: 10.1161/HYPERTENSIONAHA.107.104968
- Sica, D. A. (2005) Alpha1-adrenergic blockers: current usage consideration. *Journal of Clinical Hypertension* 7(12), 757-762
- Siyad, A. R. (2011) Hypertension. *Hygeia Journal for Drugs and Medicines* 3 (1), 1-16
- Takami, T. and Saito, Y. (2011) Effects of smoking cessation on central blood pressure and arterial stiffness. *Vascular health and risk management* 7, 633-8.
- Tyson, C. C., Nwankwa, C., Lin P. H. and Svetke, L. P. (2012) The Dietary Approaches to Stop Hypertension (DASH) Eating Pattern in Special Populations. *Current hypertension reports* 14(5):388-396. doi:10.1007/s11906-012-0296-1.
- Uzun, S., Yokusoglu, M., Kara, B., Arslan, F. and Yilmaz, B. M. (2009) The assessment of adherence of hypertensive individuals to treatment and lifestyle change recommendation. *The Anatolian Journal of Cardiology* 9, 102-9
- van de Vijver, S., Akinyi, H., Oti, S. Olajide, A. , Agyemang, A. I. and Kyobutungi, C. (2013) Status Report on hypertension in Africa – Consultative review for the 6th Session of the African Union Conference of Ministers of Health on NCD's. Nairobi. *The Pan African medical Journal* 16 (38). [www.panafrican-med-journal.com/content/article/16/38/full/#.V\\_t\\_Llh97IU](http://www.panafrican-med-journal.com/content/article/16/38/full/#.V_t_Llh97IU) Accessed 09 October 2016
- Viera, J. A. and Neutze, M. D. (2010) Diagnosis of secondary Hypertension: An Age Based Response. *American Family Physician* 82(12), 1471-1478.
- Wallace, J.P. (2003) Exercise in hypertension: A clinical review. *Sports Medicine* 33 (8), 585-595. <https://doi.org/10.2165/00007256-200333080-00004>
- Wang, L., Manson, J. E., Forman, J. P., Gaziano, J. M., Buring, J. E., and Sesso, H. D. (2010). Dietary fatty acids and the risk of hypertension in middle-aged and older women. *Hypertension* 56(4), 598-604.

Warburton, D. E., Charlesworth, S., Ivey, A., Nettleford, L. and Shannon, S. D. B. (2010) A systematic review of the evidence for Canada's physical activity guidelines for adults. *International Journal of Behavioral Nutrition and Physical Activity* 7(39).

Wen, C. P., Tsai, M. K., Chan, H. T., Tsai, S. P., Cheng, T. Y D., and Chiang, P.H. (2008) Making hypertensive smokers motivated in quitting: Developing 'blood pressure equivalence of smoking'. *Journal of Hypertension* 26, 672-677.

Whelton, P. K., Carey, R. M., Aronow, W. S., Casey Jr, D. E., Collins, K. J., Dennison, Himmelfarb, C., DePalma, S. M., Gidding, S., Jamerson, K. A., Jones, D. W., MacLaughlin, E.J., Muntner, P., Ovbigele, B., Smith Jr, S. C., Spencer, C. C., Stafford, R. S., Taler, S. J., Thomas, R.J., Williams Sr, K. A., Williamson, J.D., Wright Jr, J.T. (2017) Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. *Journal of the American College of Cardiology*. doi: 10.1016/j.jacc.2017.11.006.

Winnicki, M., Bonso, E., Dorigatti, F., Longo, D., Zaetta, V., Mattarei, M., D'Este, D., Laurini, G., Pessina, A. C. and Palatini, P. (2006) Effect of Body Weight Loss on Blood Pressure After 6 Years of Follow-Up in Stage 1 Hypertension. *American Journal of Hypertension*, 19(11), 1103–1109. <https://doi.org/10.1016/j.amjhyper.2006.04.016>

WHO (2003) *Adherence to long term therapies: Evidence for Action*. Geneva: WHO

WHO Expert Consultation (2004) Appropriate body mass index for Asian populations and its implications for policy and strategic interventions. *The Lancet* 363 (9403), 157-163

WHO (2005) *Clinical guidelines for the management of hypertension: Emro Technical Publication Series*. Cairo: WHO

WHO (2011) *Global Atlas on Cardiovascular Disease Prevention and Control*. Geneva: WHO

WHO (2013) *A global brief on Hypertension: Silent killer, global public health crisis*. Geneva: WHO

WHO (2014) *High Blood Pressure: Global and Regional Overview*. Geneva: WHO

WHO (2016) *Prevention of Cardiovascular Disease: Guidelines for assessment and management of cardio-vascular risk*. Geneva. WHO

Yang, M. H., Kang, S. Y., Lee, J. A., Kim, Y. S., Sung, E. J., Lee, K. Y., Kim, J. S., Oh, H. J., Kang, H. C., and Lee, S. Y. (2017) The Effect of Lifestyle Changes on Blood Pressure Control among Hypertensive Patients. *Korean journal of family medicine* 38(4), 173-180.

Zhang, M., Meng, Y., Yang, Y., Liu, Y., Dong, C., Xiao, J., Zhao, L. and Li, F. (2011) Major inducing factors of hypertensive complications and the interventions required to reduce their prevalence: An epidemiological study of hypertension in a rural population in China. *BMC Public Health*, 11, 301. <http://dx.doi.org/10.1186/1471-2458-11>



UNIVERSITY *of the*  
WESTERN CAPE

**ANNEX 1- CONSENT FORM**

**ENGLISH INFORMED CONSENT FORM**



**UNIVERSITY OF THE WESTERN CAPE**

Private Bag X 17, Bellville 7535, South Africa

*Tel: +27 21-959 2809, Fax: 27 21-959 2872*

**E-mail: [soph-comm@uwc.ac.za](mailto:soph-comm@uwc.ac.za)**

**CONSENT FORM**

**Title of Research Project:** **Adherence to lifestyle modification recommendations in hypertensive patients at Parirenyatwa Hospital.**

The study has been described to me in language that I understand. My questions about the study have been answered. I understand what my participation will involve and I agree to participate of my own choice and free will. I understand that my identity will not be disclosed to anyone. I understand that I may withdraw from the study at any time without giving a reason and without fear of negative consequences or loss of benefits.

**Participant's name.....**

**Participant's signature.....**

**Date.....**

**BIOMEDICAL RESEARCH ETHICS ADMINISTRATION**

**Research Office  
New Arts Building,  
C-Block, Top Floor, Room 28  
University of the Western Cape  
Private Bag X17  
Bellville 7535  
[research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)**

## ANNEX 2: GWARO RECHITENDERANO

### CHIBVUMIRANO



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

*Tel: +27 21-959 2809, Fax: 27 21-959 2872*

E-mail: [soph-comm@uwc.ac.za](mailto:soph-comm@uwc.ac.za)

### CHIBVUMIRANO

#### **MUSORO WE TSVAKURUDZO: ONGORORO YEKUONA MATEVEDZERO EKUSHANDURA MARARAMIRO AYO ANOKURUDZIRWA NAVANA MAZVIKOKOTA KUNOITA VARWERE VE HYPETERNSION VANORAPIRWA PA PARIRENYATWA HOSPITAL**

Tsvakurudzo iyi yatsanangurwa nerurimi rwandinonzwisisa. Mibvunzo yangu yetsvakurudzo iyi yapindurwa yose. Ndanzwisisa zvandinotarisirwa kuita, uye ndinobvuma kuti isarudzo yangu kuita izvi uye handina kumanikidzwa. Ndanzwisisa kuti zita rangu hariudzwi munhu. Ndanzwisisa kuti ndinokwanisa kurega zvesarudzo iyi chero nguva yandada, ndisina kupa chinangwa, ndisina kutya uye zvisina zvakaipa zvingandiwana, kana kuzoshaya kodzero dzangu.

**Zita renyu** .....

**Signature yenyu** .....

**Zuva ranhasi** .....

#### **BIOMEDICAL RESEARCH ETHICS ADMINISTRATION**

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**New Arts Building,**

**C-Block, Top Floor, Room 28**

**University of the Western Cape**

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**Bellville 7535**

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Consent Form

Version Date: 15 September 2014

## ANNEX 3- INFORMATION SHEET

### ENGLISH INFORMANT SHEET



### UNIVERSITY OF THE WESTERN CAPE

Private Bag X 17, Bellville 7535, South Africa

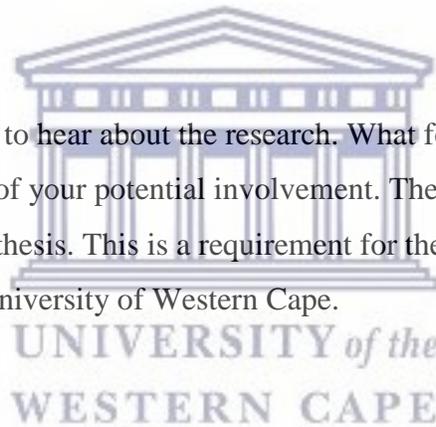
*Tel: +27 21-959 2809 Fax: 27 21-959 2872*

**E-mail:** [soph-comm@uwc.ac.za](mailto:soph-comm@uwc.ac.za)

### INFORMATION SHEET

#### Dear Participant

Thank you for your willingness to hear about the research. What follows is an explanation of the research project and an outline of your potential involvement. The research is being conducted by Rulani Makondo for a mini-thesis. This is a requirement for the Masters in Public Health which I am completing at the University of Western Cape.



#### Project Title

Adherence to lifestyle modification recommendations in hypertensive patients at Parirenyatwa Hospital.

#### Purpose of the study

The purpose of this research project is to find out the reasons why people diagnosed with hypertension may find it difficult to adopt prescribed dietary and physical activity recommendations. Once these reasons are known, they can guide the development of appropriate strategies and programs to address them.

### **Description of the study and your involvement**

You will be asked to fill in a questionnaire as well as have your height, weight and blood pressure measured. The study will be carried out at Parirenyatwa Hospital. You will be provided with the questionnaire and requested to have blood pressure, weight and height checks while you await your consultation at the Parirenyatwa Hospital medical Clinic waiting room. The entire process of data collection is expected to last less than 30 minutes. The questionnaire will have multiple questions on your demographics, dietary and physical activities, knowledge on blood pressure risk factors as well as the different factors that influence your adherence to recommended lifestyle modifications.

### **Confidentiality**

The researchers undertake to protect your identity and the nature of your contribution. To ensure your anonymity, the study will not contain information that may personally identify you. To ensure your confidentiality, all file cabinets with study documents will be kept locked; storage areas will only be accessible to research personnel. Your name will be kept confidential at all times, and will not be used on data forms instead identification codes will be used. All study documents stored as computer files will be password protected. If we write a report or article about this research project, your identity will be protected.



### **Risks**

All human interactions and talking about self or others carry some amount of risks. We will nevertheless minimise such risks and act promptly to assist you if you experience any discomfort, psychological or otherwise during the process of your participation in this study. Where necessary, an appropriate referral will be made to a suitable professional for further assistance or intervention.

### **Benefits and Costs**

This research is not designed to help you personally, but the results from this study may help in understanding the factors that influence adherence to dietary and physical activity recommendations. This knowledge will guide health messages given to patients as well as guide programs aimed at improving adherence to dietary and physical activity recommendations with

the aim of improving blood pressure control and reducing complications due to high blood pressure.

### **Voluntary Participation and Withdrawal**

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

### **Questions**

This research is being conducted by Rulani Makondo, a Master's in Public Health student at the University of the Western Cape. If you have any questions about the research study itself, please contact:

Rulani Makondo

Address: 3042 Mvura Close, Bluffhill, Harare, Zimbabwe

Cell Number +263 773 018 492,

Email: [ruliemak@gmail.com](mailto:ruliemak@gmail.com)



Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

Prof Helen Schneider

School of Public Health

Head of Department

University of the Western Cape

Private Bag X17

Bellville 7535

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Prof José Frantz  
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This research has been approved by the University of the Western Cape's Research Ethics Committee. (REFERENCE NUMBER: *to be inserted on receipt thereof*)

**BIOMEDICAL RESEARCH ETHICS ADMINISTRATION**

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## ANNEX 4- ZVAMUNOFANIRWA KUZIVA

### ZVAMUNOFANIRWA KUZIVA



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E-mail: [soph-comm@uwc.ac.za](mailto:soph-comm@uwc.ac.za)

### ZVAMUNOFANIRWA KUZIVA

#### Wadiwa mupinduri

Tinoda kutenda nekuteerera nezveongororo ino. Zvinotevera itsanangudzo yeongororo iri kuitwa, nezvinozotarisirwa kuti muite kana muchinge mabvuma. Ongororo iyi irikuitwa na Rulani Makondo, mufundo yake yekunyorwa gwaro diki, iro rinotarisirwa mufundo dzake dzapamusoro dze Masters ye Public Health idzo dzaari kufunda ku chikoro che University of Western Cape.

#### Musoro wetsvakurudzo:

Ongororo yekuona matevedzero ekushandura mararamiro ayo anokurudzirwa navana mazvikokota kunoita varwere ve hypertension vanorapirwa pa chipatara che Parirenyatwa

#### Chinagwa chetsvakurudzo

Chinagwa chetsvakurudzo iyi ndeche kutsvaka zvikonzero zvingadai kuti vanhu. Vanorwara nechirwere chehypertension vakundikane kutevedzera izvo zvinotarisirwa navana mazvikokota, kuti vange vachidya, kana zvinoitwa kuti vatwasanudze muviri yavo. Kana izvi zvawanikwa, zvinokwanisa kuzobatsira pakuwana mhinduro nenzira dzinokwanisa kubatsira kuzvigadzirisa.

### **Tsanangudzo yeongororo nezvamunotarisirwa kuita.**

Muchakumbirwa kuti mupindure mibvunzo iri pabepa, inosanganisira, kureba kwenyu, huremu henyu, ne zvinenge zvawanikwa pamaongororwa kudzvinyirira kurikuita ropa renyu ( BP). Pamuchapihwa bepa rekuisa mhinduro dzenyu muchakumbirwa kuongororwa izvi makamirira kuzowonekwa kwenyu kwamunenge mawuyira, izvi zvichaitwa muimba yekumirira, pachipatara che Parirenyatwa. Tsvakurudzo dzose idzi dzinotarisirwa kusapfura maminitisi makumi matatu. Mibvunzo iyi ichange iri yekusarudzo mhinduro pane dzakapihwa kare uye mibvunzo inoenderana namararamiro enyu, zvamunodya, zvamunoita kutwasanudzo muviri, zvamunoziva maererano ne zvinogona kukanganisa kudzvinyirirwa kweropa mumuviri menyu, ne zvakasiyana zvine huremu pakuita kuti mutevedzere zvinokurudzirwa navana mazvikokota pamararamiro enyu.

### **Zvakavanzikana**

Vaongorori vanovimbisa kusazoshambadza zita renyu uye mhinduro dzamunenge mapa. Kuratidza izvi, ongororo iyi haibvunzi mibvunzo ine nezvingaita kuti mukwanise kuzivikanwa. Mukukohomedza kuchengetedza kwemhinduro dzenyu, pachange pachigara mhinduro dzenyu pachaiswa svumbunoro, uye panongosvikwa nemuongorori. Mazita enyu haazoshambadzwi ndosaka zvakare kuchishandiswa mazita asiri enyu. Pakashandiswa macomputer, mhinduro dzenyu dzichachengetwa ne pasiwedi. Kana pakanyorwa bepa maererano efundo iyi, mazita enyu haazoshambadzarwi zvakare.

### **Ngozi**

Mikana yengozi panosangana vanhu inogaro vepo, uye kutaura pamusoro pevanhu kunomboita ngozi. Isu tichaedza nepose patinogona kuti tibvise ngozi idzi, tinokukumbirai kuti mutaure nekuchimbida, mukanzwa kusagadzikana patinenge tichiita ongororo. Panokodzera, munogona kutaurira ari pamusoro kuti muwane rubatsiro

### **Zviwanikwa ne mibhadharo**

Tsvakurudzo iyi haitarisirwe kuti ikubatsirei imi, asi zvichange zvawanikwa zvinogona kuzobatsira kunzwisisa zvikonzero panekuitwa kwe zvinokurudzirwa mararamiro anotarisirwa pakudya nekutwasanudzo muviri. Izvi zvinogona kuzobatsira zvinozoudzwa varwere ve hypertension, netarisiro yekuvakurudzira mararamiro anokurudzirwa pane zvanodya ne

kutwasanudza miviri yavo, kuti zvibatsire kudzvinyirwirwa kweropa mumuviri uye kuderedza zvakashata zvinokonzereswa ne hypertension

### **Kuzvipira kwenyu paongororo uye kuregedza kwenyu**

Ongororo iyi haimanikidzwe. Munogona kuregedza kana musingade henyu. Kana mazvipira kupinda muongororo iyi, munogona kuregedza chero nguva pamunenge madira. Hamuzoripiswi, kana kuzoshaya kodzero dzenyu nekuda kweizvi

### **Mibvunzo**

Tsvakurudzo iyi ichaitwa na Rulani Makondo, mufundi weMasters ye Public Health pachikoro che University of Western Cape. Kana muine mibvunzo munokwanisa kumubata panotevera:

Rulani Makondo

Kero: 3042 Mvura Close, Bluffhill, Harare, Zimbabwe

Nhamba dzerunhare +263 773 018 492,

Email: [ruliemak@gmail.com](mailto:ruliemak@gmail.com)

Kana muine mimwe mibvunzo pamusoro peongororo idzi kana kodzero dzenyu, kana kuti muine zvamunoda kumhangara matambudziko amungadaro masangana nawo, tsvakai:

Prof Helen Schneider

School of Public Health

Head of Department

University of the Western Cape

Private Bag X17

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Tsvakiridzo iyi yakapihwa mvumo neveUniversity of the Western Cape's Research Ethics Committee.

## **BIOMEDICAL RESEARCH ETHICS ADMINISTRATION**

### **Research Office**

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**University of the Western Cape**

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**Bellville 7535**

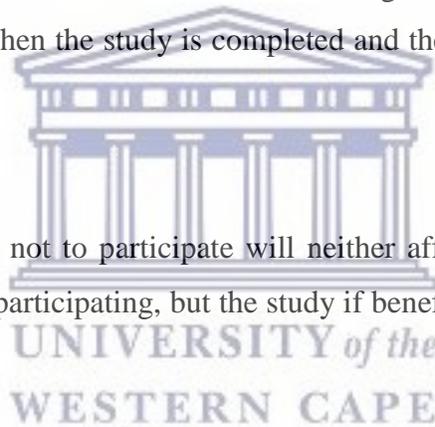


**ANNEX 5- INSTRUMENT FOR DATA COLLECTON: QUESTIONNAIRE (ENGLISH VERSION)**

**RESEARCH TITLE:** Adherence to lifestyle modification recommendations in hypertensive patients at Parirenyatwa Hospital.

NB: You have agreed to answer questions on adherence to lifestyle modification recommendations in hypertensive patients. Before proceeding with answering questions, you are reminded that your participation is completely voluntary and your responses will be handled confidentially. Information given will not bear your name and will not be traced to you in any form but will only be identified to be from an individual diagnosed with hypertension on clinic care for six months or more. When the study is completed and the data has been analyzed, these questions will be destroyed.

Your decision to participate or not to participate will neither affect your care nor is there any immediate benefit to you from participating, but the study if beneficial, may directly improve the management of hypertension



**SECTION A: DEMOGRAPHICS**

Please tick the appropriate response inside the box

1. Please indicate your sex

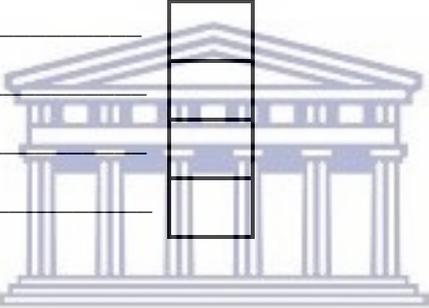
- (a) Male \_\_\_\_\_
- (b) Female \_\_\_\_\_

2. Please indicate your age group by ticking the appropriate box

(a) 18 – 25_____	<input type="checkbox"/>
(b) 26 – 35_____	<input type="checkbox"/>
(c) 36 – 45_____	<input type="checkbox"/>
(d) 46 – 55_____	<input type="checkbox"/>
(e) 56 – 65_____	<input type="checkbox"/>
(f) 66 and older_____	<input type="checkbox"/>

3. Please indicate your marital status

(a) Single_____	<input type="checkbox"/>
(b) Married_____	<input type="checkbox"/>
(c) Divorced_____	<input type="checkbox"/>
(d) Widowed_____	<input type="checkbox"/>



4. Please indicate your highest educational level

(a) None_____	<input type="checkbox"/>
(b) Primary_____	<input type="checkbox"/>
(c) Secondary_____	<input type="checkbox"/>
(d) Tertiary_____	<input type="checkbox"/>

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WESTERN CAPE

5. Please indicate your employment status

(a) Employed_____	<input type="checkbox"/>
(b) Unemployed_____	<input type="checkbox"/>
(c) Pensioner_____	<input type="checkbox"/>

6. How long have you had Hypertension

- (a) Less than 1 year \_\_\_\_\_
  - (b) 1-5 years \_\_\_\_\_
  - (c) 5-10 years \_\_\_\_\_
  - (d) More than 10 years \_\_\_\_\_
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**SECTION B**

**PATIENT KNOWLEDGE ON RECOMMENDED LIFESTYLE MODIFICATIONS  
(DIET AND EXERCISE)**

This section contains questions to assess patient knowledge on the recommended lifestyle modifications once diagnosed with chronic hypertension.

7. Which of the following do you think contributes to blood pressure control in hypertensive patients? (You may tick more than 1 option)

- (a) Diet rich in dairy fat \_\_\_\_\_
  - (b) Consumption of energy rich foods \_\_\_\_\_
  - (c) Diet rich in fruits and vegetables \_\_\_\_\_
  - (d) Gentle aerobic exercise \_\_\_\_\_
  - (e) Low carbohydrate diet \_\_\_\_\_
  - (f) Low salt diet \_\_\_\_\_
  - (g) Physical inactivity \_\_\_\_\_
  - (h) Diet rich in red meat \_\_\_\_\_
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**SECTION C**

**PATIENT ADHERENCE TO RECOMMENDED LIFESTYLE MODIFICATION  
RECOMMENDATIONS**

This section contains questions to determine self-reported adherence to lifestyle modification (diet and physical activity) recommendations and perceived reasons for non-adherence.

8. Do you exercise for a minimum of 30 minutes per day for at least four days a week?

- (a) Yes \_\_\_\_\_
- (b) No \_\_\_\_\_

If No, proceed to Question 10

9. If YES what kind of exercise recommendations do you adhere to?

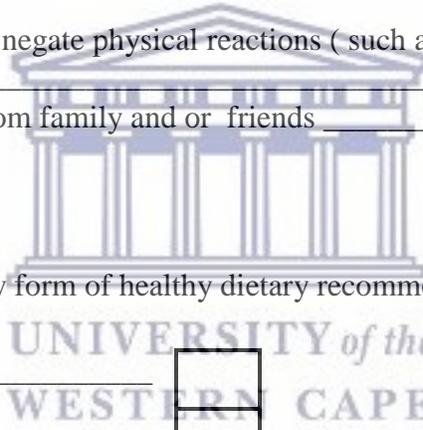
- (a) Brisk walking \_\_\_\_\_
- (b) Cycling \_\_\_\_\_
- (c) Jogging \_\_\_\_\_
- (d) Sport activities \_\_\_\_\_
- (e) Other \_\_\_\_\_

Please rank your extent of adherence to the following exercise recommendations?

	<b>Very low</b>	<b>Low</b>	<b>Fair</b>	<b>High</b>	<b>Very high</b>
Brisk walking					
Cycling					
Jogging					
Sport activities					
Other					

10. If you answered NO, from the following list , please indicate reason(s) for non-adherence to exercise recommendations (You may tick more than 1 option)

- (a) Fatigue \_\_\_\_\_
- (b) Laziness \_\_\_\_\_
- (c) Illness \_\_\_\_\_
- (d) Lack of time \_\_\_\_\_
- (e) Forget to exercise \_\_\_\_\_
- (f) Old Age \_\_\_\_\_
- (g) Weather (for an example too cold or too hot) \_\_\_\_\_
- (h) Fear of criticism (presence of others makes you uncomfortable) \_\_\_\_\_
- (i) No exercise education \_\_\_\_\_
- (j) Exercise results in negate physical reactions ( such as illness and muscular pain) \_\_\_\_\_
- (k) Lack of support from family and or friends \_\_\_\_\_

11. Do you adhere to any form of healthy dietary recommendations

- (a) Yes \_\_\_\_\_
- (b) No \_\_\_\_\_


If No, proceed to Question 14

12. If YES, what kind of healthy dietary recommendations do you adhere to? (You may tick more than option)

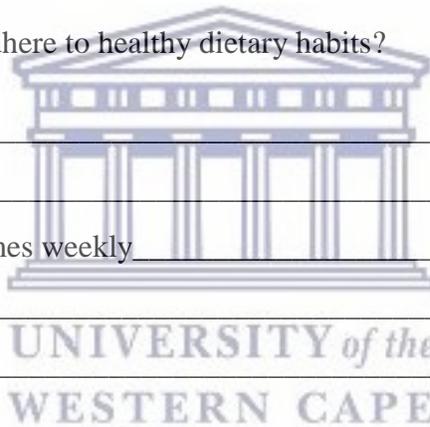
- (a) Diet low in total fat \_\_\_\_\_
- (b) Low sugar diet \_\_\_\_\_
- (c) Diet rich in fruits and vegetables \_\_\_\_\_
- (d) Consumption of lean meat \_\_\_\_\_
- (e) Low salt diet \_\_\_\_\_
- (f) Low starch diet \_\_\_\_\_


What is your extent of adherence to the following healthy dietary recommendations?

	<b>Very low</b>	<b>Low</b>	<b>Fair</b>	<b>High</b>	<b>Very high</b>
Diet low in total fat					
Diet rich in fruits and vegetables					
Low sugar diet					
Consumption of lean meat					
Low starch diet					
Low salt diet					

13. How often do you adhere to healthy dietary habits?

- (a) Once daily \_\_\_\_\_
- (b) Once weekly \_\_\_\_\_
- (c) At least four times weekly \_\_\_\_\_
- (d) Once monthly \_\_\_\_\_
- (e) Other \_\_\_\_\_




14. From the following list, please indicate reason(s) for non-adherence to dietary habits/prescriptions.

- (a) Eating out (restaurant, ceremonies, work, family & friends' homes) \_\_\_\_\_
- (b) Inappropriate dietary habits (e.g. eating snacks in-between meals) \_\_\_\_\_
- (c) Financial constraints (to procure ideal healthy diets) \_\_\_\_\_
- (d) Poor self-control \_\_\_\_\_
- (e) Granting self-permission (e.g. just this once, a little won't hurt) \_\_\_\_\_
- (f) Another's home (e.g. Cattle post, on trips) \_\_\_\_\_
- (g) Situations at home (e.g. I eat non-healthy diets when alone) \_\_\_\_\_
- (h) Other \_\_\_\_\_


Thank you very much for your participation and completing this questionnaire.

To be completed by Researcher/ Research Assistant

Participant BP                   ...../.....mmHg

Participant BMI                 .....kg/m<sup>2</sup>



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**ANNEX 6: INSTRUMENT FOR DATA COLLECTON: QUESTIONNAIRE (SHONA VERSION)**

**MIBVUNZO INOTERVERA ICHASHANDISWA MUKUDZIDZA: MIBVUDZO (MURURIMI RWECHISHONA)**

**ZVIRIKUWONGORORWA MUFUNDO:** KUONGORORA KUTEVEDZERA KUNOITA ZVINOKURUDZIRWA MUKURARAMA NANAMAZVIKOKOTA KWEAVO VANORWARA NECHIRWERE CHE BP VANORAPIRWA PA PARIRENYATWA HOSPITAL.

NB: Mabvuma kudaira mibvunzo maererano ne ongororo irikuitwa panezvinokurudzirwa navana mazvikokota kuneavo vanorwara nechirwere che BP, vanorapirwa pachipatara che Parirenyatwa. Musati matanga, munoyeuchidzwa kuti kupindura mibvunzo ino hakumanikidzwi, chido chenyu, uye mhinduro dzenyu hadziudzwe mumwe munhu. Mhinduro dzenyu hadzitarisirwe kuiswa zita, zvinozoita zvekare kuti zvionekwe kuti ndimi makapindura. Chichazivikanwa chete kuti mhinduro yemibvunzo inotevera yabva kunemunhu akabatwa chirwere che BP uye ava nemwedzi inopfuura mitanhatu achirapwa chirwere ichi. Mushure meongororo dzedu mhinduro dzenyu ticharasa.

Kubvuma / kana kuramba kudaira mibvunzo iyi hazvikanganise kurapwa kwenyu, uye hapana mubairo wamunowana pakuzviita; asi ongororo idzi dzinokwanisa kuzobatsira kurapwa kweBP, kana zvichinge zvaonekwa kuti zvakakosha zvinenge zvakabuda muongororo.

## SECTION A: DEMOGRAPHICS

Pindurai zvinoenderana nemi pamibvunzo inotevera

1. Muri munhurume here kana munhukadzi

- (a) Murume \_\_\_\_\_
- (b) Mukadzi \_\_\_\_\_

2. Mune makore mangani ekuberekwa

- (a) 18 – 25 \_\_\_\_\_
- (b) 26 – 35 \_\_\_\_\_
- (c) 36 – 45 \_\_\_\_\_
- (d) 46 – 55 \_\_\_\_\_
- (e) 56 – 65 \_\_\_\_\_
- (f) 66 kana kupfuura \_\_\_\_\_

3. Makawanikwa here / makawana

- (a) hamusati mawana / kuwanikwa \_\_\_\_\_
- (b) makawanikwa \_\_\_\_\_
- (c) makarambana \_\_\_\_\_
- (d) ndakafirwa \_\_\_\_\_

4. Gwaro rechikoro ramakasvika nderipi

- (a) Hamuna \_\_\_\_\_
- (b) Primary \_\_\_\_\_
- (c) Secondary \_\_\_\_\_
- (d) University \_\_\_\_\_

5. Zvamunoita muupenyu

- (a) Ndinoenda kubasa \_\_\_\_\_
  - (b) Handiendi kubasa \_\_\_\_\_
  - (c) Ndiri pamudya ndigere \_\_\_\_\_
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6. Mava nemakore mangani nechirwere cheBP

- (a) Harisati rava gore \_\_\_\_\_
  - (b) Makore 1-5 \_\_\_\_\_
  - (c) Makore 5-10 \_\_\_\_\_
  - (d) Makore anopfuura 10 \_\_\_\_\_
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**SECTION B**

ZVAMUNOZIVA MAERERANO NEKUCHINJA MARARAMIRO

(ZVEKUDYA NE MAEXERCISE)

Mibvunzo inotevera inoenderana nezvamunoziva pamusoro pezvinotarisirwa kunge muchiita mukurama kwenyu mushure mekunge mabatwa chirwere che BP



7. Pane zvinotevera ndezvipi zvamunofunga kuti zvingabatsira kuderedza blood pressure mu vanhu vane dambudziko iri (munogorana kusarudza mhinduro inopfura imwe)

- (a) kudya kune mafuta anobva kumukaka akanyanya \_\_\_\_\_
  - (b) Kudya kunoita kuti muwane simba rakawanda \_\_\_\_\_
  - (c) Kudya kune michero ne miriwo kwakawanda \_\_\_\_\_
  - (d) ma exercise \_\_\_\_\_
  - (e) Kudya kunopa simba kushoma \_\_\_\_\_
  - (f) Sauti shoma mukudya \_\_\_\_\_
  - (g) Kuzorora ( kusashanda kwakanyanya) \_\_\_\_\_
  - (h) Kudya kunenyama tsvuku yakawanda \_\_\_\_\_
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**SECTION C:**

Chikamu chino chinemubvunzo inoenderana ne kuteedzera kwamunoita mararamiro anochengetedza utano, nezvamungafunga kuti zvingadaro zvirikukutadzisai kurarama saizvo.

8. Munoita exercise inosvika ma miniti gumi nenhatu here mazuva mana pasvondo rega rega?

- (a) Hongu \_\_\_\_\_ 

- (b) Kwete \_\_\_\_\_ 


Kana muchiti kwete, endererai mberi kupindura mubvunzo wegumi (10)

9. Kana muchiti hongu munoita maexercises akaita sei

- (a) Kufamba zvishoma \_\_\_\_\_ 

- (b) Kuchovha bhizhautare \_\_\_\_\_
- (c) Kumhanya zvishoma \_\_\_\_\_
- (d) Munotamba mitambo zhinji \_\_\_\_\_
- (e) Munoitwa zvimwe \_\_\_\_\_

Kana mati hongu, pane zvinotevera zvinokurudzirwa maererano nemaexercise, munotevedzera zvipi?

	Zvishoma Kunyanya	Zvishoma	Pakati nepakati	Zvakanyanya	Zvakanyanya zvizhinji
Kufamba zvishoma					
Kuchova bhizhautare					
Kumhanya zvishoma					
Kutamba mitambo mizhinji					
Kuita zvimweo					

10. Kana mapindura kuti kwete, pane zvinoteera apa sarudzai chimwechete chingave chikonzero kuti musatevedzere ku exercise uko kunova ndiko kunokurudzirwa navana mazvikokota (munogorana kusarudza mhinduro inopfura imwe)

- (a) Kuneta \_\_\_\_\_
- (b) Nhungo \_\_\_\_\_
- (c) Hurwere \_\_\_\_\_
- (d) Kushaya nguva \_\_\_\_\_
- (e) Kukanganwa \_\_\_\_\_
- (f) Kukura \_\_\_\_\_
- (g) Mamiriro ekunze (kutonhora kana kupisa) \_\_\_\_\_
- (h) Kunyara \_\_\_\_\_
- (i) Kushaya fundo yazvo \_\_\_\_\_
- (j) Kunokonzera kurwadziwa kwemuviri \_\_\_\_\_
- (k) Kushaya kurudziro kwehama neshamwari \_\_\_\_\_




11. Munewo cherowo zvimwe zvamunotevedzera maeraro nezvekudya zvinotarisirwa

- (a) Hongu \_\_\_\_\_
- (b) Kwete \_\_\_\_\_


Kana mati kwete, enderera mberi kupindura mubvunzo wegumi nemana (14)

12. Kana mapidura muchiti hongu, ndezvipi zvinotevera zvmunotevedzera  
(munogona kusarudza mhinduro inopfura imwe)

- (a) Kudya kunopa simba kushoma mukudya kwenyu\_\_\_\_\_
- (b) Kudya tsvigiri kanashuga shoma\_\_\_\_\_
- (c) Kudya kwakawanda michero ne miriwo\_\_\_\_\_
- (d) Kudya kunemafuta mashoma\_\_\_\_\_
- (e) Kudya nyama isina mafuta\_\_\_\_\_
- (f) Kudya kune munyu mushoma\_\_\_\_\_


Kana mati hongu, pane zvinotevera zvinokurudzirwa maererano nokudya kwakanaka munotevedzera zvipi?

	Zvishoma Kunyanya	Zvishoma Pakati nepakati	Zvakanyanya	Zvakanyanya zvizhinji
Kudya kunemafutha mashoma				
Kudya kwakawanda michero ne miriwo				
Kudya kune shuga shoma				
Kudya nyama isina mafuta				
Kudya kunopa simba shoma				
Munyu shoma mukudya				

13 Munotevedzera kangani zvinokurudzirwa kuti munge muchitevedzere pakudya

- (a) Zuva roga roga \_\_\_\_\_
  - (b) Kamwe pasvondo \_\_\_\_\_
  - (c) Kanopfura ka ina (4) pasvondo \_\_\_\_\_
  - (d) Kamwe pamwedzi \_\_\_\_\_
  - (e) Imwe mhinduro \_\_\_\_\_
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14. Sarudzai mhinduro inotsanangura chikonzero chingava chiri icho chinokanganisa kuti musadye zvinokurudzirwa navana mazvikokota (munogona kusarudza mhinduro inopfura imwe)

- (a) Kudya pamunofamba (se kudya kumba kwehama / shamwari, kana munzvimbo dzekudyira) \_\_\_\_\_
  - (b) Kudya kumwe kusinga kuridzirwi se kudya chikafu nhando chero nguva \_\_\_\_\_
  - (c) Kushaya mari yekutanga chikafu chinotarisirwa \_\_\_\_\_
  - (d) Kutadza kuzvibata \_\_\_\_\_
  - (e) Kungozvitendera kungodya (sekuti kamwe/tushoma hatuna mhaka) \_\_\_\_\_
  - (f) Kunge murikumba kusiri kwenyu \_\_\_\_\_
  - (g) Zvinowanikwa mudzimba \_\_\_\_\_
  - (h) Zvimwewo \_\_\_\_\_
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Ndatenda chaizvo nekupindura mibvunzo kwamaita

To be completed by Researcher/ Research Assistant

Participant BP ...../.....mmHg

Participant BMI .....kg/m<sup>2</sup>

## ANNEX 7 : HOSPITAL APPROVAL LETTER

\* PLEASE COMPLETE THIS FORM TOGETHER WITH YOUR APPLICATION \*

### APPLICATION FOR RESEARCH AT PARIRENYATWA HOSPITAL

NAME OF APPLICANT: RUNANI MAKONDO

ADDRESS OF APPLICANT: 3042 MUURA CROSE, BLUFFHILL  
HARARE

NAME OF INSTITUTION

UNIVERSITY OF WESTERN CAPE, SCHOOL OF PUBLIC HEALTH

NAME OF SUPERVISOR

MS LUNGISWA TSOLEKILE

PROJECT PROPOSAL

ADHERENCE TO LIFESTYLE MODIFICATION RECOMMENDATIONS  
IN HYPERTENSIVE PATIENTS AT PARIRENYATWA HOSPITAL

OBJECTIVES

- ① To determine adherence to dietary and exercise recommendations among hypertensive patients.
- ② To identify patient and environmental related barriers to adherence to dietary and physical activity recommendations among hypertensive patients.

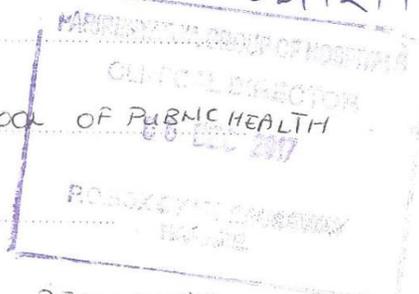
METHODOLOGY

A quantitative methodological approach will be used with an analytical cross-sectional study design. 328 hypertensive patients attending the Parirenyatwa Hospital outpatient medical clinics will be requested to complete a self-administered questionnaire.

TIMETABLE: Data collection will be over a period of 3 months from the time of study activation.

PATIENT INCLUSION CRITERIA

- ① Hypertensive patients attending the Parirenyatwa outpatient medical clinic.
- ② Age 18 years and above.
- ③ Hypertensive but however not diagnosed of any of the hypertension complications.



USE OF RESULTS

Results of the study will assist in development of strategies to tackle poor adherence to lifestyle modification recommendations in hypertensive patients in Zimbabwe.

REFERENCES

I promise to forward the Conclusions of the study to the CLINICAL DIRECTOR

NAME: Rulani Makondo

SIGNATURE

R Makondo

STATION PERMISSION

1. CONSULTANT

NAME: DR Tendani Maiti  
 Agree  Do not Agree

2. WARD MANAGER

NAME: R Dzobo  
 Agree  Do not Agree



## ANNEX 8 : INSTITUTIONAL REVIEW BOARD APPROVAL LETTER



OFFICE OF THE DIRECTOR: RESEARCH  
RESEARCH AND INNOVATION DIVISION

Private Bag X17, Bellville 7535  
South Africa  
T: +27 21 959 2988/2948  
F: +27 21 959 3170  
E: [research-ethics@uwc.ac.za](mailto:research-ethics@uwc.ac.za)  
[www.uwc.ac.za](http://www.uwc.ac.za)

16 November 2017

Ms R Makondo  
School of Public Health  
Faculty of Community and Health Sciences

**Ethics Reference Number:** BM17/9/7

**Project Title:** Adherence to lifestyle modification recommendations in hypertensive patients at Parirenyatwa Hospital.

**Approval Period:** 16 November 2017 – 16 November 2018

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

**Please remember to submit a progress report in good time for annual renewal.**

The Committee must be informed of any serious adverse event and/or termination of the study.

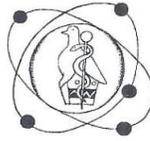
A handwritten signature in black ink, appearing to read 'Josias'.

*Ms Patricia Josias  
Research Ethics Committee Officer  
University of the Western Cape*

**PROVISIONAL REC NUMBER -130416-050**

## ANNEX 9 : MEDICAL RESEARCH COUNCIL APPROVAL LETTER

Telephone: 791792/791193  
Telefax: (263) - 4 - 790715  
E-mail: [mrcz@mrcz.org.zw](mailto:mrcz@mrcz.org.zw)  
Website: <http://www.mrcz.org.zw>



Medical Research Council of Zimbabwe  
Josiah Tongogara / Mazoe Street  
P. O. Box CY 573  
Causeway  
Harare

### APPROVAL LETTER

REF: MRCZ/B/1408

29 December 2017

Rulani Makondo  
3042 Mvura Close  
Bluff Hill  
Harare  
Zimbabwe



### RE: ADHERENCE TO LIFE STYLE, MODIFICATION, RECOMMENDATIONS IN HYPERTENSIVE PATIENTS AT PARIRENYATWA HOSPITAL

Thank you for the above titled proposal that you submitted to the Medical Research Council of Zimbabwe (MRCZ) for review. Please be advised that the Medical Research Council of Zimbabwe has **reviewed and approved** your application to conduct the above titled study. This is based on the following documents that were submitted to the MRCZ for review:

- a) Study proposal
- b) Data collection tools
- c) Consent Forms

#### **APPROVAL NUMBER**

: MRCZ/B/1408

This number should be used on all correspondence, consent forms and documents as appropriate.

- **APPROVAL DATE** : 29 December, 2017
- **TYPE OF MEETING** : Expedited
- **EXPIRATION DATE** : 28 December, 2018

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted one month before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices.
- **MODIFICATIONS:** Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY:** On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices.
- **QUESTIONS:** Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on [mrcz@mrcz.org.zw](mailto:mrcz@mrcz.org.zw).

#### **Other**

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

**MRCZ SECRETARIAT  
FOR CHAIRPERSON  
MEDICAL RESEARCH COUNCIL OF ZIMBABWE**

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH