Factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho

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PREFACE

The dissertation comprises four chapters. Chapter one highlights an overview of the problem statement, the research aims and objectives as well as the research method. Chapter two addresses literature objectives that were highlighted in chapter one. Chapter three covers the findings of the empirical objectives and presents the findings in text form and manuscript format. Chapter four provides conclusions of the study in accordance with the objectives and also states limitations and recommendations.

Author contributions in the study are discussed as follows:

Author	Contribution to manuscript
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Dr R Joubert	Supervision of the study Revision of the manuscript Guidance on interpretation of results Reviewing the manuscript for approval.
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With the following statement, the co-authors confirm their role in the study and sanction the inclusion of the manuscripts in the dissertation.

I declare that I have approved the above-mentioned manuscript and that my role in the study, as indicated above, is representative of my actual contributions and I hereby give my consent that it may be published as part of the MPharm study of RK Mafisa.

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-Psalm 34:19

ABSTRACT

In 2015, the World Health Orhanisation (WHO) stated that 1.13 billion people worldwide suffer from hypertension, with the African region having the highest prevalence of approximately 46.0%, and the American region the lowest prevalence with 35.0%. With this high prevalence of hypertension in Africa, a number of studies have revealed that there is a high prevalence of uncontrolled blood pressure (BP) in the Sub-Saharan African countries. Although treatment of hypertension is available in Lesotho, it was found to be one of the countries with a high prevalence of uncontrolled BP. The aim of this study was to determine the factors that lead to uncontrolled BP in patients taking antihypertensive medication in an outpatient setting in Mafeteng, Lesotho. In order to achieve the objectives of the study, a literature review and an empirical investigation were conducted.

The literature study gave an overview of BP control around the world, factors that affect BP control and measures to improve BP control. For the empirical investigation, an observational, cross-sectional study was conducted at Mafeteng Government Hospital from October 2018 to December 2018 where 176 hypertensive patients (80.1% females) were enrolled in the study. Data was obtained through face-to-face interview using a structured questionnaire. The mean age of participants was 61.2 ±12.93 years and most of them were aged ≥ 60 (60.8%); the mean systolic blood pressure (SBP) was 145.2 ±23.7; and the mean diastolic blood pressure (DBP) was 88.5 ±11.9.

In investigating patient-related factors leading to uncontrolled BP, it was found that about 30.1% of participants had comorbidities; 61.4% had uncontrolled BP; 90.3% adhered sub-optimally to their antihypertensive medication; 36.9% sub-optimally kept to their scheduled appointments; 65.9% consumed moderate to high amounts of salt; 86.4% followed a special diet; 85.8% engaged in physical activity; 18.2% consumed alcohol; and 18.8% were smokers.

In investigating facility-related factors leading to uncontrolled BP, it was found that amongst participants with uncontrolled BP, the doctors' adherence to the Lesotho standard treatment guidelines was questionable in 13.0% (n=108); 66.7% had not received patient education from healthcare professionals; 5.6% had not received some/all their antihypertensive medication on the day of interview; and 43.5% and 35.2% had seldom and often, respectively, experienced stock-outs of antihypertensive medication at the hospital pharmacy.

In conclusion, it was found that the rate of uncontrolled BP at the study setting is high. It can be attributed to the following: sub-optimal medication adherence, sub-optimal appointment keeping, presence of comorbidities, moderate to high consumption of salt, questionable adherence to Lesotho

standard treatment guidelines by doctors, lack of patient education by healthcare professionals and frequency of stock-outs of antihypertensive medication at the hospital pharmacy.

Keywords: hypertension, prevalence, uncontrolled blood pressure, factors, antihypertensive medication, Lesotho, adherence.

LIST OF ABBREVIATIONS

95% CI	95% Confidence Interval
ACE	Angiotensin-Converting Enzyme
ACEI	Angiotensin-Converting Enzyme Inhibitor
AHA	American Heart Association
ARB	Aldersterone Receptor Inhibitor
AT1	Angiotensin One
AT2	Angiotensin Two
AV	Atrioventricular
BD	Twice Daily
BP	Blood Pressure
CCB	Calcium Channel Blocker
COPD	Chronic Obstructive Pulmonary Disease
CVD	Cardiovascular Diseases
DASH	Dietary Approaches to Stopping Hypertension
DBP	Diastolic Blood Pressure
HCTZ	Hydrochlorothiazide
HIV/AIDS	Human Immunodeficiency Virus or Acquired Immunodeficiency Syndrome
HREC	Health Research Ethics Council
JNC7	Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure
JNC8	Eighth Joint National Committee

MmHg	Millimetres of Mercury
MOH	Lesotho Ministry of Health
MOHSW	Lesotho Ministry of Health and Social Welfare
NWU	North-West University
OD	Once Daily
OPD	Outpatient Department
PCRM	Physicians Committee for Responsible Medicines
QOL	Quality Of Life
SAHS	South African Hypertension Society
SBP	Systolic Blood Pressure
SD	Standard Deviation
SPSS®	Statistical Package for Social Sciences
STGs	Standard Treatment Guidelines
TLC	Therapeutic Lifestyle Changes
U.P.D.S	UK Prospective Diabetes Study
UK	United Kingdom
US	United States
WHO	World Health Organization

LIST OF DEFINITIONS

Controlled blood pressure Systolic blood pressure less than 140 mmHg or less than 150 mmHg in general population aged ≥60 years and diastolic blood pressure less than 90 mmHg. Or systolic blood pressure less than 130 mmHg and diastolic blood pressure less than 80 mmHg in patients with comorbidities such as diabetes and heart failure (Chobanian *et al.*, 2004:12; Lesotho Ministry of Health, 2017).

Hill-Bone compliance to blood pressure therapy scale also referred to as the Hill-Bone compliance scale, is a tool that is used to assess the behaviour of hypertension patients towards reducing sodium intake, keeping appointments and taking hypertension medication. It consists of 14 items in three subscales and each item is a four-point Likert type scale (Kim *et al.*, 2000).

Uncontrolled hypertension Systolic blood pressure greater than 140 mmHg or greater than 150 mmHg in general population aged ≥60 years and/or diastolic blood pressure greater than 90 mmHg while in patients with comorbidities such as diabetes and heart failure, it is said to be uncontrolled if systolic blood pressure is greater than 130 mmHg and/or diastolic blood pressure is greater than 80 mmHg (Chobanian *et al.*, 2004:12; Lesotho Ministry of Health, 2017).

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CHAPTER 1: INTRODUCTION

1.1 Introduction

This chapter addresses the background of the study, problem statement, research aims and objectives of the study and the methodology.

1.2 Background and the problem statement

In the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7), Chobanian *et al.* (2004:12) define normal blood pressure (BP) in adults as systolic blood pressure (SBP) <120 millimetres of mercury (mmHg) and diastolic blood pressure (DBP) <80 mmHg. Prehypertension is when SBP is 120-139 mmHg or DBP is 80-89 mmHg and hypertension is when the SBP is ≥140 mmHg and DBP is ≥90 mmHg. Chobanian *et al.* (2004:12) further classified hypertension into stage 1 and stage 2 hypertension, with stage 1 being classified as a SBP ranging between 140-159 mmHg or DBP ranging between 90-99 mmHg, and stage 2 being classified as a SBP ≥160 mmHg and DBP ≥100 mmHg.

A mean SBP of ≥140mmHg or a mean DBP ≥90 mmHg in hypertensive patients is said to be uncontrolled BP (Valderrama *et al.,* 2012:704). Valderrama *et al.* (2012:704) revealed that 66.9 million United States (US) adults, aged 18 years or older, had hypertension during 2003-2010 and more than 50% (35.8 million) of these people had uncontrolled hypertension. They further stated that of the 35.8 million people who had uncontrolled hypertension, 89.4% were well off as they had a normal income, had a health insurance and had obtained healthcare in the past year. As stated by Nicoll and Henein (2010:879), deaths that were due to uncontrolled BP were 62 000 per year in the United Kingdom (UK) and the national survey showed that the problem was more common in the Asian migrant societies.

In a study to determine how hypertension treatment and hypertension control is linked to mortality in US adults who have hypertension, Gu *et al.* (2010:43) stated that both all-cause mortality and mortality from cardiovascular diseases (CVD) were linked with hypertension treatment and control status. The risk of mortality in hypertensive patients who received treatment was 57% and it was 74% in those who did not receive treatment. Krousel-Wood *et al*. (2010:54) found that adherence to chronic conditions medications is approximately 50%.

Medication adherence has been shown to be one of the major causes of poor control of BP. In a study of 114 participants conducted in Nigeria by Akintunde and Akintunde (2015), it was found that medication adherence amongst patients with hypertension was low and even lower in patients who attended the general out-patient department than in patients attending specialty clinics. The study also found that

adherence was influenced by the age of the patient, the average monthly income and the number of medications the patient was taking (Akintunde & Akintunde, 2015). Vrijens *et al.* (2017:6) stated that appropriate adherence in antihypertensive medication can be achieved through patient-tailoring and making measurement guided interventions for each patient.

Despite available treatment of hypertension in Lesotho, hypertension remains uncontrolled thereby leading to hypertension-related morbidity and mortality. Studies conducted during 2013 and 2014/2015 by Thinyane *et al*. (2015) and Mugomeri *et al.* (2016:44) respectively, revealed that approximately 75% of hypertensive patients in Lesotho had uncontrolled hypertension. In 2014, the World Health Organization (WHO, 2014) in the World Life Expectancy report, reported that hypertension deaths in Lesotho accounted for 1.61% (n = 27 100) of total deaths, ranking Lesotho ninth worldwide.

The World Health Organization (WHO) (2014) also reported that a common complication of hypertension that causes deaths in Lesotho is stroke, accounting for 5.57% (n = 27 100) of total deaths putting Lesotho at an average rank of 38th worldwide for stroke deaths in 2014. Coronary heart disease, another complication of hypertension, accounted for 2.52% (n = 27 100) of total deaths in Lesotho also putting Lesotho at an average rank of 137th worldwide for coronary heart disease deaths.

Thinyane *et al.* (2015) also found that medication adherence was quite poor in patients receiving antihypertensive medication at a primary healthcare clinic in Maseru, Lesotho in 2013. In the same year, another study by Khothatso *et al.* (2016:27) also revealed that medication adherence was low in hypertension patients getting medication at a district hospital in Leribe, Lesotho.

In the Annual Joint Review Report (2009/2010), the Lesotho Ministry of Health and Social Welfare (MOHSW, 2010:53) reported that hypertension was the third most common cause of outpatient department (OPD) attendance in 2009. Hypertension-related female hospital admissions contributed to three percent (n = 13 982) of all female hospital admissions and those due to heart failure and stroke contributed to four percent (n = 13 982) of all female hospital admissions in 2009. Male hospital admissions due to stroke and heart failure contributed to three percent (n = 11 325) of all male hospital admissions in 2009. Stroke and heart failure constituted eight percent of deaths in both males and females in 2009.

Lesotho Ministry of Health (MOH) (2014:304) stated in the Lesotho Demographic Health Survey that 19% (n = 3 254) of females aged 15 to 49 years in Lesotho have hypertension and that only one in five of these women have their BP managed with medication. As for men, 13% (n = 2 508) aged 15-49 years have hypertension and only one in seven take medications for this condition. However, of this small percentage of male and females whose hypertension is managed with medications, research by

Thinyane *et al*. (2015) and Mugomeri *et al.* (2016:44) has revealed that BP was well controlled (<140/90 mmHg) in only 25% of these patients.

In 2014, the WHO published statistics indicating that 12% (n = 29 000) of deaths in Lesotho are caused by CVDs making CVDs the second most common cause of death after Human Immunodeficiency Virus or Acquired Immunodeficiency Syndrome (HIV/AIDS) which accounts for 44% (n = 29 000) of total deaths.

According to Roumie *et al*. (2006:168), patient education in terms of knowledge about the disease, hypertensive medication and lifestyle modifications improves BP control. Mugomeri *et al.* (2016:45) also stated that poor treatment outcomes are seen in patients with inadequate knowledge about their disease conditions. The authors further state that inadequate knowledge of antihypertensive medications is one of the major causes of uncontrolled BP.

In a study conducted by Dragomir (2010:290), it was discovered that patients who do not adhere to antihypertensive medication incur a greater chance of vascular conditions while patients who adhere to antihypertensive medications obtain an improved health status. Ralmi (2012:617) found that BP control was better in patients who were adherent to BP medication than in patients who were non-adherent.

Lifestyle and behavioural changes, including dietary aspects, result in reduced BP and improved BP control (Appel *et al.*, 2003:2092; Chobanian *et al*., 2004:25; Nicoll & Henein, 2010:880; Roumie *et al*. 2006:168). Hypertensive patients should be taught about the importance of eating healthy, being physically active and refraining from excessive drinking and smoking (Steyn, 2006:45). Adoption of the Dietary Approaches to Stopping Hypertension (DASH) eating plan, has proven to reduce SBP by 8 to 14 mmHg within a period of six months (Chobanian *et al.*, 2004:25). Chobanian *et al.* (2004:25) further stated that this diet consists of low-fat dairy foods, a lot of vegetables and fruit. Ha (2014:16) found that a reduction of salt intake from the average 9-12 grams per day to the recommended 5-6 grams per day yields improved outcomes in the management of cardiovascular conditions.

Regular physical activity for 30 minutes daily on most days of the week has been found to lower SBP by 4-9 mmHg within a period of six months. Engagement in aerobic exercise decreases BP in patients with and without hypertension (Whelton, S *et al.*, 2002:493). Adequate alcohol drinking is ≤2 drinks per day in men; ≤1 drink in men weighing less than 60 kg and in women (Appel *et al*., 2003:2089). It was further stated that alcohol drinking of up to this much can lower SBP with 2 - 4 mmHg within a period of six months. An average drink is any drink that contains about 0.6 ounces or 14 grams of pure alcohol (National Institute of Alcohol Abuse and Alcoholism n.d). Xin *et al.* (2001:1116) found that reducing alcohol intake in people who drank immoderately (that is, more than two drinks per day in males or more than one drink per day in females) was related to a substantial reduction in high BP.

Hypertensive patients with comorbidities require intense BP control strategies as these comorbidities put them at a much higher risk of other complications (Kesarwani *et al.*, 2009:1062; Schmieder *et al.*, 2008:629). Luijks (2015:15) also found that the number of comorbid conditions present at baseline substantially associated with the increase in SBP over a certain period.

Shabangu and Suleman (2015:829) stated that constant availability of medicines will result in improved health outcomes in non-communicable diseases. Jindal (2011:41) stated that standard treatment guidelines (STGs) should be framed in such a way that they are suitable for different levels of healthcare and that they are important and most essential for the management of non-communicable diseases.

Assuming that uncontrolled BP is a major cause of CVD deaths in Lesotho, these statistics show that hypertension is not well controlled, and it is one of the major problems under non-communicable diseases. It is, therefore, imperative that factors that lead to uncontrolled BP in Lesotho are identified so that measures can be taken to improve BP control. Knowledge obtained from this study can help draw suitable guidelines to optimise the control of hypertension in Lesotho.

From this discussion, the following research questions were formulated:

- How many patients in Lesotho have uncontrolled BP?
- What are the patient-related factors that lead to uncontrolled BP in Lesotho?
- What are the facility-related factors that lead to uncontrolled BP in Lesotho?

1.3 Research aim and objectives

This section covers the research aim and objectives of the study.

1.3.1 Research aims

The general aim of this study was to determine the factors that lead to uncontrolled BP in patients taking antihypertensive medication in an outpatient setting in Mafeteng, Lesotho.

1.3.2 Literature objectives

The objectives of conducting a literature review were to:

- Investigate the control of BP worldwide, narrowing down specifically to Lesotho;
- Determine consequences of uncontrolled BP;

- Determine factors that influence poor control of BP in patients taking hypertensive treatment;
- Review the guidelines for the treatment of hypertension; and
- Identify the measures taken to improve BP control by different organisations around the world.

1.3.3 Empirical objectives

Through the empirical investigation, the study aims to:

- Determine BP control status (i.e. controlled versus uncontrolled BP) of patients taking antihypertensive medication in an outpatient setting in Mafeteng, Lesotho;
- Determine the prevalence of uncontrolled BP in the outpatient setting;
- Determine patient-related factors that lead to uncontrolled BP by:
  - Assessing medication adherence of patients to hypertension medication;
  - Assessing adherence of patients to follow-up of appointments;
  - Assessing the presence of concomitant and comorbid conditions in hypertension patients; and by
  - Assessing lifestyle behaviour (physical activity, diet, salt intake, alcohol consumption and smoking status) of hypertensive patients before and after diagnosis;
- Determine facility-related factors that lead to uncontrolled BP by:
  - Assessing adherence to standard treatment guidelines by doctors in the outpatient setting;
  - Assessing the availability of antihypertensive medication to patients in the outpatient setting; and
  - Assessing provision of patient education by healthcare service providers in the outpatient setting.

1.4 Research methodology

Research methodology covers the study setting, target population and study population, study design and the study sampling.

1.4.1 Study setting

The study was conducted at Mafeteng Government Hospital, a 111-bed hospital which is situated in the Mafeteng district, Lesotho. Mafeteng Government Hospital is the only hospital in the district and,

therefore, offers treatment to a broad population in the district including referred patients and those whose treatment is initiated in the hospital. It provides treatment to urban and rural patients and it is one of the hospitals with the highest number of hypertension cases. This was the site of choice because among other diseases treated, the Mafeteng Government Hospital offers hypertension treatment services to patients in the OPD every week on Wednesdays.

1.4.2 Target population and study population

The target population was all patients with hypertension receiving their hypertension treatment at Mafeteng Government Hospital. About 800 patients visit Mafeteng Government Hospital for their hypertension treatment follow-up monthly. The study population was hypertensive patients meeting the inclusion criteria.

1.4.2.1 Inclusion criteria

All adult hypertensive patients, referred from clinics or whose treatment was initiated at Mafeteng Government Hospital, who had been receiving hypertensive treatment at the hospital for more than six months were included in the study. This is because retrospective data for the previous six months and the first available BP measurement (e.g. BP measurement at diagnosis) was required during data collection.

1.4.2.2 Exclusion criteria

Pregnant women who developed gestational hypertension were excluded from the study because there are various other factors that may influence their BP during pregnancy.

1.4.3 Study design

This study was conducted using an observational, cross-sectional study design. The Dictionary of Epidemiology (2014:203) defined observational studies as studies in which no intervention is made during the study. Cross-sectional studies are defined as studies in which data is gathered at one point in time (Brink *et al.*, 2012:101). This study design helped determine the status and factors influencing control of BP in hypertensive patients thereby leading to an insight into the actual factors that influence poor BP control in the outpatient setting in Lesotho.

1.4.4 Sampling

This section covers the sampling technique and the determination of sample size of the study.

1.4.4.1 Sampling technique

All patients meeting the inclusion criteria were asked to participate in the study.

1.4.4.2 Determination of sample size

The study used an all-inclusive sampling; thus, sample size was not calculated. The results are generalizable to the district because Mafeteng Government Hospital serves both patients in rural and urban areas.

1.5 Data-collection tool

This section covers the data source, development of data-collection tool, and assurance of validity and reliability of the data-collection tool.

1.5.1 Data source

Data for this study was obtained from patient records, specifically the prescription booklets and also through face-to-face interviews using a structured questionnaire.

From the prescription booklet, patient demographic data and medical history were taken. Demographic information includes the gender as well as age of the patient, while medical history included previous BP readings, the current BP reading, comorbidities and other chronic conditions, and prescribed medication the patient received from the facility.

From the face-to-face interviews, the researcher obtained information which determined patient education and patient knowledge about the disease and adherence to medication together with adherence to lifestyle changes.

1.5.2 Development of the data-collection tool

A structured questionnaire was developed by the researcher to ensure that all the study patient-related variables are covered. It was developed based on different factors that are found to affect high BP in literature (Appel *et al*., 2003:2085; Jindal, 2011:39; Kesarwani *et al.*, 2009:1062; Lambert *et al*., 2006:287; Luijks *et al.*, 2015:15; Mugomeri *et al.*, 2016:43; Schmieder *et al.*, 2008:629; Shabangu & Suleman, 2015:831; Thinyane *et al.*, 2015). The researcher found relevant articles that highlight factors that can cause high BP and then set up questions (that were later approved by the statistician) to find out from participants if any of those factors found in literature are the ones that negatively affect the BP of patients in Lesotho. Table 1-1 shows contents of the data-collection tool.

It consisted of three sections that are as follows:

- Section A covered the patient demographic information.
- Section B covered current and retrospective data from the past six months on patient medical history (including previous BP readings and medication history) to help assess facility adherence to STGs, prescribing patterns and out-of-stock medications.
- Section C consisted of questions that assisted in assessing patients' knowledge about their condition, whether the facility staff offer patient education about high BP, patients' access to hypertensive medication, patient's adherence to follow-up, patients' adherence to lifestyle modifications and patients' adherence to high BP medication. The Hill-Bone adherence scale (Refer to Annexure VI, VII, XI) was used to assess patient adherence to hypertension medication (refer to section 1.5.3.1 for full discussion).

Table 1-1: Contents of the data-collection tool

Objectives	Section in data-collection tool (A, B, or C)	Explanation
Demographic information	A	Information regarding the demographics of the patient was filled in in this section
Patient-related factors:		
Patient education	C	Closed-ended questions were asked to determine whether the patient is educated about the disease, lifestyle modifications and medications were asked
Adherence to medication by patients	C	Determined through the Hill-bone scale
Adherence to lifestyle changes	C	Closed-ended questions to determine whether the patient adheres to lifestyle changes were asked in this section
Salt intake by patients	C	Determined through the Hill-Bone scale
Comorbid conditions	B	This information was obtained from the prescription booklet
Adherence to follow-up	C	Determined through the Hill-Bone scale

Objectives	Section in data-collection tool (A, B, or C)	Explanation
Demographic information	A	Information regarding the demographics of the patient was filled in in this section
Facility-related factors:		
Out-of-stock medications	B	This information was obtained from the prescription booklet
Adherence to STGs	B	This information was obtained from the prescription booklet
BP control status of patients:		
State of BP control in patients	B	BP readings obtained from the prescription booklet

1.5.3 Validity and reliability of the data-collection tool

The study supervisors, the statistician and an expert working in Lesotho health sector validated the data-collection tool in order to ensure validity and reliability.

1.5.3.1 Validity of data-collection tool

Validity of the data-collection tool determines whether the tool accurately measures all the necessary variables that it was intended to measure (Brink *et al*., 2012:165; Katzenellenbogen & Joubert, 2014:123; Pietersen & Maree, 2016c:239).

To validate the data-collection tool, the researcher and study supervisors checked the data collection tool to ensure that the questions in the tool represent what the researcher wants to cover. The statistician and a pharmacy lecturer at the National University of Lesotho looked at the following:

Content validity was used to assess how well the data-collection tool represents all the components of the variables that are to be measured. This type of validity is performed when the researcher designs the data-collection tool and it is based on the literature review of the researcher. The review reveals the important aspects of the variables that must be included in the content of the tool (Brink *et al*., 2012:166; Katzenellenbogen & Joubert, 2014:126; Pietersen & Maree, 2016c:241).

According to Kim *et al*. (2000), the content validity of the Hill-Bone compliance scale was assessed through a relevant review of literature and an expert panel, which concentrated mostly on cultural sensitivity and appropriateness of the instrument for low literacy. Internal consistency, reliability and

predictive validity of the Hill-Bone compliance scale were assessed through the use of community-based samples of patients with hypertension. The standardised alphas for the total scale were 0.74 and 0.84, and the average inter-item correlations of the 14 items were 0.18 and 0.28, respectively. Kim and colleagues further stated that the construct and predictive validity of the Hill-Bone compliance scale was assessed by factor analysis and by testing of theoretically derived hypotheses regarding whether the scale demonstrated consistent and expected relationships with related variables.

They also looked at **Face validity** to check whether the tool seems to measure what it is meant to. It is said to be based on intuitive judgement that is made by experts in the field (Brink *et al*., 2012:166; Katzenellenbogen & Joubert, 2014:126; Pietersen & Maree, 2016c:241). The structured questionnaire was face-validated by the research supervisors, a pharmacist working in a hospital environment and the pharmacy lecturer from the National University of Lesotho.

Construct validity is the type of validity that measures the relationship between the instrument and the related theory (Brink *et al*., 2012:168). The researcher translated the structured questionnaire into Sesotho, the researcher's native language. The researcher then gave the translated questionnaire to a native Sesotho speaking health professional, who is not familiar with the aims of the study to back-translate the structured questionnaire into English. In order to determine the accuracy of the translation, the original structured questionnaire and the back-translated questionnaire were compared to check for differences which were then accounted for by the researcher. In conclusion, the researcher translated the questionnaire into Sesotho after accounting for the observed differences and allowed the structured questionnaire to be evaluated by a native Sesotho speaking individual.

1.5.3.2 Reliability of data-collection tool

The data-collection tool is said to be reliable if when used in the same population on different respondents or by different researchers on the same population, it can produce the same results (Brink *et al*., 2012:169; Katzenellenbogen & Joubert, 2014:301; Pietersen & Maree, 2016c:238). The researcher formulated the questionnaire with reference to literature and consulted the supervisors and the statistician, thereby ensuring reliability of the tool. Lambert *et al*. (2006:288) found the Hill-Bone Compliance Scale to be reliable and valid for use in South Africa and that it is more effective in the majority of the black population than Caucasians and this is an advantage for this study because the population of Lesotho consists of 99.7% Basotho people.

1.6 Data-collection process

This section comprises of the process of obtaining permission to conduct the study, recruitment of study participants, the process of obtaining informed consent and the actual process of collecting data with the data-collection tool.

1.6.1 Process of obtaining permission

The following were required prior to implementation of the study:

- Ethics clearance by the Health Research Ethics Council (HREC) of the North-West University (NWU) (Potchefstroom campus) (Refer to Annexure VIII);
- A letter of permission from the National Review Board and Ethics Committee of the Lesotho Ministry of Health (Refer to Annexure IX);
- A letter of goodwill permission from the Medical Director of Mafeteng Government Hospital (Refer to Annexure X);
- A confidentiality agreement from the independent person who will act as a mediator of the study (Refer to Annexure III); and
- A confidentiality agreement from the assistant data collector (Refer to Annexure IV).

1.6.2 Recruitment of participants

After permission from the NWU HREC, Lesotho MOH National Review Board and Ethics Committee and Mafeteng Government Hospital had been granted, the researcher put up size A0 advertisement posters (refer to Annexure V) on areas which had been assigned by the hospital administration. The posters contained contact details of the researcher so that anyone who wanted to participate or required more information regarding the study could contact the researcher. The posters were removed on the last day of recruitment.

An independent Mosotho who is a registered Nurse Midwife in Lesotho, and is fluent in both Sesotho and English acted as a mediator during the recruitment period. The researcher ensured that the mediator understood the ethical issues concerned in scientific research. The independent person signed a confidentiality agreement (refer to Annexure III) before starting with recruitment of participants.

On the day of hypertension follow-up (Wednesdays), the researcher, the assistant data collector and the mediator went to Mafeteng Government Hospital to invite patients to participate in the study. This

process was done every Wednesday for one month starting from the date of ethics approval. On this day, the mediator introduced the study to the hypertensive patients and gave the patients contact detail forms which they filled in when they were interested in participating in the study. They were asked to place the contact details forms in a tamperproof box labelled 'CONTACT DETAIL FORMS' which they would find at the hospital registration (or pharmacy) area, and the researcher would call them to tell them more about the study and to ask them to participate. It also had contact details of the researcher for anyone who would require more information regarding the study.

The mediator then took out the informed consent forms, one copy written in Sesotho and the other written in English and then read out the informed consent form (refer to annexure I & II) to the patients. She then explained the contents of the form in detail and then gave each interested patient a copy of the informed consent form according to the language preference of each patient. This copy served as a duplicate for the patient for record purposes and to go through before they decided whether or not they wanted to participate.

1.6.3 Process of obtaining informed consent

The researcher called the patients who provided their contact details and further explained the study. The researcher asked the potential participants to voluntarily participate in the study and then explained that the potential participants had the right to refuse to take part and that they could withdraw from the study at any stage without any penalties. The researcher also gave the potential participants the opportunity to ask questions if they need any clarifications. The potential participants were also told that they would not be remunerated for participating in the study.

The researcher then communicated the date of the next hospital appointment on which the potential participant, the mediator and the researcher would meet to sign the informed consent form and possibly continue with the interview. This means that the potential participants were given a period of at least one month to decide on whether they wanted to participate in the study.

On the day of the agreed appointment, the researcher, the potential participant (and witness) met in an arranged private room to sign an informed consent form. Before signing, the researcher ensured that the potential participant understood all the terms of the study and if the potential participant continued with consent, they would all sign, and the signed informed consent form would be temporarily stored in a box in the room before being moved into a locked cupboard at the end of the day. If it was on the agreed date of data-collection, the mediator (and witness) was excused from the room so that the researcher and the assistant data collector could continue with data collection. If it was not on the agreed date of data-collection, then further arrangements were made by the researcher to set up an appointment for data collection.

The contact details forms were kept in a locked cupboard and they were destroyed in front of a witness after the interviews have taken place. After completion of the study, all the signed informed consent forms were handed to the Medicine Usage in South Africa offices where they will be kept for a period of five years.

1.6.4 The process of collecting data using the data-collection tool

On the day of data collection, the following steps were taken:

- An independent Mosotho who speaks both Sesotho and English fluently with at least a Lesotho General Certificate of Secondary Education or a Cambridge Overseas School Certificate acted as an assistant data-collector during the period of data-collection. The researcher trained the assistant data-collector on how to utilize the data collection tool (refer to section 1.6.4.1) and also ensured that the assistant data-collector understood the ethical issues concerned in scientific research. The assistant data-collector first signed a confidentiality agreement (refer to Annexure IV) in order to ensure that the participant information was kept confidential.

- After the participant had received their medication from the hospital pharmacy, she/he went into an arranged room that had been provided by the hospital management, where they were interviewed one at a time. The room had a minimum of three chairs and one desk which were occupied by the participant, assistant data-collector and the researcher.

- In the room, the researcher, also fluent in Sesotho and English, asked each participant to reaffirm their consent before commencing with data capturing. When the participants reaffirmed consent, then the researcher and the assistant data collector continued with data capturing but if the participant was no longer interested in taking part then they were excused from the study.

- The assistant data-collector captured data from the participants' prescription booklets into Section A and B of the data-collection tool accordingly. A code was written on the data-collection tool in each page. The information collected includes demographic information and medical history. In the same room, while the assistant data-collector was busy with capturing data from the prescription booklet, the researcher proceeded with data-collection of the last section of the data-collection tool by interviewing the participant.

- In Section C of the data-collection tool (structured questionnaire), the researcher interviewed the participant by asking them structured questions and filled in all the answers the participant had given with ink in the questionnaire.

- The researcher and the assistant data-collector acted as their own translators where translation was needed.

- The code on each data-collection tool was known by the researcher and the assistant data-collector only, and the participant if they were interested in knowing their code number. All filled in data-collection tools were stored in a closed box immediately after each interview so that no patient could see the data-collection tools of others.

- Each interview and data-collection process was estimated to take at most 30 minutes. Upon completion of the interview, Section A and B of the data-collection tool were stapled together with Section C of the data-collection tool (structured questionnaire) and were stored in a box which was later stored in the researcher's office in a locked cupboard.

- At the end of data-collection from each participant, the prescription booklets of participants who had completed participation were patched with a visible sticker to ensure that they were not interviewed again when they revisited the hospital. The participant was handed their prescription booklet, a bottle of water, a fruit and those participants who had mentioned that they needed to rush to work were given M20.00 which would help with transport costs and they left the room. These expenses were funded by the researcher as it was stipulated during the ethics application.

1.6.4.1 Training of the assistant data-collector

The following steps were taken to ensure that the assistant data-collector understood the process:

- The researcher explained the data-collection tool/process to the assistant in detail;

- With the use of a sample prescription booklet, the researcher showed the assistant the information that would be captured from the prescription booklets onto the data-collection tool;

- The researcher then gave the assistant five sample prescription booklets with fake data and asked her to capture the necessary information onto the data-collection tool;

- The researcher then assessed whether the assistant had filled in the information in a satisfactory manner and continued the process until she was satisfied with the way in which the assistant captured the data.

1.7 Data analysis

The data was coded and entered into a Microsoft Excel® 2016 spread sheet and it was later imported into Statistical Package for Social Sciences (SPSS®) version 25.0 where it was summarised and

analysed with help of a statistician. Descriptive statistics are used to organise and summarise data in such a way that the data characteristics are meaningful and understandable (Pietersen & Maree, 2016a:216; Rosner, 2010:5). Inferential statistics allow the researcher to generalise the study findings to a large population (Brink *et al*., 2012:190; Pietersen & Maree, 2016b:235). The researcher captured and stored the data from the data-collection tool into her password and antivirus protected personal computer using the Microsoft Excel® 2016 spread sheet weekly. This was done by capturing the data into two separate spreadsheets, and data in the two copies were compared (double entry method) so as to ensure the integrity of the database. The created database was then copied onto the researcher's password and antivirus protected external hard drive as a means of back-up. This external hard drive was stored in a locked cupboard which only the researcher has access to.

1.7.1 Statistical analysis

This section covers the descriptive and inferential statistics that were used in the study. Data from the study was analysed and summarised with assistance from a statistician.

1.7.1.1 Descriptive statistics

The descriptive statistics that were used include mean, standard deviation (SD) and frequency. Arithmetic mean was used as a measure of central tendency. It is determined by adding up all the observations of a given sample and dividing the summation by the total number of items in a sample (Rosner, 2011:9, Sokal & Rohlf, 2009:28). Standard deviation, which was used as a measure of dispersion takes into consideration all the items in a sample and is said to be highly sensitive to outliers (Sokal & Rohlf, 2009:36).

Frequency was used in the first objective to determine the BP control status of participants and the researcher described this by stating the number of participants with controlled BP and the number of participants with uncontrolled BP. For the second and the last objective, the researcher used frequency to determine the patient-related factors and facility-related factors that led to uncontrolled BP. The mean and SD were used to measure variance in age and gender while a confidence interval of 95% (95% CI) were used to determine the statistical significance of the results.

1.7.1.2 Inferential statistics

Pearson's chi-square test which was used to determine whether there was a relationship between categorical groups was used in this study (Bolboaca *et al*., 2011:531). It was used to determine the relationship between the group of patients with controlled BP and the group of patients with uncontrolled BP in order to find out which factors mostly affected the control of BP.

The effect size was used to determine the practical significance of the results that were found to be statistically significant (Ellis & Steyn, 2003:51). Cramér's *V* was used to determine the strength of association in a population where the Pearson's Chi square is used to find out if the results were practically significant.

In Table 1-2 a summary is provided of all the different descriptive and inferential statistics that were used during the study.

Table 1-2: Statistical analysis table

Objectives	Measurements	Independent variables	Dependent variables	Descriptive statistics	Inferential statistics	Effect size
Study population characteristics	Patient population description, by age, gender	Gender	Gender	Frequency (%)		
			Age BP	Mean ± SD (95% CI)		
			BP control status Smoking status Adherence status	Frequency (%)		Cohen's *d*-value
		Gender	Age BP	Mean ± SD (95% CI)	Independent *t*-test	
Determining the BP control status of patients	BP control status	BP patients	Uncontrolled=1 Controlled=0	Frequency (%)	Pearson's chi square	Cramer's V
Determining patient- related factors that lead to uncontrolled BP	Association between medication adherence status and control status	BP control status Uncontrolled=1 Controlled=0	**Adherence** Adherent=1 Non-adherent=0	Frequency (%)	Pearson's chi square	Cramer's V
	Lifestyle changes: *Diet*	BP control status Uncontrolled=1 Controlled=0	Special diet After diagnosis	Frequency (%)	Pearson's chi square	Cramer's V

Objectives	Measurements	Independent variables	Dependent variables	Descriptive statistics	Inferential statistics	Effect size
	Salt restriction	BP control status Uncontrolled=1 Controlled=0	Salt restriction After diagnosis	Frequency (%)	Pearson's chi square	Cramer's V
	Physical activity	BP control status Uncontrolled=1 Controlled=0	Physical activity After diagnosis	Frequency (%)	Pearson's chi square	Cramer's V
	Smoking	BP control status Uncontrolled=1 Controlled=0	Smoking After diagnosis	Frequency (%)	Pearson's chi square	Cramer's V
	Alcohol intake	BP control status Uncontrolled=1 Controlled=0	Alcohol After diagnosis	Frequency (%)	Pearson's chi square	Cramer's V
	Other conditions	BP control status Uncontrolled=1 Controlled=0	Other conditions Yes=0 No=1 Type of condition	Frequency (%)	Pearson's chi square	Cramer's V

Objectives	Measurements	Independent variables	Dependent variables	Descriptive statistics	Inferential statistics	Effect size
Determining facility-related factors that lead to uncontrolled BP	Out-of-stock medications	BP control status Uncontrolled=1 Controlled=0	Out of stock medication Yes=0 No=1	Frequency (%)	Pearson's chi square	Cramer's V
	Adherence to STGs	BP control status Uncontrolled=1 Controlled=0	Adherence to (STGs) Adherent=0 Questionable=1	Frequency (%)	Pearson's chi square	Cramer's V
	Provision of patient education	BP control status Uncontrolled=1 Controlled=0	Provision of patient education Yes=0 No=1	Frequency (%)	Pearson's chi square	Cramer's V

1.7.2 Study variables

The Dictionary of Epidemiology (2014:289) defines a study variable as any quantity that can have different values across individuals or other study units.

In Table 3 an overview is given of all the different variables that were used in this study.

Table 1-3: Table of variables

Variable	Description
Blood pressure	BP reading of the patient on the day of visit, measured in mm Hg.
Blood pressure control status	Indicator of the BP control status of the patient, measured as either 'controlled' or 'uncontrolled'. Controlled status will be defined as a SBP less than 140 mmHg or less than 150 mmHg in general population aged ≥60 years and DBP less than 90 mmHg (Lesotho Ministry of Health, 2017). Uncontrolled BP was defined as SBP greater >140 mmHg or >150 mmHg in general population aged ≥60 years and DBP >90 mmHg (Lesotho Ministry of Health, 2017).
Patient-related factors	
Gender	Gender was used to indicate whether a prescription was prescribed for a male or female patient.
Age	Age was calculated by subtracting the date of birth from the year of interview.
Medications adherence	The Hill-Bone compliance scale was used to measure patient adherence to antihypertensive medicines. Adherence was interpreted as optimal if the total score (from question 1, 2, 8, 9, 10, 11, 12, 13 & 14) was 9; sub-optimal if the total score was 10-18 points; and poor if the score was >18.
Adherence to appointment keeping	Questions 6 and 7 of the Hill-Bone scale were used to measure adherence to follow-up. Optimal adherence to follow-up was said be a total score of 2; sub-optimal adherence to follow-up was a score of 3 to 4; and poor adherence to follow-up if score was >4.
Concomitant and comorbid conditions	The number and type of comorbid and/or concomitant condition was quantified in each patient. Categories for chronic conditions include: heart disease, kidney disease, diabetes mellitus, asthma, chronic obstructive pulmonary disease (COPD), epilepsy or other.

Variable	Description
Lifestyle changes before and after diagnosis	
Diet	Participants was categorised as those who engaged in a special diet before and after diagnosis, and those who did not. Special diet included intake of reduced saturated fats, high fibre, high (at least once a day) vegetable intake, high fruit intake, and low fat dairy product intake.
Salt consumption	Salt restriction in diet was categorised using a 4-point scale, ranging from 'none of the time' to 'all the time', in response to the questions "how often do you eat salty food', 'how often do you shake salt, fondor, or aromat on your food before you eat it and how often do you eat fast food". Salt consumption was low if the total score was 3; moderate if score was 4 to 6 points; and high if score was >6
Physical activity	Level of physical activity before and after diagnosis were determined using the questions 'do you exercise', 'how often do you engage in physical activity in a week'.
Smoking status	Smoking status before and after diagnosis were determined, categorised as 'yes' or 'no'.
Alcohol intake	Alcohol intake before and after diagnosis were determined, categorised as 'yes' or 'no'. The frequency of intake was categorised as 'daily weekly or occasionally. The number of drinks were quantified on an ordinal scale, from 1 to ≥4 drinks.
Facility-related factors	
Access antihypertensive medications	The availability of antihypertensive medications was said to be limited if the patient did not receive at least one of the prescribed antihypertensive medications. Frequency of out-of-stock medication was also considered in assessing access to medication.
Provision of patient education	Patients were asked if they received any hypertension related information from the hospital personnel at the facility. Answers were categorised as 'yes' or 'no'.
Adherence to standard treatment guidelines	Prescribing patterns were compared to the standard treatment guidelines by the Ministry of Health of Lesotho. Prescribing indicators that will be assessed includes: • If type of active ingredient prescribed are on the STG • Checking the dose to see if it is appropriate for a specific patient • Checking frequency (once daily- OD, twice daily- BD, three times daily- TDS, four times daily- QID) to see if it is appropriate for a specific patient

Variable	Description
	Adherence to STGs was said to be questionable if the BP did not improve after 6 months of uncontrolled BP and there was no treatment change or modification

1.8 Ethical considerations

This section covers all ethical issues concerned in the study including permission and informed consent, anonymity, confidentiality, respect for research participants, benefit-risk ratio analysis, anticipated risks and precautions, potential study limitations, data management, dissemination of research results, role of the members in the research team and conflict of interest.

1.8.1 Permission and informed consent

The conduction of the research study commenced as soon as permission has been granted from the NWU HREC (Reference: NWU-00027-18-S1), the National Review Board and Ethics Committee of the Lesotho MOH (Reference: 112-2018), and Mafeteng Government Hospital (See section 1.6.11.6.1). Refer to section 1.6.3 for the process of obtaining informed consent by the participants.

1.8.2 Anonymity

To safeguard the privacy of the subjects, anonymity was ensured by using codes to protect the identity of the subjects and no personal information or identifiers such as identity number or patient numbers were collected.

1.8.3 Confidentiality

- Confidentiality was ensured by using codes instead of names or any form of identification for all participants.
- The mediator and assistant data-collector were required to sign a confidentiality agreement to ensure that they do not release any information about the patients in the study sample.
- After permission was granted by the Lesotho MOH, the name of the hospital appears in the final report; names of participants were not captured and, as thus, are not included anywhere in the research study.

1.8.4 Respect for research participants

Respect for research participants was ensured by maintaining privacy and confidentiality of information of the participants. Patients were also informed that they could withdraw from the study whenever they felt they could no longer continue to take part.

1.8.5 Benefit-risk ratio analysis

This section covers anticipated, direct and indirect benefits of the study.

1.8.5.1 Anticipated benefits

Results of this study can be used to improve treatment and treatment outcomes of high BP in hypertensive patients.

1.8.5.2 Direct benefits

There are no direct benefits in this study.

1.8.5.3 Indirect benefits

The research community will gain from the results of this study as these results add to the already existing literature and will open more opportunities for future research. Possible facility-related factors that influence adherence may also be identified, and the recommendations made for improvement of these factors may have an indirect benefit to future hypertensive patients. The participants gained knowledge about their condition (hypertension) and this will in turn lead to improved treatment outcomes in patients.

1.8.6 Anticipated risks and precautions

This section entails anticipated risks to the participants and to the researcher and precautions that were taken to avoid these risks.

1.8.6.1 Anticipated risks to the participants and precautions taken

- In conducting this research project, participants might have experienced time loss and psychological distress such as boredom and self-exposure during data collection. To overcome these risks, the researcher made the questionnaire as brief and clear as possible and only the researcher knows what the responses of each patient are, and the information was not be given to any third-party without the consent of the participant.

- The researcher also handled the information as professionally as possible, so the participants did not have to worry about being self-exposed.

- If it was determined that an individual is being treated inappropriately, it could be reported to the hospital management, the National Review Board and Ethics Committee of the Lesotho MOH, the supervisor or the NWU-HREC and the matter would be dealt with accordingly.

1.8.6.2 Risk-level descriptor

The risk level in this research is minimal because possibility of harm and estimated discomfort in this research is negligible. For this study, the benefits overweigh the risks.

1.8.7 Dissemination of research results

Study results will be disseminated in the form of a dissertation and publications into accredited journals. The results will also be disseminated at conferences and in a report to the Lesotho MOH, and Mafeteng Government Hospital and feedback will be given to the participants in the form of presentations and a poster consisting of the results. The poster will be put up at Mafeteng Government Hospital OPD.

1.8.8 Role of the members in the research team

The researcher: Ms Refeletse Mafisa (BPharm, Hons)	The role of the researcher was to compile the data-collection tool, to administer the data-collection tool and to help in the analysis of data. The researcher was also responsible for the conduction of literature review, planning and writing and manuscripts and dissertation.
Study supervisor: Dr R Joubert (BPharm, MPharm, PhD (Pharmacy Practice))	The role of the supervisor was to guide the researcher in conducting the research, validated the data-collection tool and made sure that the researcher handled the data ethically.
Study co-supervisor: Dr DM Rakumakoe (BPharm, PharmD)	The role of the co-supervisor was to guide the researcher in conducting the research, validated the data-collection tool and ensured that the researcher handled the data ethically.

1.8.9 Conflict of interest

There was no conflict of interest because the researcher, assistant data-collector and the mediator are not employees at Mafeteng Government Hospital.

1.9 Chapter summary

The background of the study explored prevalence and control status of hypertension and it was established that prevalence of hypertension is high and BP control is poor in most areas of the world. Research aims and objectives were then determined based on the background. Planning and design of the study were then established. The following chapter focuses on reviewing literature on uncontrolled hypertension and associated factors.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to conceptualise factors associated with uncontrolled blood pressure (BP), the state of BP control and measures taken to improve BP control.

2.2 Hypertension

Hypertension is defined as a raised systolic blood pressure (SBP), diastolic blood pressure (DBP), or both (Saseen, 2009:2). Also defined by Porter and Kaplan (2011:2221), hypertension is the prolonged rise of resting SBP (≥ 140 mm Hg), DBP (≥ 90 mmHg), or both. It is also known as high BP. Moini (2009:188) defined BP as a measurement on the walls of the arteries when blood is pumped by the heart. It was further stated that the pressure measured when the heart contracts is called the SBP and that measure when the heart relaxes is called the DBP (Moini, 2009:188).

Saseen (2009:2) explained that BP is influenced and regulated by different neural and humoral factors in the body. These factors include the adrenergic nervous system, which consists of the α-receptors and the β-receptors; the renin angiotensin-aldosterone system which controls the systemic and renal flow of blood; the renal function and renal blood flow which influence the fluid and electrolyte balance; and the hormonal factors which include the adrenal cortical hormones, vasopressin, thyroid hormone and insulin (Saseen, 2009:3). In cases where the above mentioned mechanisms do not function well, adverse changes in BP occur, resulting in hypertension (Saseen, 2009:2).

2.2.1 Hypertension statistics

In 2019, the WHO reported that there are 1.13 billion people with hypertension world-wide. In 2008, Africa was the WHO region with the highest prevalence of hypertension at 46.0% and the American region had the lowest prevalence of 35.0% (WHO, 2011:22). The prevalence ranged between 36% and 41% in other WHO regions (South-East Asia, Europe, Eastern Mediterranean & Western Pacific) (WHO, 2011:22).

Moreover, the WHO (2019) stated that only 1 in 5 people with hypertension have controlled BP. Valderrama *et al*. (2012:704) reported that about 53.5% (n = 66.9 million) of adults with hypertension in the United States of America had uncontrolled BP. Blood pressure has also shown to be a problem in the United Kingdom as there are over sixty thousand deaths due to uncontrolled BP yearly (Nicoll & Henein, 2010:879). Furthermore, the National Heart Foundation of Australia (2016:35) reported that

close to 4.3 million Australians have hypertension and over two thirds (68.0%) of these adults had uncontrolled BP in 2017-2018.

In Lesotho, about thirty percent of women and fifty-nine percent of men reported to have never had their BP measured (Lesotho MOH, 2014:303). However, those who had been measured before, 19% (n = 3 254) of women and 13% (n = 2508) of men aged between 15-49 years, had hypertension and one in five women and one in seven men had their high BP managed by antihypertensive medication.

In their review, Addo *et al.* (2007:1016) found that hypertension is a huge problem in Sub-Saharan Africa as several studies showed that control of BP was low. These findings concur with findings from several studies conducted from different countries in Sub-Saharan Africa. For instance, Horsa *et al.* (2019:3) and Tesfaye *et al.* (2017:23) found that 73.8% (N = 225) and 52.7% (N = 330) of participants, respectively, had uncontrolled BP in various hospitals in Addis Ababa, Ethiopia between 2014 and 2016. About 57.7% (N = 2870) of participants had uncontrolled BP in Ghana (Sarfo, 2018:6).

In addition, Folb, (2016:1242) found that 60.0% (N = 3 220) had uncontrolled BP in the Western Cape, South Africa between 2011 and 2012. In conclusion, Lesotho is another country of the Sub-Saharan Africa that also has high rates of uncontrolled BP. In studies by Mugomeri *et al.* (2016:44) and Thinyane (2015), uncontrolled BP was found to be above 75%. Addo *et al.* (2007:1016), therefore, suggested that healthy lifestyles should be encouraged so as to help avert and decrease the prevalence of hypertension in Sub-Saharan Africa. They also stated that intensifying treatment measures of hypertension would help to improve blood pressure control in the region.

2.2.2 Clinical presentations

The WHO (2019) stated that high BP is sometimes referred to as a “silent killer” because of its asymptomatic nature; therefore, the WHO encourages regular screening for hypertension. However, symptoms such as headaches, epistaxis, irregular heartbeats, blurred vision and a buzzing sound in the ears may occur (Wells *et al.*, 2009:112; WHO, 2019). The WHO (2019) further stated that severe/untreated hypertension may result in fatigue, nausea, vomiting, confusion, anxiety, chest pain and muscle tremors. Moreover, Khatib and El-Guindy (2005:26) mentioned that signs of target organ damage such as murmurs over neck arteries, motor defects, arrhythmias and dependent oedema could be suggestive of high BP.

2.2.3 Diagnosis

Elevated BP is the only sign of primary hypertension. Hypertension is diagnosed when the average of two or more readings taken at different clinical encounters is above the normal BP (Lesotho MOH, 2017:13; Wells *et al.* 2009:112).

2.2.4 Risk Factors

The WHO (2019) revealed that risk factors can be classified into modifiable and non-modifiable risk factors. Modifiable risk factors include sedentary lifestyle, smoking, alcohol consumption, unhealthy diets as well as being obese or overweight. (Jo *et al.*, 2001:1526; Khatib & El-Guindy, 2005:15; WHO, 2019). It was mentioned that age >50 years and having conditions such as diabetes mellitus or kidney disease, and family history of cardiovascular disease, hypertension, hyperlipidaemia or diabetes mellitus are some of the non-modifiable risk factors of hypertension (Esposti *et al.*, 2004:210; Khatib & El-Guindy, 2005:25; WHO, 2019).

2.2.5 Classification of blood pressure

The classification of BP by the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure JNC7, indicating normal BP, prehypertension, stage 1 and stage 2 hypertension is shown in Table 2-1 (Chobanian *et al.*, 2004:11). According to Moini (2009:188), hypertension can also be classified as primary or essential hypertension, secondary hypertension and tertiary or malignant hypertension. Mioni states that essential hypertension is idiopathic, meaning that the cause is unknown.

Kamiemski and Keogh (2006:355) revealed that about 90% of patients who are hypertensive have essential hypertension and it is caused by other conditions besides those that are related to renal and endocrine disorders. Just like Esposti *et al.* (2004:210), Khatib & El-GUindy (2005:25) and the WHO (2019), Kamiemski and Keogh (2005:35) stated that even though the cause of essential hypertension is unknown, family history of hypertension, hyperlipidaemia, diabetes mellitus, obesity, aging, stress, diet, smoking and excessive drinking of alcohol are factors attributed to essential hypertension.

Table 2-1: JNC7 classification of blood pressure

Blood pressure classification	Systolic BP (mmHg)	Diastolic BP (mmHg)
Normal	<120	and <80
Prehypertension	120-139	or 80-89
Stage 1 hypertension	140-159	or 90-99
Stage 2 hypertension	≥160	or ≥100

Secondary hypertension results from renal disease, endocrine disease, pheochromocytoma or a benign tumour of the adrenal medulla and this type of hypertension is treated by dealing with the primary cause (Saseen, 2009:4). Kamienski and Keogh (2006:355) and Saseen (2009:4) mention that secondary hypertension affects 10% of hypertensive patients and that further diagnostic tests are required to confirm diagnosis of secondary hypertension. Tertiary/malignant hypertension is a type of hypertension that is intense, severe and is rapidly progressive with numerous complications (Kamienski and Keogh, 2006:355).

Saseen (2009:4) explained that other types of hypertension include pseudo hypertension and white-coat hypertension. Pseudo hypertension is a type of hypertension in which there results an overestimation of SBP and it is detected by the use of Osler's manoeuvre and is said to be rare (Saseen, 2009:4). This happens because blood vessels of the patient have become stiff and thick due to calcification, suggesting that a higher pressure is necessary to occlude the artery (Saseen, 2009:4).

Saseen (2009:4) also mentioned that white-coat hypertension is another type of hypertension in which BP values are consistently raised if BP of the patient is measured in a clinical environment in the presence of a health personnel, yet when measured anywhere else, or within 24-hour ambulatory monitoring, BP is not raised. It is sometimes referred to as a persistently elevated average office BP of >140/90 mmHg and an average awake ambulatory reading of <135/85 mmHg. The term white-coat hypertension applies only in patients without target organ disease and are not on hypertensive therapy (Saseen. 2009:4).

Uncontrolled BP is said to be SBP ≥140 mmHg in patients with age <60 years or ≥150 mmHg in patients with age ≥60 years, and/or the DBP is ≥90 mmHg in all adult patients on antihypertensive medication (James *et al.*, 2014:6; Lesotho MOH, 2017:14). These readings apply in patients who do not have any compelling indications such as diabetes mellitus (James *et al.*, 2014:6; Lesotho MOH, 2017:14). According to the Lesotho standard treatment guidelines for patients with diabetes mellitus, the BP is said to be uncontrolled if the SBP is ≥140 mmHg or the DBP is ≥90 mmHg in all adult patients (Lesotho MOH, 2017:71) while the JNC7 defines uncontrolled BP in patients with compelling indications as SBP ≥130 mmHg and/or DBP ≥80 mmHg (James *et al.*, 2014:6). Blood pressure control is defined as SBP <140 mmHg and DBP <90 mmHg in adult patients receiving antihypertensive treatment (James *et al.*, 2014:6; Mills *et al.*, 2016:447; Lesotho MOH, 2017:14; Yoon *et al.*, 2016).

Mills *et al.* (2016:447) conducted a study in which it was found that world-wide BP control in 2010 was 13.8% (that is, 10.9% in men and 16.8% in women). However, Yoon *et al.* (2016:3) found that 53.0% of adults aged 18 years and above in the United States had controlled BP. Adults aged 60 years and above were more likely to have controlled BP than those aged 18-39 years (Yoon *et al.*, 2015:3).

2.2.6 Complications of uncontrolled hypertension

It was mentioned that uncontrolled hypertension is a risk factor for conditions such as stroke, heart attack, heart failure, kidney failure and erectile dysfunction (American Heart Association (AHA), 2017; Wells *et al.* 2009:84; WHO, 2019). The AHA (2017) further mentioned that hypertension can also lead to vision loss. Furthermore, the WHO (2019) explains that increased BP may lead to reduced blood flow and oxygen to the heart resulting from hardened arteries. Consequently, this may cause angina, heart attack, a bigger harm to the heart and an irregular heartbeat that at times may result in sudden death. The UK Prospective Diabetes Study (U.P.D.S) Group (2004:1639) stated that high BP is one of the most harmful aspects of diabetic retinopathy. It is, thus, crucial that BP control is maintained so as to reduce occurrences of clinical complications from diabetic eye disease.

In their study, Wells *et al.* (2009:84) found that hypertension appeared to be one of the highest risk factors of heart failure. Hypertensive patients have a higher risk of having heart attack, heart failure, stroke, kidney disease than normotensive people (Chobanian *et al.*, 2004:12). Saseen (2009:13-6) mentioned that hypertension complications include atherosclerotic vascular disease which can either be coronary artery disease, carotid artery disease, peripheral arterial disease and abdominal aortic aneurysm. Other complications include CVDs such as heart failure, chronic kidney disease and retinopathy.

2.2.7 Management of hypertension

There are two approaches to hypertension treatment and they are the non-pharmacological approach and the pharmacological approach. The non-pharmacological approach consists of lifestyle modifications while the pharmacological approach consists of antihypertensive medication (James *et al.*, 2014:3; Chobanian *et al.*, 2004:25; Porter & Kaplan, 2011:2225). Porter & Kaplan (2011:2225) stated that if the SBP remains higher than 140 mmHg and/or DBP remains higher than 90 mmHg after six months of lifestyle modifications, then antihypertensive treatment is required in such patients. Lifestyle modifications are discussed in detail under factors that influence BP control in Section 2.4.2.

2.2.7.1 Pharmacological treatment

Patients should be started on pharmacological hypertensive treatment if they are under the age of 60 years and their BP is ≥140/90 mmHg, or if the patients also have diabetes and the BP reads ≥140/90 mmHg, or if the patient has chronic kidney disease and their BP is ≥140/90 mmHg. Patients aged 60 years and above are started on antihypertensive medication when their BP is ≥150/90 mmHg (James *et al.*, 2014:4; MOH, 2017:14).

According to Kamienski and Keogh (2006:356), hypertension is pharmacologically treated using a step-wise approach. Each step uses a different group of antihypertensive medication to control hypertension. There are four steps in treating hypertensive patients, namely:

- Step 1: Diuretic, beta blocker, calcium channel blocker (CCB), angiotensin-converting enzyme inhibitor (ACEI)
- Step 2: Diuretic with beta blocker, sympatholytics
- Step 3: Direct-acting vasodilator; sympatholytic with diuretic
- Step 4: Adrenergic neuron blocker; combinations from Steps 1, 2, and 3.

2.2.7.2 Diuretics

According to Porter and Kaplan (2011:2226), the main classes of diuretics are thiazide-type diuretics, loop diuretics, and potassium sparing diuretics. Loop diuretics are said to cause inhibition of sodium and chloride reabsorption; thiazide diuretics (for example hydrochlorothiazide, chlorothiazide, chlorotalidone and indapamide (Moini, 2009:200; Wells *et al.*, 2009:118)) cause loss of potassium, sodium, chloride ions and water; while potassium-sparing diuretics cause potassium retention (Kamienski & Keogh, 2006:357 ; Moini, 2009:200;).

In addition, loop diuretics are used to treat hypertension in patients who have lost 50% of kidney function; these are given twice daily. Wells *et al.* (2009:118) stated that diuretics intensely reduce BP by bringing about diuresis. The decrease in plasma volume and stroke volume resulting from diuresis yields a reduction in cardiac output, thus a decrease in BP (Wells *et al.*, 2009:118). Examples of loop diuretics include furosemide, bumetanide and torsemide (Moini, 2009:200; Wells *et al.*, 2009:118).

Diuretics cause a decline in peripheral vascular resistance which is accountable for the long-term hypotensive effects (Porter & Kaplan, 2011:2226). Porter and Kaplan (2011:2226) stated further that thiazides lower BP by shifting sodium and water from arteriolar walls thereby resulting in a decreased peripheral vascular resistance. Brunton *et al.* (2008:546) mentioned that adverse effects of thiazide diuretics may include gout and muscle cramps.

Aldosterone antagonists, also classified as potassium-sparing diuretics are powerful hypertension medication with a slow onset of action of up to 6 weeks (Saseen 2009:11; Wells *et al.*, 2009:118). Saseen (2009:11) further explained that potent blockade of the aldosterone receptor inhibits sodium and water retention, and inhibits vasoconstriction. Hyperkalaemia, a known dose-dependent effect with these agents, is more noticeable in patients with chronic kidney disease or in patients simultaneously taking an ACEI or ARB. Because eplerenone is a more specific aldosterone blocker, its incidence of

hyperkalaemia may be greater compared to spironolactone (Saseen, 2009:11). Examples of potassium sparing diuretics include spironolactone, triamterene and eplerenone (Moini, 2009:200; Wells *et al.*, 2009:118).

According to Moin (2009:202) and Wells *et al* (2009:118) the use of diuretics may lead to the following adverse effects: hyperkalemia (potassium-sparing diuretics), dehydration, hypokalemia (thiazide diuretics), dizziness, muscle cramps, impotence, joint disorders and headaches.

2.2.7.3 Angiotensin-Converting Enzyme Inhibitors

The angiotensin converting enzyme inhibitors (ACEIs) directly inhibit angiotensin-converting enzyme (ACE) and therefore block the conversion of angiotensin one (AT1) to angiotensin 2 (AT2) (Porter & Kaplan, 2011:2227). This action reduces AT2 mediated vasoconstriction and aldosterone secretion, and ultimately lowers BP. Bradykinin accumulates in some patients because inhibiting ACE prevents the breakdown and inactivation of bradykinin and causes a dry cough in some patients (Porter & Kaplan, 2011:2227; Wells *et al.*, 2009:118).

Cough is the most frequent, yet harmless side effect of ACEI therapy (Saseen, 2009:9). Other side effects may incude blood dyscrasias, dizziness, photosensitivity, loss of taste, hypotension, angioedema, renal impairment and hyperkalemia (Moini, 2009:193; Wells *et al.*, 2009:119). Angiotensin converting enzyme inhibitors reduce BP by interfering with the conversion of AT1 to AT2 and by inhibiting the degradation of bradykinin, thereby decreasing peripheral vascular resistance without causing reflex tachycardia (Porter & Kaplan, 2011:2227). These drugs reduce BP in many hypertensive patients, regardless of plasma renin activity and because they provide renal protection, they are the drugs of choice for diabetes mellitus (Porter & Kaplan, 2011:2227; Saseen, 2009:9; Wells *et al.*, 2009:118). Some of the most frequently used ACEIs are captopril, enalapril, Lisinopril, fosinopril, quinapril, trandopril, moexipril and benazepril (Moini, 2009:193).

2.2.7.4 Angiotensin II Receptor Blockers

According to Wells *et al.* (2009:118), AT2 is generated by the renin-angiotensin pathway (which involves ACE) and an alternative pathway that uses other enzymes such as chymases. Angiotensin-converting enzyme inhibitors block only the renin-angiotensin pathway, whereas Angiotensin II Receptor Blockers (ARBs) antagonize AT2 generated by either pathway (Saseen, 2009:9). The ARBs directly block the AT type 1 receptor that mediates the known effects of AT2 (vasoconstriction, aldosterone release, sympathetic activation, antidiuretic hormone release, and constriction of efferent arterioles of the glomerulus) (Porter and Kaplan, 2011:2228). Saseen (2009:9) explained that ARBs modulate the renin

angiotensin-aldosterone system by directly blocking the AT2 type 1 receptor site. Therefore, they block AT2-mediated vasoconstriction and aldosterone release.

Overall, ARBs are well tolerated and they do not affect bradykinin; hence, they do not cause dry cough as do the ACEIs (Saseen, 2009:9). Because aldosterone is blocked, monitoring of potassium is important to avoid hyperkalaemia (Saseen, 2009:9; Porter and Kaplan, 2011:2228). According to Porter and Kaplan (2011:2228), these drugs block AT2 receptors and are just as effective as ACEIs. AT2 receptor blockers may provide added benefits via tissue ACE blockade. Examples of ARBs include losartan, eprosartan, telmisartan, candesartan, valsartan, irbesartan and olmesartan (Moini, 2009:194). Patients using these medications may experience some or none of the following adverse effects: orthostatic hypertension, dizziness, hyperkalemia, muscle cramps, headache, renal insufficiency and drowsiness (Moini, 2009:193; Wells *et al*., 2009:120).

2.2.7.5 Calcium Channel Blockers

The calcium channel blockers (CCBs) reduce calcium entry into smooth muscles, resulting in coronary and peripheral vasodilation, and a decrease in BP (Porter & Kaplan, 2011:2227; Saseen, 2009:9). These drugs decrease cardiac contractility (except amlodipine and felodipine). Dihydropyridine CCBs are vasodilators that may result in reflex tachycardia while non-dihydropyridine CCBs (verapamil and diltiazem) block the atrioventricular (AV) node thereby causing a decrease in AV node conduction, decrease in heart rate, decrease in cardiac contraction, and have some vasodilatory effects (Porter & Kaplan, 2011:2227). Side effects depend on the individual CCB used, but can include flushing, peripheral oedema, tachycardia, bradycardia or heart block, and constipation (Porter & Kaplan, 2011:2227; Saseen, 2009:9).

Porter and Kaplan (2011:2227) suggested that these drugs should not be prescribed for patients with 2nd or 3rd degree AV block or with left ventricular failure. They also mentioned that long-acting nifedipine, verapamil, or diltiazem is used to treat hypertension, but short-acting nifedipine and diltiazem are connected to a high rate of MI and are not recommended. Wells *et al.* (2009:120) stated that CCBs make the smooth and cardiac muscles to relax through blockade of voltage-sensitive calcium channels, consequently resulting in a reduction of entrance of extracellular calcium into cells. Vascular smooth muscle relaxation leads to vasodilation and a corresponding reduction in BP (Wells *et al.*, 2009:120). Other examples of CCBs are amlodipine, isradipine, nicardipine, felodipine and nisldipine (Wells *et al.*, 2009:120).

According to Wells *et al*. (2009:120) some of the other adverse effects that may be experienced with the use of CCBs include bradycardia, anorexia, heart failure, hyperplasia, headache and dizziness.

2.2.7.6 β-Blockers

According to Wells *et al.,* (2009:121), the actual mechanism of β-blockers in lowering BP is unknown but maybe through decreasing cardiac output through negative chronotropic and inotropic effects on the heart and blockade of renin release from the kidneys. Moreover, Saseen (2009:10) stated that β-blockers have several direct effects on the cardiovascular system like decreasing cardiac contractility and output, lowering heart rate, blunting sympathetic reflex with exercise, reducing central release of adrenergic substances, inhibiting norepinephrine release peripherally, and decreasing renin release from the kidney. They should, however, be used as add-on therapy in combination with the other first-line agents (ACEIs, ARBs, CCBs, or thiazide diuretics) (Saseen, 2009:10). Porter and Kaplan (2011:2227) added that β-Blockers slow heart rate and reduce myocardial contractility, therefore lowering BP. All β-blockers are similar in antihypertensive efficacy (Porter and Kaplan 2011:2227; Wells *et al.*, 2009:121). Mioni (2009:197) and Wells *et al.* (2009:121) highlighted that patients on β-blocker therapy may experience certain adverse effects, such as dry mouth, skin or eyes, they may suffer from an upset stomach, drowsiness/fatigue, weakness, cold extremities and dizziness. Examples of β-blockers are atenolol, betazolol, timolol, acebutalol, bisoprolol, pindolol, propranolol, carteolol, metropolol and nadolol (Moini, 2009:195; Wells *et al*., 2009:121).

2.2.7.7 Other agents

Many older antihypertensive drug classes should mainly be used to provide additional BP lowering after first line and second-line agents have been implemented (Saseen, 2009: 10). Central α-agonists (e.g., clonidine, methyldopa) work in the vasomotor centres of the brain where they stimulate inhibitory neurons, and decrease sympathetic outflow from the central nervous system. The resultant decrease in peripheral vascular resistance and cardiac output lowers BP (Saseen, 2009:10). Saseen (2009:10) stated further that adrenergic antagonists (reserpine) are not commonly used in the treatment of hypertension (Saseen, 2009:10).

Wells *et al.* (2009:123) mentioned that direct arterial vasodilators (including minoxidil, hydralazine, ethanol, Na^+ nitroprusside) work directly on vessels, independently of the autonomic nervous system. Minoxidil is more potent than hydralazine but has more adverse effects, including sodium and water retention and hypertrichosis (which is poorly tolerated by women). Minoxidil should be reserved for severe, refractory hypertension. Hydralazine is used during pregnancy (e.g. for preeclampsia) and as an adjunct antihypertensive. There is a relationship between long-term, high dose of hydralazine and drug-induced lupus syndrome, which may resolve when the drug is stopped (Wells *et al.* 2009:123).

2.3 Factors that influence blood pressure control

There are a number of factors that influence BP control and they can be classified as patient-related factors, facility/system-related factors, socio-economic factors and medical-related factors (Barreto *et al.*, 2016:120; Cordero *et al.*, 2011:584; Gupta & Guptha, 2010; 2019; Horsa *et al.*, 2019:4; Kim, 2007:399; Khothatso *et al.*, 2016:27; Lackland, 2014:4; Lalkhen *et al.*, 2015:136; Mattke *et al.*, 2011:48; Mpande *et al.*, 2018:18; Mugomeri *et al.*, 2016:45; Pinto, 2006:110; WHO, 2003:112; Sarfo, 2018; Saseen, 2009:5; Schroeder *et al*., 2004:7; Tesfaye, 2017; WHO, 2011; WHO, 2003:112; Yiannakopoulou, 2004:246).

Examples of these factors as according to the above sources are the following:

- Patient related factors include inter *alia* lifestyle factors such as diet, smoking, alcohol use, physical activity, medication adherence, knowledge about self-care behaviours and complications of hypertension of the study participants; and adherence to appointment keeping.
- Facility/system-related factors include, inter *alia,* medication access (stock-outs), adherence to STGs, provision of patient education and level of healthcare facility.
- Socio-economic and socio-demographic factors include, inter *alia,* location of residence, employment status, medical scheme cover, level of education, gender, age, and race.
- Medical-related factors include, inter *alia,* duration of hypertension history and treatment, presence of comorbidities, and number of antihypertensive medication prescribed.
- For the purpose of this study, the focus will be on patient-related and facility-related factors and the factors were classified as stated in the subsequent sections.

2.3.1 Patient-related factors

For the purpose of this study, patient-related factors are those that are directly connected to patients and, if modifiable, can only be modified by patients. Patient-related factors that influence BP control include medication adherence, sociodemographic factors, socio-economic factors, clinical factors (duration of treatment, comorbid conditions, type of treatment), therapeutic lifestyle changes and appointment keeping (Ho, 2009:3030; Mpande *et al.*, 2018:20; WHO, 2003:112; WHO, 2011). These factors will be discussed in the following paragraphs.

2.3.1.1 Medication adherence

Medication adherence is defined 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). Good medication adherence is associated with good BP control while poor medication adherence or non-adherence is associated with poor BP control (Ho, 2009:3030; Mpande *et al.*, 2018:20). Medication non-adherence is associated with various factors including the health system (poor quality of provider-patient relationship, poor communication, lack of access to health care); condition (asymptomatic chronic disease, mental health disorders); patient (physical impairment such as vision problems, psychological or behavioral problems); therapy (complexity of regimen, side effects); and socioeconomic reasons (low literacy, high medication costs, poor social support) (WHO, 2003:112; WHO, 2011).

It is of great importance that patients be educated about the importance of adherence to antihypertensive medication. In order to maintain controlled BP, it is the responsibility of both the patient and healthcare professionals to ensure that antihypertensive medication adherence is achieved. (Ho *et al.*, 2009:3031; Jimmy & Jose, 2011:158; Mpande *et al.*, 2011: WHO, 2003:112).

Moreover, most medication non-adherence results from lack of knowledge about hypertension and its treatment (Kim, 2007:403; Schroeder *et al*., 2004:7; Yiannakopoulou, 2004:246) and researchers recommend that healthcare professionals should also focus on educating patients about the benefits of adhering to medication. This knowledge includes what high BP is, its complications, management and side effects of medication (Kim *et al.*, 2007:399; Mugomeri *et al.*, 2016:45). Yiannakopoulou *et al.*, (2004:247) mentioned that compliance can be improved by physicians devoting on counselling patients about their medication while Schroeder *et al.* (2004:7) also found that reduction of the number of daily doses and formulating simpler regimen for patients is beneficial in the improvement of medication adherence.

2.3.1.2 Lifestyle modifications

Lifestyle modifications, also known as therapeutic lifestyle changes (TLC), address the poor lifestyle choices that are at the root causes of chronic diseases (Hartley, 2014:36). The TLC programs address diet, exercise, stress management and nutrient depletion using cognitive behavioural approaches in an effort to correct the underlying causes of chronic disease (Hartley, 2014:36; National Center for Chronic Disease Prevention and Health Promotion, 2008:3; National Cholesterol Education Program, 2002:V-2). The goal of a TLC program is to empower the patient with knowledge, skills and a desire to create and maintain new habits needed to manage their chronic disease and potentially eliminate its root cause (Hartley, 2014:36).

Khatib and El-Guindy (2005:48) stated that adoption of healthy lifestyles by all individuals is critical in the prevention of high BP and an essential part of the management of those with hypertension. Lifestyle modifications decrease BP, enhance antihypertensive drug efficacy and decrease cardiovascular risk

(National Heart Foundation of Australia, 2016:26). Khatib and El-Guindy (2005:48) mentioned further that patients with prehypertension and no compelling indication (including heart failure, prior myocardial infarction or stroke, high coronary risk status, diabetes mellitus, chronic renal disease) respond well to lifestyle modifications and usually do not need drug therapy.

Lifestyle modifications are the keystone of management for preventing and treating hypertension (Saseen, 2009:5). Moreover, Chobanian *et al.* (2004:25) also stated that adoption of healthy lifestyles by all persons is critical for the prevention of high BP and is an indispensable part of the management of those with hypertension. Chobanian *et al.* (2004:25) explained that lifestyle modifications reduce BP, prevent or delay the incidence of hypertension, enhance antihypertensive drug efficacy, and decrease cardiovascular risk. For example, in some individuals, a 1 600 mg sodium DASH eating plan has BP effects similar to single drug therapy. Chobanian *et al.* (2004:25) further emphasised that combinations of two (or more) lifestyle modifications can achieve even better results. For overall cardiovascular risk reduction, patients should be strongly counselled to quit smoking.

Whelton, P *et al.* (2002:1887) stated that a combination of increased physical activity, moderation in alcohol intake and consumption of a diet that is lower in sodium content and higher in fruits, vegetables and low-fat dairy products than the average American diet represents the best approach for preventing high BP in the general population and in high-risk groups. Moreover, Whelton, P *et al.* (2002:1887) explained that the demonstrated reductions in BP using lifestyle changes (as large as those seen in drug studies) can occur in virtually all sub-groups of the population, and can be sustained over a long period of time (more than 3 years).

It was stated by Hartley (2014:36) that the goals of TLC programs are to improve health, increase quality of life and decrease disease burden by improving body composition. Consequently, improved body composition results in decreased fat mass - specifically visceral adipose tissue, increased muscle mass and, therefore, improvement of multiple biomarkers related to chronic disease (Hartley, 2014:36).

2.3.1.2.1 Dietary recommendations

According to Chobanian *et al.* (2004:25), BP control is also benefited by adoption of the DASH eating plan which was described in Section 1.2 as a diet rich in fruits, vegetables and low fat dairy products, with a reduced content of dietary cholesterol, saturated fat and total fat (modification of whole diet). Furthermore, Chobanian *et al*. (2004:25) stated that this diet is rich in potassium and calcium content; but restricted in sodium. Appel (2006:304) also described the DASH diet as dietary modifications that effectively lower BP inclusive of reduced salt intake, increased potassium intake, moderation of alcohol consumption (among those who drink), and consumption of an overall healthy dietary pattern.

Porter and Kaplan (2011:54) stated that macrominerals such as sodium, potassium and calcium are needed in substantial amounts in the body on a daily basis. In addition, Sacks *et al*. (2001:5) showed that the DASH diet, as compared with the control diet, resulted in a significantly lowered SBP at every sodium level and in a significantly lower DBP at the high and intermediate sodium levels. It had a larger effect on both systolic and diastolic BP at high sodium levels than it did at low ones. Sacks *et al*. (2001:5) mentioned that as compared to high-sodium control diet, the low-sodium DASH diet produced greater reductions in systolic and diastolic BP than either the DASH diet alone or a reduction in sodium alone.

- Fruits and vegetables

The Physicians Committee for Responsible Medicines (PCRM) (2014:3) reported that adults who follow a vegetarian diet have a BP 7/5mmHg lower than adults who consume a diet including meat. Changing diet to meals constituting fruits, vegetables, whole grains, and legumes can bring BP down and reduce need for antihypertensive medications (Chobanian *et al.*, 2004:25; PCRM, 2014:3). The PCRM (2014:3) also stated that based on clinical trials, people who make dietary changes can expect to see lower BP, an average drop of 5/2mmHg, in just six weeks.

In their randomized controlled feeding trial, Lin *et al.* (2011:8) reported that the DASH dietary pattern may improve the vascular endothelium's ability to up-regulate nitric oxide, in response to a localized stressor leading to reduced BP. Moreover, consumption of vegetarian diets has been associated with a decrease in systolic BP in comparison to omnivore diets hence vegetarian diets are said to be useful in the management of hypertension (Yokoyama *et al*., 2014:582).

- Dairy products

In a study conducted by Toledo *et al.* (2009:60), low-fat dairy products were associated with a decrease in SBP of up to 4 mmHg. Reductions of 2-5 mmHg in average BP levels at the population level was associated with reductions in mortality, fatal chronic heart disease and fatal stroke by seven percent, nine percent and 14%, respectively (Toledo *et al.*, 2009:60). In their cohort, Alonso *et al.* (2005:975) stated that calcium from low-fat dairy products was associated with lower risk of hypertension. Wang *et al.* (2015:1890) reported that participants who consumed three or more servings per week of total dairy foods had 0.49±0.12 mmHg increment in SBP every year compared with the 1.05±0.06 mmHg increment among those who consumed one or no serving per week (p <0.001).

- Fats & Oils

The AHA (2015) stated that monounsaturated fats are fat molecules that have one unsaturated carbon bond in the molecule so that these fats can help reduce bad cholesterol levels in the blood which can lower the risk of heart disease and stroke. Miura *et al.* (2013:8) mentioned that the intake of

monounsaturated fats is inversely related to BP especially the intake of oleic acid from vegetables. It was, therefore, recommended that the general population increases their intake of vegetables for prevention and control of hypertension (Miura *et al.*, 2013:8). The AHA (2015) mentioned that oils that contain monounsaturated fats include olive oil, canola oil, peanut oil, safflower oil and sesame oil.

- Calcium

A calcium-rich diet (> 1 000 mg calcium daily) slightly decreases BP and this positive effect is due to parathyroid hormone suppression with a subsequently decreased calcium content in the vascular smooth muscle cells (Simonetti & Mohaupt, 2007). A calcium-rich diet inhibits lipogenesis in the fat tissue, thus additionally improving the cardiovascular risk profile (Simonetti & Mohaupt, 2007). Lin *et al* (2011:9) also stated that the urinary calcium data may suggest another possible BP lowering mechanism where effects of higher potassium and low acid load of the DASH diet may contribute to calcium ions retention.

The retention of calcium ions results in BP reduction through vascular effects of calcium (Resnick, 1999:110). It was also observed that increased calcium can help reduce the risk of gestational hypertension (Iqbal *et al.*, 2019:1362). Additionally, Kamienski and Keogh (2006:173) mentioned that patients should be educated that dairy products such as milk are the major sources of calcium and that its absorptionis influenced by the quantity of vitamin D in the body. They also added that even though in smaller amounts, calcium is also found in eggs, green leafy vegetables, broccoli, legumes, nuts and whole grains.

- Potassium

Increased dietary potassium can lower BP (Iqbal *et al.*, 2019:1362), especially if the patients have hypertension that can be deemed as salt-sensitive and also decrease the necessity for high BP medication (Haddy *et al.,* 2006:550). Reduced potassium intake can raise BP as it increases urinary excretion of sodium (AHA, 2016). It is recommended that the average daily potassium intake be increased to about 4 700 mg (AHA, 2016). Kamienski and Keogh (2006:173) mentioned souces of potassium include fruits, fruit juices, vegetables and potassium supplements. Moreover, they further stated that bananas and dried fruits are a lot richer in potassium than oranged and fruit juices.

- Sodium (salt)

In their study, Sacks *et al*. (2001:5) and Iqbal *et al.* (2019:1361) found that reduction of sodium intake significantly lowered systolic and diastolic BP in a step-wise manner, with both the control diet and the DASH diet. The level of dietary sodium had approximately twice as great an effect on BP with the control diet as it did with the DASH diet and there was a greater response of BP to progressively lower levels of

sodium intake (Sacks *et al*., 2001:5). Chobanian *et al.* (2004:25) stated that dietary sodium should be reduced to no more than 100 millimoles per day (2.4 grams of sodium or 6 grams of sodium chloride) which reduces BP by 2-8 mmHg.

Whelton, P *et al.* (2002:1887) suggested that since sodium added during processing of foods accounts for approximately three quarters of an individual's total sodium intake, any meaningful reduction in sodium intake is based on a decrease in dietary sodium from food sources. Whelton, P *et al.* (2002:1887) further explained that this could be achieved by gradually reducing the amount of sodium added during processing and by greater availability and promotion of foods with lower sodium content. Sodium is said to be found in large amounts in table salt, canned foods, processed meats, pickles, potato chips and pretzels.

2.3.1.2.2 Physical activity

Chobanian *et al.* (2004:25) stated that everyone who is able should engage in regular aerobic physical activity such as brisk walking at least 30 minutes per day most days of the week. Cavill *et al.* (2019:2) stated that all types of physical activity are of interest, including walking or cycling for transport, dance, traditional games and pastimes, gardening and housework, as well as sport or deliberate exercise. Thus, sport and exercise are seen as particular types of physical activity: sport usually involving some form of competition, and exercise usually being taken to improve fitness and health (Cavill *et al.*, 2019:2). Physical activity can vary widely in intensity: the amount of effort made by an individual (WHO, 2011).

According to the WHO (2011:31), convincing scientific evidence based on a wide range of well-conducted studies showed that adults of 65 years and above age group, who were physically active, had higher levels of cardiorespiratory fitness, a lower risk profile for developing a number of disabling medical conditions, and lower rates of various chronic non-communicable diseases than do those who are inactive.

2.3.1.2.3 Alcohol intake

Chobanian *et al.* (2004:25) stated that alcohol intake should be limited to no more than 1 oz. (30 millilitres) of ethanol, the equivalent of two drinks per day in most men and no more than 0.5 oz. of ethanol (one drink) per day in women and lighter weight persons. A drink is 12 oz. of beer, 5 oz. of wine, and 1.5 oz. of 80-proof liquor (National Institute on Alcohol Abuse and Alcoholism n.d). In a meta-analysis by Xin *et al.* (2001:1115), it was found that there was a reduced consumption of alcohol which was associated with a great reduction of SBP and DBP.

2.3.1.2.4 Tobacco smoking cessation

Smoking cessation is defined as the stopping of smoking for a period of at least 6 months and confirmed by the assessment of carbon monoxide in the smoker's expired air using a smokerlyser (Aung *et al.,* 2013:6). In their study, Pujades-Rodriguez *et al.* (2014:136) reported that the hazard of all CVDs (except cardiac arrest or sudden cardiac death) gradually decreased with time after smoking cessation, with hazard ratios ranging between 0.43 and 1.03 for the first 2 years after quitting, and between 0.25 and 1.09 for the period after 10 years of quitting, compared with current smokers.

Zheng *et al.* (2014:13) conducted a study which covered seven countries in Asia. The study revealed that tobacco smoking was the major cause of death in Asia and that of the 5 million deaths attributable to active tobacco smoking in the world, nearly 45% occurring in Asia. This shows that tobacco smoking is a hazard to the lives of people worldwide and that awareness needs to be improved not just among hypertensive patients.

2.3.1.3 Sociodemographic and socioeconomic factors

Age is a sociodemographic factor that is associated with BP control (Barreto *et al.*, 2016:120; Horsa, 2019:4; Pinto, 2006:110). According to Barreto *et al.* (2016:120), Horsa *et al.* (2019:4) and Pinto (2006:110), increased BP is seen at the age ≥60 years due to stiffening of the arteries. In research conducted by Lackland (2014:4), it was found that race is one of the factors that may have major implications on BP control. Moreover, it was found by Sarfo *et al.* (2018:6) that patients staying in urban residences in Ghana are more likely to have uncontrolled BP.

In addition, Mpande *et al.* (2016:18) found that patients with a medical insurance were more likely to have uncontrolled BP than those who did not have it. Paulsen *et al.* (2011:509) also found that socioeconomic status had a significant contribution towards poor BP control. Paulsen *et al.* (2011:509) came to this conclusion after having assessed the following factors: educational level, income after taxation, labour market status and cohabitant status.

2.3.1.4 Knowledge of the disease

Inadequate or lack of knowledge about high BP and its complications is associated with poor BP control (Mpande *et al.*, 2018:21; Mugomeri *et al.*, 2016:45; Tesfaye *et al.*, 2011:24). In their study, Kim *et al.* (2007:403) and Khothatso *et al.* (2016:27) found that lack of knowledge about hypertension and its treatment was associated with poor medication adherence which is also associated with poor BP control. It was, therefore, suggested by researchers that patients should be regularly educated about hypertension by healthcare professionals in order to improve their BP control (Khothatso, 2016:27; Mpande *et al.*, 2018:21; Mugomeri *et al.*, 2016:45; Tesfaye *et al.,* 2011:27).

2.3.1.5 Medical factors

Certain medical factors, such as duration of treatment, comorbid conditions and type of treatment may also influence the control of BP. Presence of a comorbidity was found to influence BP control (Cordero *et al.*, 2011:584) either by the aetiology of the comorbidity itself or through the treatment of that comorbidity in the form of drug-drug interactions (Lalkhen *et al.*, 2015:136). The authors mentioned that these comorbidities may include diabetes mellitus (most predominant), dyslipidaemia, heart failure, and COPD. Cordero *et al.* (2011.584) also stated that other clinical factors influencing BP control include duration of treatment and the type of treatment.

2.3.1.6 Appointment keeping

Researchers found that poor appointment keeping is associated with uncontrolled BP (Barreto, 2016:117; Sarfo *et al.*, 2018:6). Mugomeri *et al.* (2016:44) conducted a study in Lesotho, in which participants mentioned various reasons for missing their follow-up appointments. Some participants mentioned that they had been away on the day of their appointment (35.6%, N = 212); they were ill (26.6%); they did not have transport money (15.3%); they had forgotten (14.0%); they had work and other commitments (4.5%) or they had medical appointments somewhere else (3.2%), while 0.9% mentioned that they had misplaced their medical record book. Mugomeri *et al.* (2016:44) further mentioned that some patients complained that keeping their appointments was hard because hospitals and clinics offered only one day for hypertension treatment services per month. It is, therefore, suggested that the healthcare provider schedules a more appropriate appointment date collaboratively with the patient. (Jimmy & Jose, 2011:157; Mugomeri *et al.*, 2016:45).

2.3.2 Facility-related factors

For the purpose of this study, facility-related factors are factors that are linked directly to the facility/system and can only be modified by the facility/system. Facility-related or system factors that influence BP control include access to medication, adherence to standard treatment guidelines, educating patients about hypertension and others (waiting time, patient-prescriber relationship and overall patient satisfaction). These factors will be discussed in the subsequent paragraphs.

2.3.2.1 Access to medication

The WHO (2009) defined access to medication as the ability for people to get medication when they are in need so as to attain a better and desired health. Access to medications seems to be a problem in BP control as Sarfo *et al.* (2018:11) reported poor access to high BP medication was associated significantly with poor BP control. Sarfo *et al.* (2018:11) stated that some participants had not received some of their high BP medication (20.5%, N = 2 870) at 5 hospitals in Ghana due to stock-outs; 6.5% could not obtain

the medication from community pharmacies while 1.0% could not obtain the medication from licensed chemical sellers. The WHO (2016:33) also stated that CVD medication access (availability& affordability) is poor in low income countries.

Moreover, Wagner *et al.* (2011:159) stated that cost becomes one of the major barriers to access to medication among populations deemed to be less affluent, whereas wealthy populations from various countries in urban areas have access to adequate healthcare and medicines for non-communicable diseases such as hypertension. It was further stated that access to medication can be improved by ensuring that policy-makers implement affordable quality of care and also increase the coverage of health insurance (Rockers *et al.*, 2018, Wagner *et al.,* 2011:159).

Some countries improve chronic conditions medication access including high BP medication by subsidising their cost through regulations of retail mark-ups while others reduce cost by reducing tariffs and taxes on such medication (Mattke *et al.*, 2011:49). Moreover, low cost of medication can be achieved by using fixed-dose combination and this not only helps with improving access to medication but can also add to improved medication adherence (Abegunde, 2011:22).

2.3.2.2 Adherence to Lesotho standard treatment guidelines

It was stated by Mattke *et al.* (2011:48) that developing appropriate treatment guidelines for NCDs is important as it helps in familiarizing care provision for such conditions as hypertension. Treatment guidelines also help in improving access to medication. Mattke *et al.* (2011:48) exemplify that if guidelines are formulated based on the essential medicines list, then the patients can easily and affordably access the medication as such medication are meant to be available at all times.

Moreover, Horsa *et al.* (2019:3) found that modification of treatment for hypertension treatment by physicians was associated with uncontrolled BP. For this reason, the authors suggested that physicians follow current STGs so as to select appropriate medication for patients. Furthermore, it was mentioned by Abegaz *et al.* (2017:32) and Chobanian *et al.* (2004:25) that STGs are important for the control of NCDs as they provide a guide on how clinicians can go about treating certain conditions. They stated that BP control is achieved when the patient receives and takes the right medication and dosing, at the right frequency and for the correct duration. Elliot (2009:24) suggested that STGs should be implemented and taught by healthcare providers in a much effective and improved manner in the community setting.

2.3.2.3 Patient education about hypertension

According to the Patient Education Institute (2013), patient education is any set of strategic informative activities that are done in order to improve the health behaviours and health status of patients. The main

purpose of patient education is to improve the health of patients, and in other cases, to reduce deterioration of the health of patients (Patient Education Institute, 2013). Patient education helps improve treatment outcomes and recognize mistakes before they arise. Patient Education Institute (2013) further stated that benefits patients gain from patient education include being able to manage their health, improve the understanding of their health statuses and health care plans, as well as reducing treatment complications.

Mugomeri *et al.* (2016:5) conducted a study in Lesotho where thirty-six percent of hypertension patients did not have adequate knowledge about hypertension and 44% of hypertension patients did not have adequate knowledge about antihypertensive medicines. The patients were found to have poor treatment outcomes and inadequate knowledge of hypertension. Uncontrolled hypertension was greatly associated with inadequate knowledge of antihypertensive medication. Mugomeri *et al.* (2016:5) suggested that knowledge of hypertension and its treatment should be improved among patients through adequate patient education.

On that note, Lertsuwunseri and Sangwatanaroj (2011:24) devised an educational program for 66 hypertensive patients in Thailand, which consisted of a combination of conventional and traditional means and this program had a major impact on the BP of patients. The education comprised basic knowledge of hypertension and its complications, the effects of diet, salt and exercise on BP. After a three months' follow-up, significant reductions in BP were observed, thereby signifying the importance of education about lifestyle changes, and application of lifestyle changes as well. Chobanian *et al.* (2004:61) also stated that patient-centred behavioural interventions are said to help improve BP control.

Moreover, Hacihasanoğlu and Gözüm (2011:698) found that patient education improves lifestyle behaviour of patients, medication adherence and body mass index which in turn results in improved BP control. Mpande *et al.* (2018:21) suggested that every hypertensive patient be given all the necessary education about high BP so as to improve their BP control. After finding out that poor knowledge of hypertension in patients is associated with uncontrolled BP, Tesfaye *et al.* (2017:27) suggested that healthcare professionals continually educate patients about lifestyle changes and related complications during follow-up visits so as to achieve satisfactory BP control.

2.3.2.4 Other facility-related factors

It was found that patient-prescriber relationship affects adherence to medication (Kim *et al.*, 2002:598). In addition, longer waiting times are negatively related to doctor-patient relationship (Moore *et al.*, 2004:429). Also, Apter *et al.* (1998:1816) stated that poor communication between patients and healthcare professionals can contribute to poor/low adherence. Chobanian *et al.* (2004:61) stated that it is important for patients to feel like clinicians care for them. Furthermore, Hsu *et al.* (2014:8) found that

the overall quality of pharmacy services was the main factor influencing medication adherence while Gu *et al.* (2008:2) found that patients who were satisfied with the pharmacist consultation are the ones who were more desirable to comply with their medication.

Gascon *et al.* (2004:129) found that the quality of care at healthcare facilities has an impact on the treatment compliance. Jin *et al.* (2008:277), therefore, suggested that healthcare service providers build good relationships with patients so as to achieve good medication compliance and which will in turn result in reaching desired therapeutic goals.

2.4 Measures taken to improve blood pressure control

A discussion about different measures taken to improve BP control by different organizations follows in the subsequent paragraphs.

2.4.1 The World Health Organization

The WHO developed a HEARTS technical package with the aim to prevent and improve control of CVD (heart attack, stroke, heart failure & kidney disease) in people who are at risk (WHO, 2016:17). The HEARTS package provides effective and applicable interventions that are meant to improve control and prevention of CVD and its risk factors and hypertension has been identified by the WHO (2016:11) as a metabolic risk factor for CVD. It is implemented in the primary healthcare to provide interventions on specialist treatment, screening, assessment & management of risks as well as health education (WHO, 2016:21). The HEARTS technical package elements include the following (WHO, 2016:23):

- **Healthy lifestyle:** the HEARTS package will use readily available resources to aid in lifestyle counselling and self-care.
- **Evidence-based treatment protocols:** simple and standardised treatment protocols for managing high BP are included in the package.
- **Access to essential medicines and technology:** a set of essential medicine (with fixed-dose combination) and basic technology will be defined assuring that they are made available in primary healthcare setting.
- **Risk-based management:** updated CVD risk factor prediction charts will be provided and they will be country specific in order to facilitate improved management of risk factors.

- **Team care and task-sharing:** decentralised, community-based and patient-centred care will be supported and provided through training healthcare providers, offering incentives for patient-centred care and by supporting community relations.

2.4.2 The Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (2017) financially supports a number of public health programs aimed at addressing high BP. Those programs are the:

- The WISEWOMAN program which operates by assisting women aged from 40 to 60 years of age, who have little or no medical scheme cover to decrease their risk of CVD and other chronic conditions;

- The Paul Coverdell National Acute Stroke Program whose long-term goal is to ensure that all Americans receive the high quality care of CVD. Data obtained from this program is also used in the development of stroke management guidelines;

- The Public Health Action Plan to Prevent Heart Disease which plans a national course to prevent and stop heart disease and stroke and;

- Healthy People whose goal is to "improve cardiovascular health and quality of life (QOL) through prevention, detection and treatment of risk factors for the heart attack and stroke…"

2.4.3 The American Heart Association

In managing hypertension, the American Heart Association (AHA) encourages patients to take their medication appropriately and incorporate healthy lifestyle changes such that their QOL is improved and the risk of, inter *alia,* heart disease, stroke and kidney disease is reduced (AHA, 2017). The AHA encourages everyone to get their BP checked regularly and keep record of their results. They also provide a printable BP log for people to keep track of their BP readings on their website (AHA, 2017).

2.4.4 The JNC7

In the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7), it was stated that if healthcare professionals provide empathetic reinforcement to patients, their BP medication adherence will improve. That is, healthcare providers should show empathy and positive feedback during management of hypertension (Chobanian *et al.* 2004:61). It was also stated that patients need to be motivated in order to adhere to their

medication and to live a healthy lifestyle. Chobanian *et al.* (2004:61) mentioned that clinicians must always modify the hypertension treatment regimen when necessary and reinforce lifestyle modifications.

Furthermore, Chobanian *et al.* (2004:62) stated that it is imperative for clinicians to set up the next follow-up appointment before the patient leaves the consultation room and that reminders, either computer-based or in the form of contacting patients should be made.

Chobanian *et al.* (2004:62) also mentioned that patients should be educated about the management of hypertension and that understanding and acceptance of diagnosis should be assessed such that any misunderstandings and concerns can be cleared. It is also important that healthcare professionals work hand in hand towards ensuring that therapeutic goals are reached, also offering intensive counseling about hypertension to patients (Chobanian, *et al*., 2004:62). Clinicians should individualize the treatment regimen of patients by including patients in decision making and also encourage social support systems like support groups or involvement of family members (only if patients consent) (Chobanian, *et al.*, 2004:63).

2.5 Different standard treatment guidelines

Table 5 shows approaches to the management of hypertension by the JNC7, the JNC8, South African Hypertension Society (SAHS) and the Lesotho Ministry of Health and it was compiled from Chobanian *et al*. (2004:31); James *et al.* (2014:4), SAHS (2015) and the Lesotho MOH (2017:14).

Table 2-2: Management of hypertension by different organisations/countries

	JNC7	JNC8	South African Hypertension Society	Lesotho Ministry of Health
Medication treatment initiated	≥140/90 mmHg in general population with compelling indications or goal not achieved with lifestyle modifications alone.	≥140/90 mmHg in general population <60 years (years) and all with compelling indications or goal not achieved with lifestyle modifications alone. ≥150/90 mmHg in general population ≥60 years	≥140/90 mmHg in general population with compelling indications or goal not achieved with lifestyle modifications alone. ≥150/90 mmHg in general population ≥80 years	≥140/90 mmHg in general population <60 years with compelling indications or goal not achieved with lifestyle modifications alone. ≥150/90 mmHg in general population ≥60 years
BP goal	<140/90 mmHg in general population <130/80 mmHg in patients with diabetes mellitus and/or kidney disease	<140/90 mmHg in general population aged <60 years and all with compelling indications <150/90 mmHg in general population aged ≥60 years	<140/90 mmHg in general population <150/90 mmHg in general population ≥80 years	<140/90 mmHg in general population aged <60 years and those with diabetes mellitus <150/90 mmHg in general population aged ≥60 years

	JNC7	JNC8	South African Hypertension Society	Lesotho Ministry of Health
Step 1	Lifestyle modifications If BP goal is not achieved: **No compelling indications:** Initiate thiazide-type diuretic in stage 1 hypertension or a two-drug combination in stage 2 hypertension (usually including a thiazide-type diuretic) **With compelling indications:** Treatment is initiated taking into consideration the type of compelling indication the patient has.	Lifestyle modifications **Non-black**: thiazide-type diuretic, CCB, ACEI, or ARB. **Black:** thiazide-type diuretic or CCB With compelling indications, treatment is initiated taking into consideration the type of compelling indication the patient has.	Lifestyle modifications for 3-6 months in BP 140-159/90 mmHg-99 mmHg & <3 risk factors, no target organ damage or complications If goal is not reached: Lifestyle modifications and Hydrochlorothiazide (HCTZ) 12.5 -25 mg OD or indapamide 1.25 – 2.5 mg OD Or CCB Or and ACEI or ARB in BP 140-159/90-99 mmHg, diabetes, <3 risk factors, target organ damage or complications Review after 4-6 weeks	Lifestyle modifications for 2 months Then if goal is not achieved, HCTZ 12.5mg OD for 1 month and if not responding increase to 25mg OD for 2 months

	JNC7	JNC8	South African Hypertension Society	Lesotho Ministry of Health
Step 2	Optimize dosages or add additional drugs until goal BP is achieved. Consider consultation with hypertension specialist.	If goal is not reached: Emphasize the importance of medication adherence and lifestyle changes. Optimize dosages or add additional drugs from different recommended classes until goal BP is achieved. If after all the mentioned options, the goal is still not reached, Consider specialist referral.	If goal is still not reached: The above-mentioned step combined with another drug from a different recommended class If goal is not reached: Optimize dosages or add an additional 3rd drug from a different recommended class until goal BP is achieved. And if BP is still not at goal: Add spironolactone 25mg OD or a β-blocker or α-blocker or minoxidil or a centrally acting drug or hydralazine Or Replace HCTZ with furosemide 40mg BD Assess adherence, secondary causes, home or 24 hour BP monitoring for white coat or pseudo resistance. If after all the mentioned	Step 2 plus CCB Or ACEI Or Beta-blocker for two months If goal not reached, add another drug from a different class until goal is achieved If after all the mentioned options, the goal is still not reached, Consider specialist referral.

			options, the goal is still not reached, Consider specialist referral.	

The BP goal for hypertension treatment is generally the same in the four guidelines at <140/90 mmHg (Chobanian *et al.*, 2004:25; James *et al.*, 2014:4; Lesotho MOH, 2017:14; SAHS, 2015). However, the goal BP differs in patients with compelling indications (130/80 mmHg in the JNC7, 140/90 mmHg in the other 3 guidelines); and in patients aged ≥60 years (150/90 mmHg in the JNC8 & the Lesotho STGs) and ≥80 years (150/90 mmHg in the SAHS) (Chobanian *et al.*, 2004:31; James *et al.*, 2014:4; Lesotho MOH, 2017:14; SAHS, 2015).

Additionally, medication treatment is initiated at BP ≥140 mmHg and/or ≥90 mmHg in patients with compelling indications in all the four guidelines and if there are no compelling indications or any other risk factors, then lifestyle modifications are indicated (Chobanian *et al.*, 2004:31; James *et al.*, 2014:4; Lesotho MOH, 2017:14; SAHS, 2015). However, medication treatment was initiated at ≥150 mmHg and/or ≥90 mmHg in patients aged ≥60 years in JNC8 and the Lesotho STGs and in patients aged 80 years in the SAHS guidelines (James *et al.*, 2014:4; Lesotho MOH, 2017:14).

Also, the first line treatment in JNC7 and the Lesotho STGs is HCTZ while in the JNC8 and SAHS, any of the drugs from the recommended classes can be used as first line (Chobanian, *et al.*, 2004:31; James *et al.*, 2014:4; Lesotho MOH, 2017:14; SAHS, 2015). This, therefore, shows that treatment of hypertension does not differ much across organisations and countries.

2.6 Chapter summary

In this chapter, hypertension and its control were defined. Blood pressure control and prevalence were reviewed in various regions around the world and factors influencing BP control were conceptualised. Measures taken to improve BP by different organisations were reviewed and hypertension treatment guidelines by different countries/organisations were explored. The next chapter (Chapter 3) focuses on the presentation of findings of the empirical study.

CHAPTER 3: RESULTS AND DISCUSSION

3.1 Introduction

The aim of this chapter is to present findings from the empirical objectives of the study. The findings are presented in a manuscript and in text form. Table 3-1 shows sections in which the objectives were addressed.

Table 3-1 Cross-reference to where objectives were addressed

Objectives	Cross-reference
Determine BP control status	3.2
Determine prevalence of BP control in the study setting	3.2
Determine patient-related factors leading to uncontrolled BP	3.2
Determine facility-related factors leading to uncontrolled BP	3.3

3.2 Manuscript: Patient-related factors contributing towards uncontrolled BP in patients taking antihypertensive medication in Mafeteng, Lesotho

The manuscript titled *´Patient-related factors contributing towards uncontrolled BP in patients taking antihypertensive medication in Mafeteng, Lesotho´* will be submitted to the *South African Medical Journal.* It was written in accordance with the *South African Medical Journal* authors guide (Annexure XII) obtained from website http://www.samj.org.za/index.php/samj on 16/7/2019.

Patient-related factors contributing towards uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho

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Background: The number of adults living with hypertension in the world rose from 594 million in 1975 to 1.13 billion in 2015. It is estimated that over 75% of the Lesotho population receiving antihypertensive treatment still have uncontrolled blood pressure. Medication adherence has been shown to be one of the major causes of poor control of blood pressure.

Objectives: To determine patient-related factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho.

Methods: The research study was conducted using an observational, cross-sectional study design. It was an all-inclusive study targeting hypertensive patients receiving treatment at the outpatient department in Mafeteng Government Hospital. Data were acquired from prescription booklets and face-to-face interviews; then captured on a pre-designed data collection form and structured questionnaire.

Results: The study enrolled 176 adult participants (80.1% females). The mean age of participants was 61.2 (12.9) years; with mean systolic blood pressure at 145.2 (23.7) mmHg while mean diastolic blood pressure was 88.5 ± 11.9 mmHg. Sixty-one percent of participants had uncontrolled BP and about 91.7% of them adhered sub-optimally to their antihypertensive medication; 66.7% consumed moderate to high amounts of salt, and 18.5% engaged in smoking. Approximately 71.7 % of participants with comorbidities (n=53) had uncontrolled blood pressure, with diabetes mellitus being the leading comorbidity, accounting for 60.4% of all comorbidities.

Conclusion: Most patients in Mafeteng Government Hospital have uncontrolled blood pressure attributed to sub-optimal adherence to antihypertensive medication, unsatisfactory appointment keeping, presence of comorbidities related to blood pressure control, unsatisfactory compliance to therapeutic lifestyle changes especially with salt consumption.

Background

The number of adults with hypertension in the world rose from 594 million in 1975 to 1.13 billion in 2015.[1] Moreover, a 2018 study involving 71 countries revealed that the prevalence of hypertension had increased over the past decade.[2] Despite available treatment for hypertension in Lesotho, hypertension remains uncontrolled, thereby leading to hypertension-related morbidity and mortality. Recent data by the World Life Expectancy show that hypertension deaths in Lesotho accounted for 1.59% of total deaths, ranking Lesotho fifth worldwide for hypertension deaths.[3] Stroke, a complication of hypertension is one of the most common causes of death in Lesotho, accounting for 4.87% of total deaths putting Lesotho at an average rank of 38th worldwide for stroke deaths.[3]

The Dietary Approaches to Stopping Hypertension (DASH), physical activity, body weight management (ideal BMI = 18.9-24.9 kgm^{-2}), smoking cessation and moderate alcohol consumption have been

attributed to improved BP control and are, therefore, highly recommended in the management of hypertension.[4-7] In addition, appointment keeping is another factor that is attributed to uncontrolled hypertension.[9-11] Furthermore, it was found in studies conducted in Lesotho in 2013 and 2014-2015 respectively that over 75% of participants in both studies had uncontrolled blood pressure (BP).[11,12] Medication adherence, a predictor of uncontrolled BP,[6] has also proved to be a major problem in some regions of Lesotho.[12,14]

It was found that medication adherence was relatively low in patients receiving antihypertensive medication at a primary healthcare clinic in Maseru, Lesotho in 2013.[12] In the same year, another study also revealed that medication adherence was low among hypertensive patients receiving treatment at a district hospital in Leribe, Lesotho.[14] These studies show that despite available treatment of hypertension in Lesotho, hypertension remains uncontrolled thereby leading to hypertension-related morbidity and mortality. Therefore, the aim of this study was to determine the patient-related factors that will lead to uncontrolled BP.

Method

An observational, cross-sectional study was conducted at Mafeteng Government Hospital, a secondary healthcare facility, in Mafeteng district, Lesotho. The facility offers hypertension treatment services at the out-patient department (OPD) and follow-up appointments for hypertensive patients are scheduled every Wednesday. The study received ethical approval from the Health Research Ethics Committee of the North-West University (Reference: NWU-00027-18-S1) and from the National Review Board and Ethics Committee of the Lesotho Ministry of Health (Reference: 112-2018). Goodwill permission by the Medical District Officer was granted at Mafeteng Government Hospital.

Adults aged ≥18 years, who had been receiving hypertension treatment at the facility for more than six months, excluding pregnant women who developed gestational hypertension, were invited to participate in the study. Potential participants were given a one-month period to decide on whether or not they would like to participate in the study, and if they agreed to participate, an informed consent form was signed and researchers proceeded with data collection.

The structured questionnaire was printed in English and Sesotho. Therefore, interviews were conducted in Sesotho or English depending on the participants' preference. Data was obtained from the participants' prescription booklets and through face-to-face interviews. Demographic information such as age and gender, medical history such as current and previous BP readings and comorbidities of the participants was acquired from prescription booklets. Face-to-face interviews helped acquire information regarding medication adherence, adherence to lifestyle changes and appointment keeping. The questionnaire consisted of three sections, namely Section A in which demographic information were captured, Section B where the participant's medical history was captured, and Section C where patient-related factors such as lifestyle changes were captured. The Hill-Bone Compliance to High Blood Pressure Therapy Scale was a part of Section C, and was used to determine medication adherence, appointment keeping and salt consumption.[15,16]

Uncontrolled BP was defined as systolic blood pressure (SBP) ≥140 mmHg in adults aged <60 years and diabetes mellitus patients, or ≥150 mmHg in adults aged ≥60 years, and/or diastolic blood pressure (DBP) ≥90 mmHg in all adults.[17] For the purpose of this study, medication adherence was said to be optimal if the participant scored a total of 9 points from the 9 items of the Hill-Bone scale addressing medication adherence, sub-optimal if the participant scored 10-18 points and poor/non-adherent if the score is >18 points.

Appointment keeping was said to be optimal if the participant scored a total of 2 points from the 2 items in the Hill-Bone scale addressing appointment keeping, sub-optimal if participants scored 3-4 points and poor if the total score is >4. Salt consumption was said to be low if the participant scored a total of 3 points from the 2 items in the Hill-Bone scale addressing salt consumption, moderate if the total is 4-6 points and high if the total is >6 points. Lastly, special diet was defined as diet consisting of reduced fat, low salt, high fibre, high fruits and vegetables.

The data was coded and captured into a Microsoft Excel® 2016 spreadsheet and imported into Statistical Package for Social Sciences (SPSS®) version 25.0 where it was summarised and analysed with the assistance of a statistician. It was summarised and organised into frequency, percentages, mean, standard deviation and interquartile range so that it would be comprehensible and meaningful.[18,19] The following variables were looked into: age, gender, duration of treatment, SBP, DBP, BP control, comorbidities, medication adherence, appointment keeping and therapeutic lifestyle changes (TLC) including salt consumption, special diet, physical activity, alcohol consumption and smoking.

Results

The study enrolled 176 participants and Table 1 outlines the summary of participants. About 61.4% of participants had uncontrolled hypertension and 91.7% of these participants were sub-optimally adherent to their antihypertensive medication as demonstrated in Table 2 which shows relationship between patient-related factors and BP control. About 9.7% (N = 176) of participants were optimally adherent and the remaining 90.3% were found to be sup-optimally adherent to their antihypertensive medication. In addition, about 63.1% (N=176) of participants optimally kept to their scheduled appointments and 61.1% of those with uncontrolled BP (n=108) optimally kept to their scheduled appointments.

Table 1: Summary of participants (N=176)

CATEGORICAL DATA		
Variable	**Category**	**N (%)**
Sex	Females	141 (80.1%)
	Males	35 (19.9%)
Age (years)	<60	69 (39.2%)
	≥60	107 (60.8%)
Duration of treatment (months)	6-9	15 (8.5%)
	10-12	6 (3.4%)
	>12	155 (88.1%)
Comorbidities	None	123 (69.9%)
	Present	53 (30.1%)
CONTINUOUS DATA		
Variable	Mean (standard deviation)	95% confidence interval
Age (years)	61.2 (12.9)	59.3 – 63.1

SBP (mmHg)	145.2 (23.7)	141.1 – 148.9
DBP (mmHg)	88.5 (11.9)	86.7 – 90.2

About 66.7% (n=108) of participants with uncontrolled BP were found to consume moderate to high salt amounts while the remaining 33.3% consumed little or no salt. Approximately 14.8% of participants with uncontrolled BP did not engage in physical activity at least 4 four days weekly nor follow a special diet. Only 16.7% of participants with uncontrolled BP consumed alcohol and 18.5% were smokers. Approximately 35.2% of participants with uncontrolled BP had one or more comorbidities and 53.5% (n=38) of those had diabetes alone or with other conditions. Figure 1 indicates how comorbidities were distributed amongst patients with uncontrolled hypertension (NOTE: some participants had more than one comorbidities).

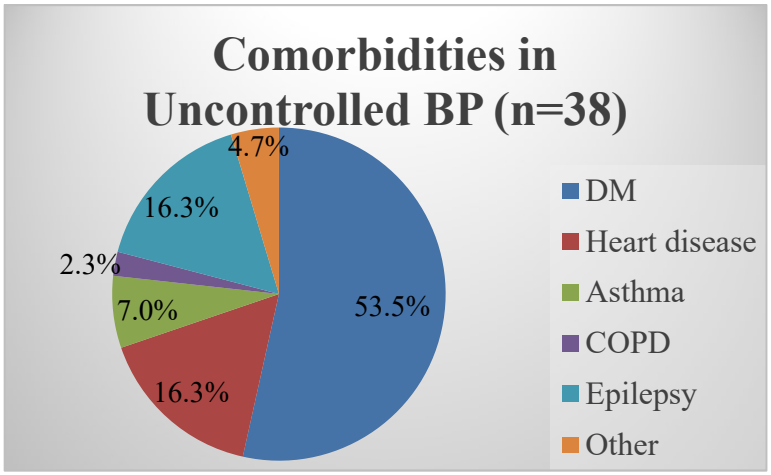


Figure 1: Comorbidities in uncontrolled hypertension participants

Table 2: A cross-tabulation showing the relationship between patient-related factors against BP control in participants

Factors	Categories	Controlled (N=68) n *(%)*	Uncontrolled (N=108) n (%)
Medication adherence	Optimal	8 (11.8%)	9 (8.3%)
	Sub-optimal	60 (88.2%)	99 (91.7%)
Comorbidities	Present	15 (22.1%)	38 (35.2%)
	Absent	53 (77.9%)	70 (64.8%)
Salt consumption	Low	22 (32.3%)	36 (33.3%)
	Medium	42 (61.8%)	68 (63.0%)
	High	2 (2.9%)	4 (3.7%)
Special diet	Yes	60 (88.2%)	92 (85.2%)
	No	8 (11.8%)	16 (14.8%)
Physical activity	Yes	59 (86.8%)	92 (85.2%)
	No	9 (13.2%)	16 (14.8%)
Alcohol consumption	Yes	14 (20.6%)	18 (16.7%)
	No	54 (79.4%)	90 (83.3%)
Smoking	Yes	13 (19.1%)	20 (18.5%)
	No	55 (80.9%)	88 (81.5%)
Appointment keeping	Optimal	45 (66.2%)	66 (61.1%)
	Sub-Optimal	23 (33.8%)	42 (38.9%)

Discussion

The study was an all-inclusive study involving 176 participants where 80.1% were females and this coincides with results from other studies which revealed that over fifty percent of study participants were females.[20-22] However, this may not be conclusive that there are more females than males with hypertension, but it may be that there are more females than males encountered at the healthcare facilities as other studies revealed that more females (mean 25.8 visits in 2011) visited and used facility services than males (mean 22.6 visits in 2011).[23] Another study also revealed that healthcare visits were significantly higher in females ($p = 0.0004$) than in males.[24]

This study had more participants (60.8%) aged above 60 years. Concurrently, it was found in one study that hypertension was more prevalent in adults aged above 60 years,[25] another found that the mean age of its participants was 60.3 (11.1) years,[22] while the others revealed that prevalence of hypertension increases with increase in age.[26,27]

It was found in the current study that 30.1% of participants with uncontrolled BP (n = 108) had one or more comorbidities and this is consistent with results from one study where 43.4% (N = 18 856) of participants had one or more comorbidities.[28] Diabetes mellitus was the leading comorbidity at 53.8% of all comorbidities (n = 38) in the current study as it was in another study where it was the most prevalent comorbidity to hypertension at 18.2% (N = 3 219).[28] Researchers, therefore, suggest that since hypertension and diabetes mellitus increase the risk of macrovascular and microvascular complications, preventive approaches in the management of both conditions should be implemented.[28]

The mean SBP of study participants was found to be 145.2 (23.7) mmHg while the mean DBP was 88.5 (11.9) mmHg consistent with results from a study of 175 participants who had a mean SBP of 148.7 (25.8) mmHg and a mean DBP 89.3 (15.2) mmHg [22] and another study of 923 participants who had a mean SBP of 151 (27) mmHg and a mean DBP of 87(12) mmHg.[21]

It was found that most of the 108 participants with uncontrolled BP (61.4%, N = 176), did generally well in terms of engaging in TLCs such as following a special diet (85.2%) as part of management of hypertension, engaging in physical activity at least four times a week (85.2%), non-smoking (81.5%) and non-alcohol drinking (83.3%). In contrast, in a study of 691 participants, 216 participants were previously diagnosed with hypertension and 67 of these had uncontrolled BP. It was found that 51 (76.1%; n = 67) participants with uncontrolled BP were leading a sedentary lifestyle and 48 (71.6%; n = 67) participants were smokers.[29] In another study that had 78.6% (N = 70) with uncontrolled BP, it was found that only 7.1% and 37.1% of participants adhered to physical exercise and special diet changes respectively[12]. Findings of the current study may imply that there may be other factors influencing BP control of the participants besides the above mentioned TLC or that participants need more clarification on what lifestyle modifications entail as various studies have proven that BP control is improved when patients follow TLCs.[11,13,14,30,31]

However, in the current study, salt (sodium chloride) consumption seemed to be a problem as 66.7% (n = 108) of the participants with uncontrolled BP were identified as consuming moderate to high amounts of salt. This may be one of the factors leading to poor BP control as research has shown that high dietary salt intake leads to high BP or poor BP control.[11,14,32] Furthermore, 61.1% (n = 108) of study participants with uncontrolled BP were optimally adherent to appointment keeping in our study while in a study conducted in Lesotho, 52.4% (N = 212) had defaulted their scheduled appointment at least one time over the previous six months. Most patients in the current study were optimally adherent, however, this can be improved further and it is the responsibility of the patients to attend to scheduled appointments accordingly for improved BP control as it is for health care professionals to set up reasonable appointment schedules.[11,33]

The findings of this study also revealed that 61.4% (n = 176) of participants with controlled BP were optimally adherent to their medication and that only 8.3% (n = 108) of those with uncontrolled BP were optimally adherent to their medication. This results concur with findings from one study where it was found that only 20% (N = 1000) of participants were adherent to their antihypertensive medication.[34] In another study, it was found that 70.3% (n = 118) of participants with uncontrolled BP showed low/poor medication adherence.[35] Both studies revealed that participants with uncontrolled BP were more likely to be non-adherent to their antihypertensive medication.[34,35]

Limitations of this study are that the findings of this study were obtained in the form of self-report and may therefore be bias as some participants may have reported what they thought the interviewers wanted to hear. Despite the limitation, the findings of this study have implications for healthcare providers and policymakers. Patient education about hypertension, its complications and management, inclusive of TLCs and compliance to treatment should be done regularly at healthcare facilities. Education materials about hypertension should also be provided to patients. In addition, management of hypertension and comorbidities should be done holistically to achieve better control in all conditions.

Conclusion

Most patients in Mafeteng Government Hospital have uncontrolled BP attributed but not limited to sub-optimal adherence to antihypertensive medication, unsatisfactory AP keeping, presence (and treatment) of comorbidities related to BP control and unsatisfactory compliance to TLC especially with salt consumption. Researchers recommend regular patient education with emphasis on benefits of compliance (adherence, TLC, AP keeping) in the management of hypertension. It is also recommended that a holistic therapeutic approach to managing hypertension and comorbidities be devised.

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Conflict of interest - None

Authors' contribution – RKM was responsible for planning and preparation of the study, statistical analysis, interpretation of results and drafting of the manuscript. RJ was responsible for supervision of the study and drafting of the manuscript, statistical analysis, and reviewed the manuscript for approval. DR was responsible for co-supervision of the study and drafting of the manuscript, and reviewing the manuscript for approval. MS was responsible for co-supervision of the manuscript, interpretation of results and reviewing the manuscript for approval.

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3.3 Facility-related factors leading to uncontrolled BP

In this section, findings regarding facility-related factors will be shown and discussed. The adherence of doctors to the Lesotho STGs seemed questionable in 4.0% of cases. Adherence to STGs was said to be questionable if for the previous 6 months, uncontrolled BP had not improved, and there was no treatment adjustment either by dose titration or addition of a drug. On the other hand, participants were asked if they had received any educational information about high blood pressure and 66.7% (N = 176) of participants had not received patient education about hypertension from healthcare professionals at the facility.

About 94.4% of participants with uncontrolled BP had received all their antihypertensive medication on the day of interview but only 19.4% reported that they had always received all their high BP medication at the facility. Table 3-2 shows facility-related factors on BP control. The Chi square test shows a great association between frequency of out-of-stock medication and BP control with a Cramér's V of 0.840 (p = 0.05) and little association between BP control and adherence to STGs, provision of patient education and receiving all medication from the hospital pharmacy on the day of interview.

Table 3-2: Facility-related factors on BP control

Factor	Category	Controlled BP (N = 68) n *(%)*	Uncontrolled BP (N = 108) n *(%)*	Cramér's V
Adherence to STGs	Adherent	68 (100.0%)	94 (87.0%)	0.233
	Questionable	0 (0.0%)	14 (13.0%)	
Provision of patient education	Yes	29 (42.6)	36 (33.3%)	0.138
	No	39 (57.4%)	72 (66.7%)	
Got all antihypertensive medication on day of interview	Yes	67 (98.5%)	102 (94.4%)	0.105
	No	1 (1.5%)	6 (5.6%)	
Frequency of stock-outs	Never	14 (20.6%)	23 (21.3%)	0.840
	Seldom	43 (63.2%)	47 (43.5%)	
	Often	11 (16.2)	38 (35.2%)	

About 63.6% of participants always bought their antihypertensive medication from community pharmacies if they had not gotten the medication from the hospital pharmacy as demonstrated in Table 3-3.

Table 3-3: Action patients took for stock-outs at the hospital pharmacy

Action for stock-outs	Frequency (n)	Percent	Cumulative Percent
No stock-outs (not applicable)	40	22.7%	22.7%
Bought	112	63.6%	86.4%
Bought, borrowed	1	0.6%	86.9%
Bought, borrowed, waited for the next refill date	1	0.6%	87.5%
Bought, got from another facility, waited for the next refill date	1	0.6%	88.1%
Bought, waited for the next refill date	8	4.5%	92.6%
Waited for next refill date	12	6.8%	99.4%
Got from another facility	1	0.6%	100.0%
TOTAL	**176**	**100.0%**	

Although on the day of interview most of the participants had received all their antihypertensive medication (98.5%, n = 68 in controlled; 94.4%, n = 108 in uncontrolled), only 20.6% and 21.3% of controlled and uncontrolled BP, respectively, had never experienced out-of-stock at the hospital pharmacy. These findings concur with Sarfo *et al.* (2018:10) who found that 98% (N = 2870) of study participants had received all their antihypertensive medication at the respective sites' hospital pharmacies. However, Kalungia *et al.* (2017:142) found that 58.2% (N = 15) of facilities experienced low availability of antihypertensive medication and frequent stock-outs and this could bring about negative outcomes in the management of hypertension. In addition, Wirtz *et al.* (2018:884) pointed out that in order to achieve positive clinical outcomes in all patients, affordability and availability of medication to all patients should be improved.

Just as 63.6% (N = 176) of the participants in the current study bought medication from community pharmacies when they had not received them from the hospital pharmacy due to stock-outs, 42% (N = 2870) of participants in a study by Sarfo *et al.* (2018:10) bought antihypertensive medication from community pharmacies and licensed chemical sellers. In addition, Rockers *et al.* (2018:6) found that there were frequent stock-outs of non-communicable diseases medication at public facilities in Kenya. This may imply that access together with affordability of antihypertensive medication is a contributing factor to poor BP control (Sarfo *et al.*, 2018:14), especially in those participants who could not always afford to buy medication but had to wait for the next refill date. Moreover, Bigdeli *et al.* (2013:696) stated

that the affordability of medication may be a reason for poor access to medication as some patients may not afford medication that was out-of-stock at the facilities.

Findings of the current study revealed that the adherence of doctors to STGs was questionable in 4% of all the 176 case as the BP of those particular patients had been uncontrolled for the past 6 months and there was no modification of antihypertensive treatment by either adjusting doses or adding another drug. Horsa *et al.* (2019:3) found that antihypertensive medication of participants in their study was modified in about 22% (N = 225) where BP had increased and this resulted in a decrease in BP. Gopalakrishnan *et al.* (2014:4) stated that STGs are important as they help in promoting rational drug use, thereby reducing the risk of adverse event and poor clinical outcomes. Furthermore, Sooruth *et al.* (2015:52) found that healthcare professionals understood and adhered to the use of STGs but suggested that training on STGs use should be improved as it seemed inadequate.

It was found that 66.7% (n=108) of participants in the current study with uncontrolled BP had not received patient education regarding hypertension. Patient education about management of high BP and lifestyle changes helps in the improvement of BP control and lifestyle of patients (Hacihasanoğlu & Gözüm, 2011:698). Gallefoss *et al.* (2000:282) found that patient education improved the clinical outcomes of asthma and COPD and reduced visits of patients to the general practitioner. The Patient Education Institute (2013) stated that patient education helps in improving the health of patients. Therefore, Mugomeri *et al.* (2016:5) recommended adequate patient education about hypertension and treatment as they had found that inadequate knowledge of hypertension was related to uncontrolled BP.

3.4 Chapter summary

In this chapter, findings for patient-related factors and facility-related factors were presented and discussed. The next chapter (Chapter 4) focuses on the conclusions drawn from the findings of the study.

CHAPTER 4: CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

4.1 Introduction

The purpose of the final chapter is to draw conclusions from this study with regards to the specific objectives set. This chapter begins with a brief overview of the structure of the dissertation, followed by some highlights and conclusions drawn from the findings of this study. Thereafter, the limitations of this study are discussed, followed by recommendations for future studies.

4.2 Content of dissertation

This dissertation consisted of four chapters. Chapter 1 gave an overview of the study while focusing on providing background to the study, detailing the problem to be investigated by answering the research questions. It also provided the aim of the study as well as specific literature and empirical objectives, along with the methodology that was used to achieve these objectives.

Chapter 2 provided a background to hypertension including the prevalence thereof, as well as a discussion on controlled and uncontrolled hypertension. Factors that influence uncontrolled hypertension were also discussed, as well as complications of uncontrolled hypertension. The chapter also provided the difference between different treatment guidelines and recommendations by organizations on the measures to improve BP control.

Chapter 3 represented the results of this study in one manuscript (Section 3.2) as well as additional results (Section 3.3), along with the discussion of this dissertation. The title of the manuscript is: “Patient-related factors contributing towards uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho”. This manuscript was prepared for submission to the *South African Medical Journal*.

4.3 Conclusion

The aim of this study was to determine the factors that lead to uncontrolled BP in patients taking antihypertensive medication in an outpatient setting in Mafeteng, Lesotho. Two main approaches were followed to achieve this goal, namely a literature review as well as an empirical investigation. The empirical investigation followed an observational, cross-sectional research design. The conclusions for the specific research objectives are addressed in the subsequent paragraphs.

4.3.1 Conclusion from the literature review

The objectives for the literature review as specified in Chapter 1, section 1.3.2 were achieved in Chapter 2 of this dissertation. The findings for each objective is summarised and concluded on in the subsequent paragraphs.

4.3.1.1 Investigate the control of BP worldwide, narrowing down specifically to Lesotho

An overview of hypertension as well as the prevalence thereof was discussed in Chapter 2, Section 2.2.1. From the Literature Review, it was found that there are in excess of 1 billion patients worldwide suffering from hypertension, with 1 in every 4 males and 1 in every 5 females having hypertension, with Africa having the highest prevalence (WHO, 2019). It was also found that in Lesotho, 19% and 13% of females and males, respectively, aged between 15-49 years, had hypertension in 2014. It was seen that in the USA, UK, Australia and Sub-Sahara Africa, hypertension control was below 50% (refer to Section 2.2.1).

4.3.1.2 Determine consequences of uncontrolled BP

In Chapter 2, Section 2.2.6, the complications of uncontrolled BP were discussed. It was seen that hypertension appears to be one of the highest risk factors of heart failure. It was also noted that hypertensive patients have a higher risk for heart attacks, heart failure, and stroke and kidney disease than normotensive people (refer to Section 2.2.6). In addition, it was seen that hypertension complications include atherosclerotic vascular disease which can either be coronary artery disease, carotid artery disease, peripheral arterial disease and abdominal aortic aneurysm. Other complications include CVDs such as left ventricular dysfunction (heart failure), chronic kidney disease and retinopathy. From the literature it can, thus, be concluded that it is crucial that BP control is maintained so as to reduce occurrences of clinical complications.

4.3.1.3 Determine factors that influence poor control of BP in patients taking antihypertensive treatment

Factors that influence BP control were discussed in Section 2.3 and they were categorised as patient-related factors (Section 2.3.1) and facility-related factors (Section 2.3.2). From the literature, patient-related factors that were found to influence poor BP control include the following: poor medication adherence, poor appointment keeping, presence of comorbidities, lack of knowledge about hypertension and treatment, increased age, sedentary lifestyle, smoking, excessive alcohol consumption and poor dietary choices (high salt intake, high saturated fat intake, less fruits and vegetables, etc.). Facility-related factors found to influence poor BP control include poor access to medication, not providing

patients with education about hypertension, poor adherence to STGs by healthcare professionals, quality of service provision, waiting time and patient-prescriber relationship.

4.3.1.4 Review the guidelines for the treatment of hypertension

The treatment of hypertension was discussed in Chapter 2, Sections 2.2.7 and 2.4.1, where there were differentiated between pharmacological and non-pharmacological treatment. The four steps in treating hypertension, according to Kamienski and Keogh (2006:356) were highlighted, followed by a brief discussion on the different medications used in treating hypertension. The treatment guidelines from the JNC7, JNC8, South African Hypertension Society and the Lesotho Ministry of Health's Standard Treatment Guidelines (STGs) were compared in table format (Section 2.5, Table2-2). It was seen that the goal BP for hypertension treatment is generally the same for all four guidelines. All four guidelines indicated lifestyle modifications as first-line treatment if there are no other compelling indications or risk factors. It can be concluded that the Lesotho STGs compare well to other hypertension treatment guidelines.

4.3.1.5 Identify the measures taken to improve BP control by different organisations around the world

A discussion about different measures taken to improve BP control by the World Health Organization, the Centre for Disease Control and Prevention, the American Heart Association and the JNC7 were presented in Section 2.4.1 to **Error! Reference source not found.**. It was seen that all but one of these organisations, regard a change in lifestyle the biggest measure to improve BP control, as well as to reduce possible complications.

4.3.2 Conclusion for the empirical study

The objectives for the empirical investigation as specified in Chapter 1, Section 1.3.3, were achieved in Chapter 3 of this dissertation. The findings for each objective are summarised and concluded on in the subsequent paragraphs.

4.3.2.1 Determine BP control status (i.e. controlled versus uncontrolled BP) of patients taking antihypertensive medication in an outpatient setting in Mafeteng, Lesotho

It was found from the empirical findings that there are more patients with uncontrolled BP (n = 108) than those with controlled BP (n = 68) in Mafeteng Government Hospital out-patient department, Lesotho. These findings correspond with findings from the literature (refer to Section 2.1) where it was revealed that two studies which were conducted in Lesotho between in 2013-2015 had more patients with uncontrolled BP than with controlled BP.

4.3.2.2 Determine the prevalence of uncontrolled BP in the outpatient setting

From empirical findings, prevalence of uncontrolled BP was found to be 61.4%. This shows that there is a high prevalence of uncontrolled BP in out-patient settings in Lesotho as Thinyane *et al.* (2015) and Mugomeri *et al.* (2016:44) revealed uncontrolled BP of >75% in outpatient settings of Lesotho.

4.3.2.3 Determine patient-related factors that lead to uncontrolled BP

From the empirical investigation, it was found that only 8.3% (n = 108) of participants with uncontrolled BP were adherent to their antihypertensive medication. These findings concur with findings from a study where 29.7% (n = 118) of participants with uncontrolled BP had low medication adherence (Mpande *et al.*, 2018:18). Yiannakopoulou *et al.*, (2005:245) also found that only 20% (N=1 000) of participants were adherent to their medication, consistent with findings from the current study where it was found that only 9.7% (N = 176) were adhering optimally to their high BP medication. We can, therefore, conclude that medication adherence in the facility is not satisfactory and it affects BP control.

Furthermore, about 38.9% (n = 108) of participants with uncontrolled BP did not optimally keep to their scheduled appointments. Mugomeri *et al.* (2016:44), who had >75% of participants with uncontrolled BP, found that 35.6% (N = 212) of participants had sometimes missed their follow-up appointments. In addition, in a study by Barreto *et al.* (2016:3), there were 43 participants who did not adequately attend their scheduled appointments and 81.4% (n = 43) of these had uncontrolled BP. From the discussed findings we can, therefore, conclude that appointment keeping in the facility is related and affects BP control.

It was also found in the current study that 66.7% (n = 108) consumed moderate to high amounts of salt while only 33.3% consumed little amounts of salt. Findings from the literature (Section 2.3.1.2.1) revealed that reducing the amount of salt consumption results in decreased BP measurements. We, therefore, conclude that salt consumption is a contributing factor to uncontrolled BP in this population as over 60% of participants were not consuming low amounts of salt and the rate of their uncontrolled BP was high.

In addition, from the empirical findings, it was found that 85.2% (n = 108) of participants with uncontrolled BP had followed a special diet and engaged in physical activity, 81.5% were non-smokers and 83.3% did not drink alcohol. These findings do not agree with findings from the literature, which stated that adopting TLCs such as a special diet, being physically active, non-smoking and drinking alcohol moderately, reduced BP (Chobanian *et al.*, 2004:25; Kanj *et al.*, 2018:2; Khatib & Elguindy, 2005:48; Thinyane *et al.*, 2015). We, therefore, conclude that uncontrolled BP in the current study population is not influenced by TLCs as patients seem to adhere but may be influenced by other factors, or that patients do not fully understand what TLCs and are, therefore, not following them appropriately.

Finally, about 30.1% (n = 108) of participants with uncontrolled BP had comorbidities and diabetes was the dominating comorbidity. Findings from literature revealed that presence of comorbidity influence the clinical outcomes of the management of hypertension including BP control (Cordero *et al.*, 2011:584; Lalkhen *et al.*, 2015:136). We, therefore, conclude that presence of comorbidities in the current study had an influence on BP control of the participants as literature suggests.

4.3.2.4 Determine facility-related factors that lead to uncontrolled blood pressure

In the literature study (Section 2.3.2.2), it was found that adherence to STGs is associated with BP control and that STGs are necessary for improved control of hypertension. It was suggested by Horsa *et al.* (2019:3) that healthcare professionals follow STGs. In the current study, although little, association between BP control and adherence to STGs was found, we can, therefore, conclude that questionable adherence to STGs in 13% (n = 108) of participants with uncontrolled BP was related to uncontrolled BP.

In addition, it was found that 66.7% (n = 108) of participants with uncontrolled BP had never received patient education from healthcare professionals at the facility while literature showed that patient education (especially about lifestyle modifications and medication adherence) is necessary for BP control (Hacihasanoğlu & Gözüm, 2011:698; Lertsuwunseri and Sangwatanaroj, 2011:24). We can, therefore, conclude that lack of provision of patient education at the facility contributed toward uncontrolled BP.

In conclusion, it was found from the empirical investigation that only 21.3% (n = 108) of participants with uncontrolled BP had never experienced stock-outs at the hospital pharmacy while the remainder seldom or often experienced stock-outs. This limits the availability and access to medication which is associated with BP control (Sarfo, *et al.*, 2011), as not all patients in the current study were able to buy medication if it is out-of-stock at the hospital pharmacy. We can, therefore, conclude that uncontrolled BP was also influenced by frequent stock-outs at the facility as the findings revealed a great association between the two (Cramér's V = 0.84, p = 0.05).

4.4 Study limitations

There may be social desirability bias due to the fact that some data was acquired from interviews and patients may have responded with answers that seemed socially acceptable. This may have caused an overestimation in the number of participants who adhere to lifestyle changes.

4.5 Recommendations

The following recommendations are proposed:

- Healthcare professionals should educate patients regularly about hypertension and put emphasis on the importance of adhering to therapeutic lifestyle changes such that BP control is improved.
- Comorbidities should be managed holistically such that all conditions are well controlled.
- Access to antihypertensive medication should be reviewed and improved such that stock-outs are reduced at facilities.
- Healthcare professionals should keep abreast with new treatment guidelines so that they are always updated with new developments. This can be achieved if the Ministry of Health arranges trainings and workshops regularly for all healthcare professionals where new developments and ideas regarding management of non-communicable diseases can be shared.
- In the future, researchers may look into factors contributing towards uncontrolled BP from the healthcare professionals' perspective.

4.6 Chapter summary

The final chapter highlighted the findings of the literature study and empirical investigation in relation to the literature and empirical objectives. The limitations of the study and recommendations for future research, healthcare professionals and policymakers were highlighted.

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ANNEXURE I: INFORMED CONSENT FORM (ENGLISH)

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Health Research Ethics Committee
Faculty of Health Sciences
NORTH-WEST University
(Potchefstroom Campus)
2018 -10- 15
HREC Stamp

INFORMED CONSENT DOCUMENTATION FOR HYPERTENSION PATIENTS BEING INTERVIEWED

TITLE OF THE RESEARCH STUDY: FACTORS LEADING TO UNCONTROLLED BLOOD PRESSURE IN PATIENTS TAKING ANTIHYPERTENSIVE MEDICATION IN MAFETENG, LESOTHO

ETHICS REFERENCE NUMBERS: NWU-00027-18-S1

PRINCIPAL INVESTIGATOR: DR R JOUBERT

POST GRADUATE STUDENT: RK MAFISA

ADDRESS: MOTSE-MOCHA, PABALLONG, P.O.BOX 929, MAFETENG 900

CONTACT NUMBER: 072 879 5852

You are being invited to take part in a **research study** that forms part of a Masters study. Please take some time to read the information presented here, which will explain the details of this study. Please ask the researcher or person explaining the research to you any questions about any part of this study that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research is about and how you might be involved. Also, your participation is **entirely voluntary** and you are free to say no to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part now.

This study has been approved by the **Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00027-18-S1)** and will be conducted according to the ethical guidelines and principles of Ethics in Health Research: Principles, Processes and Structures (DoH, 2015) and other international ethical guidelines applicable to this study. It might be necessary for the research ethics committee members or other relevant people to inspect the research records.

What is this research study all about?

- *This study will be conducted in Mafeteng Government Hospital between April and July. I will be asking you questions in an interview and writing down your responses down with ink while my assistant data-collector will copy some information (blood pressure readings, medications, other conditions) from your prescription booklet into a sheet of paper with ink.*

- *In this study, the aim of the researcher is to determine factors that lead to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho.*

- *The researcher will do this by identifying factors that are directly influenced by patients and factors that are directly influenced by the hospital/facility.*

- *We plan to ask you questions using a designed form in order to determine the factors that lead to uncontrolled blood pressure in Lesotho.*

Why have you been invited to participate?

- *You have been invited to be part of this research because Mafeteng Government hospital has been selected to be part of the study and you are receiving your high blood pressure treatment in this hospital.*

- *You also fit the research because you have been receiving antihypertensive medication for a period of six months or more.*

- *You will unfortunately not be able to take part in this research if you are pregnant.*

What will be expected of you?

During your time of visit at the hospital (high blood pressure check-up), you will be expected to answer questions from the designed form. You will also be asked to provide us with your prescription booklet so that we can copy information such as prescribed medication, date of birth, other conditions and blood pressure readings.

Will you gain anything from taking part in this research?

- *There will be no direct gains for you in the study.*
- *The other gains of the study are for improvement of treatment and treatment outcomes of high BP in hypertensive patients in Lesotho. Also, the research community will also gain from the results of this study as these results will add to the literature and will open more opportunities for future research.*

Are there risks involved in you taking part in this research and what will be done to prevent them?

- *The risks to you in this study are that the participants may experience time loss and psychological distress such as boredom and self-exposure during data collection these but will be limited by making the questionnaire as brief and clear as possible and only the researcher will know what the participant has written in the form. You can also skip any question you are not comfortable answering.*
- *There are more gains for you in joining this study than there are risks.*

How will we protect your confidentiality and who will see your findings?

- *Anonymity of your findings will be protected by using codes to protect the identity of the subjects and no personal information or identifiers will be collected such as your name and surname, ID number or patient number. Your privacy will be respected by storing your consent forms and questionnaires in a locked cupboard, of which only the researcher will have access to. Also, the interviews will be conducted in a private room to ensure privacy. Your results will be kept confidential by preventing the data from being released to any third party without the consent of the subjects; the mediator will be required to sign a confidentiality agreement to ensure that he/she does not release any information about the patient; and the name of the hospital will appear in the final report, but your names will not be included anywhere in the final report. Only the researchers, study supervisors and the statistician will be able to look at your findings. Findings will be kept safe by locking hard copies in locked cupboards in the researcher's office and for electronic data it will be password protected. Data will be stored for five years.*

What will happen with the findings or samples?

- *The findings of this study will only be used for this study.*

How will you know about the results of this research?

- We will give you the results of this research when the study has been completed by making presentations at the hospital.
- You will be informed of any new relevant findings by presentations at the hospital.
- Feedback will also be made known to you by putting up a poster showing a brief summary of the results at Mafeteng Government Hospital OPD.

Will you be paid to take part in this study and are there any costs for you?

This study is not funded by any organisation, the researcher will cover the costs of the study.

• No you will not be paid to take part in the study because there will be no added costs as the interview will take place on the day of your hospital visit.

- You will also not be kept at the hospital after normal hours, which is 16:00.

Refreshments (a fruit and a bottle of water) will be served to you when you leave after completing the interview.
There will thus be no costs involved for you, if you do take part in this study.

Is there anything else that you should know or do?

- You can contact Refeletse Mafisa at (+266)58822245 or +27728795852 or send an email to fifimafisa@gmail.com or,
- Dr Rianda Joubert at +27182994290 (tell) or send an email to Rianda.Joubert@nwu.ac.za if you have any further questions or have any problems regarding the study.
- You can also contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 1206 or carolien.vanzyl@nwu.ac.za if you have any concerns that were not answered about the research or if you have complaints about the research.
- You will receive a copy of this information and consent form for your own purposes.

Declaration by participant

By signing below, I ……..…… agree to take part in the research study titled **Factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho**.

I declare that:

- I have read this information/it was explained to me by a trusted person in a language with which I am fluent and comfortable.
- The research was clearly explained to me.
- I allow the researchers to use my prescription booklet for obtaining any information necessary for the study.
- I have had a chance to ask questions to both the person getting the consent from me, as well as the researcher and all my questions have been answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be handled in a negative way if I do so.
- I may be asked to leave the study before it has finished, if the researcher feels it is in the best interest, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) …….…….. 20....

....
Signature of participant **Signature of witness**

Declaration by person obtaining consent

I *(name)* ……..…… declare that:

- I clearly and in detail explained the information in this document to

  ……

- I did/did not use an interpreter.
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I gave him/her time to discuss it with others if he/she wished to do so.

Signed at (*place*) ..... on (*date*) ..... 20....

.....
Signature of person obtaining consent

Declaration by researcher

I *(name)* ..... declare that:

- I had the information in this document to explained by ..... who I trained for this purpose.
- I did not use an interpreter
- I encouraged him/her to ask questions and took adequate time to answer them and I was available should he/she want to ask any further questions.
- The informed consent was obtained by an independent person.
- I am satisfied that he/she adequately understands all aspects of the research, as described above.
- I am satisfied that he/she had time to discuss it with others if he/she wished to do so.

Signed at (*place*) ..... on (*date*) ..... 20....

.....
Signature of researcher

Current details: (23239522) G:\My Drive\9. Research and Postgraduate Education\9.1.5.6 Forms\9.1.5.6_HREC_ICF_Template_Apr2018.docm
25 April 2018

File reference: 9.1.5.6

ANNEXURE II: INFORMED CONSENT FORM (SESOTHO)

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Health Research Ethics Committee
Faculty of Health Sciences
NORTH-WEST University
(Potchefstroom Campus)
2018 -10- 15
HREC Stamp

INFORMED CONSENT DOCUMENTATION FOR HYPERTENSION PATIENTS BEING INTERVIEWED

TITLE OF THE RESEARCH STUDY: FACTORS LEADING TO UNCONTROLLED BLOOD PRESSURE IN PATIENTS TAKING ANTIHYPERTENSIVE MEDICATION IN MAFETENG, LESOTHO

ETHICS REFERENCE NUMBERS: NWU-00027-18-S1

MOFUPUTSI OA MANTLHA: DR R JOUBERT

MOITHUTI: RK MAFISA

ATERESE: MOTSE-MOCHA, PABALLONG, P.O.BOX 929, MAFETENG 900

LINOMORO TSA MOHALA: +2772 879 5852 kapa +26658822245

U memeloa ho nka karolo lipatlisisong tseo e leng karolo ea boithuto ba mofuputsi lekaleng la Master of Pharmacy in Pharmacy Practice Studies. Mohokahanyi o tla kena lipakeng ho hlalosa lintlha tsa boithuto bona ho oena. U tla kopuoa ho nka nako ho bala litaba tse ngotsoeng mona hore u fumane kutloisiso mabapi le boithuto bona le se tla lebelloa ho tsoa ho oena boithutong bona. O kopuoa ho botsa mofuputsi kapa motho ea sebetsang le eena ho u hlalosetsa ka boithuto bona kapa lipotso tse tlang ho u thusa ho utloisisa hantle boithuto bona. Ho bohlokoa haholo hore u utloisise hore na boithuto bona bo mapabi le eng le hore na karolo ea hao ke efe boithutong bona. Hape, ela hloko hore ho nka karolo ha se setlamo 'me o lokolohile hore u ka hana ho etsa joalo. Ha u ka hana ho na karolo, sena se ke ke ea u ama hampe ka mokhoa ofe kapa ofe. U na le tokelo ea

ho ikhula boithutong bona nakong e nngoe le e nngoe ea boithuto bona leha u ka lumela ho nka karolo hona joale.

Boithuto bona bo lumelletsoe ka molao ke **Health Research Ethics Committee tlasa lekala la lithuto tsa bophelo North-West University (NWU-00027-18-S1)** 'me bo tla etsoa ho latela melao-theo le litataiso (DoH, 2015) tsa lekala lena hape le litataiso tse ling tsa machaba tsa boitšoaro tse sebetsang thutong ena. Ho ka 'na ha hlokahala hore litho tsa komiti ea boitšoaro ba lipatlisiso kapa batho ba bang ba tšoanelehang ba hlahlobe litlaleho tsa lipatlisiso.

Phuputso-boithuto e mabapi le eng?

- *Boithuto bona bo tla etsetsoa Mafeteng Hospital lipakeng tsa April le July 'me bo tla kenyelletsa lipotso tse tlang ho botsoa ke motho ea rupelletsoeng ho etsa joalo ka thuso ea motho e mong ea etsang lipatlisiso.*
- *Boithutong bona, sepheeo sa mofuputsi ke ho fumana lintlha tse lebisang ho khatello e sa laoleheng ea mali bathong ba ntseng ba noa litlhare tsa khatello e phahameng ea mali.*
- *Mofuputsi o tla etsa Sena ka ho hlalohanya lintlha tse amanang le bakuli le tse amanang le sepetlele.*
- *Re rerile ho bitsa bakuli lipotso ka pampiri-potso ele ho fumana lintla tse lebisang khatellong e ea laoleheng ea mali Mafeteng, Lesotho.*
- *Re rerile hape ho fumana litaba tse ling ho tsoa ka libukaneng ea monka-karolo.*

Hobaneng u memetsoe ho nka karolo?

- *U memetsoe ho na karoo boithutong bona hobane Sepetlele sa 'Muso sa Mafeteng se hloauoe ho ba karolo hape u fumana litlhare tsa hao tsa khatello e phahameng ea mali teng.*
- *Hape u nepahetse sebakeng ea boithuto bona hobane u ntse u fumana litlhare tsa khatello e phahameng ea mali nakong ea likhoeli tse tšeletseng kapa ho feta.*
- *U tla hloleha ho nka karolo haeba u le mokhachane.*

Ke sefe se lebelletsoeng ho oena?

- *U lebelletsoe ho araba lipotso tse tsoang pampiri potsong nakong ea ketelo ea hlahlobo ea khatello e phahameng sepetlele.*

Na ho na le seo u tla tla se una ha u na karoo lipatlisisong tse?

- *Ho ke ke hoa e-ba le melemo e tobileng ho uena thutong ena empa seo u tla se fumana ha u nka karolo ke ho ruha tsebo ka litaba tsa khatello e phahameng ea mali 'me u fumane le katleho ea kalafo.*
- *Hape re lebelletse ho fumana katleho ea kalafo bakuling ba khatello e phahameng ea mali Lesotho. Taba e nngoe ke hore batho ba bang ba tla etsa lipatlisiso ba tla fumana thuso liphethong tsa boithuto bona 'me ba ekeletse litabeng tse ling tse seng ntse li le teng mabapi le lipatlisiso tsena kamoso.*

Na ho na le likotsi tse tla u ama ha u ka kenya letsoho phuputsong ee, 'me ho tla etsoa eng ho li thibela?

- *Likotsi tse ka u amang boithutong bona ke hore ba-nka-karolo ba ka ba le tahlehelo ea nako le khatello ea kelello e kang ho ba le bolutu le ho iponahatsa nakong ea pokello ea lintlha tsena empa e tla fokotsoa ka ho etsa hore pampiri-potso e be khutšoanyane le hore lipotso e be tse hlakileng ha ho khoneha, 'me ke mofuputsi feela o tla tseba seo mo-nka-karolo a se ngotseng ka foromo*
- *Ho na le melemo e mangata ho uena ha u ka nka karolo boithutong bona ho feta likotsi.*

Re tla sireletsa uena le tseo re tlang ho li fumana ka uena joang?

- *Liphetho tsa hao li tla bolokoa e le lekunutu hoba ha hona moo lebitso la hao kapa nomoro ea boitsebiso kapa kapa nomoro ea mokuli e tla sebelisoa teng, mo-nka-karolo ka mong o tla fuoa nomoro e ikhethang. Boitsebiso ba hau ba boinotši bo tla hlomphuoa ka ho boloka foromo ea hao ea tumello le pampiri-potso ea hao ka lebokoseng le koetsoeng, leo e leng mofuputsi a tla ba le monyetla oa ho fumana. Hape lipuisano li tla etsetsoa ka phaposing ea sephiri ele ho netefatsa hore hona le boinotši. Liphetho tsa hau li tla boloka e le liphiri e le ho thibela hore litaba tsa hao li se ke tsa lokolloa ho motho ofe kapa ofe oa boraro ntle le tumello ea mo-nka-karolo; Mohokahanyi o tla hlokoa hore a tekene boitlamo ba sephiri ele ho netefatsa hore ha nah o ntša litaba life kapa life tseo a tla li fumana ka mokuli; 'me ke lebitso la sepetlele feela le tla hlaha tlalehong eseng mabitso a ba-banka-karolo. Ke bafuputsi feela, batataisi ba lipatlisiso le ralipalopalo ba tla sheba liphetho tsa hao. Litaba tsohle tse bokelletsoeng li tla bolokoa ka hloko lebokoseng le notletsoeng phaposing ea mofuputsi 'me sebakeng sa litaba tse bolokiloeng komporong, hot la netefatsoa hore komporo e lula e notletsoe ka nomoro ea lekunutu. Litaba tsohle tse bokelletsoeng li tla bolokoa nako ea lilemo tse supileng.*

Ho tla etsahala joang ka liphetho tse tla fumanoa?

- Liphetho tse tla fumanoa li tlo sebelisetsoa boithuto bona feela.

U tla tseba joang ka liphetho tsa patlisiso ee?

- *Re tla u fa liphetho tsa lipatlisiso ha ho se ho qetuoe ka boithuto ka mokhoa oa tlhahiso e tla tshoareloa sepetlele.*

U tlo pataloa ha u nka karolo boithutong bo hape na ho na le litjeo tse tlo patalloa ke uena?

Boithuto bona ha boa ts'ehetsoa ka lichelete ke mokhatlo ofe kapa ofe. Litjeo tsohle tsa boithuto li tlo lefelloa ke mofuputsi.

- Che, ha u na ho pataloa ha u nka karolo boithutong bona hobane ha ho na litjeo tse u tla kopana le tsona nakong ea puisano kaha puisano eo e tlo etsoa ka nako eo u tla be u etetse sepetlele ka letsatsi le baletsoeng ke ngaka.
- U tla fuoa tholoana le botlolo ea metsi. Hape re tla netefatsa hore ha re u boloke sepetlele ke theko ho lihora tsa ts'ebetso e leng ho fihlela ka hora ea bone thapama.
- Hang hoba lipuisano li fele lipakeng tsa mo-nka-karolo le bafuputsi, mo-nka-karolo o tla fuoa tholoana le botlolo ea metsi
- Ha ho na litjeo tse ekelitsoeng tseo u tla kopana le tsona ha u nka karolo boithutong bona.

Na ho na le se seng hape seo u batlang kapa lokelang ho se tseba kapa ho se etsa?

- U ka letsetsa Refeletse Mafisa ho (+266)58822245 kapa +27728795852 kapa u romelle email ho fifimafisa@gmail.com kapa;
- Dr Rianda Joubert ho +27182994290 (ofising) or +27824941378 (thekeng) kapa u romele email ho Rianda.Joubert@nwu.ac.za haeba u na le lipotso kapa liqholotso mabapi le boithuto bona.
- Hape u ka letsetsa Mofumahali Carolien van Zyl oa Health Research Ethics Committee ho 018 299 1206 kapa oa mo romella email ho carolien.vanzyl@nwu.ac.za haeba tse ling tsa lipotso tsa hao ha lia arajoa mabapi le patlisiso ena kapa haeba u na le litletlebo ka patlisiso ena.
- U tla fumana kopi ea foromo ena bakeng sa merero ea hao.

Boitlamo ba monka-karolo

Ka ho tekena mona, nna …….. ke lumela ho nka karolo patlisisong e bitsoang **Factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho**.

Ke itlama hore:

- Ke balile tlhahisoleseling ena kapa ke e hlaloselitsoe ke e hlaloseitsoe ke mothoa ts'epahalang ka puo eo ke e utloang ke bile ke phuthulohile ka eona.
- Phuputso ena ke e hlaloselitsoe ka ho hlaka.
- Ke lumella bafuputsi ho sebelisa bukana eaka ho fumana litaba tse tla sebelisoa boithutong bona.
- Ke bile le monyetla oa ho botsa lipotso ho motho ea neng a batla tumello 'moho le ho mofuputsi 'me lipotso tsohle tsaka li ile tsa arajoa.
- Kea utloisisa hore ho nka karolo boithutong bona ke **boithaopo** 'me ha kea qobelloa ho nka karolo.
- Nka khetha ho tlohela ho nka karolo boithutong ka nako efe kapa efe 'me khetho eo e ke ke ea sebetsoa ka tsela e mpe haeba ke etsa joalo
- Nka kopuoa ho tlohela ho nka karolo pele boithuto bo fela haeba mofuputsi a utloa ho hlokahala kapa haeba ke sa latele merero ea phuphutso kamokhoa oo ho neng ho lumellanoe ka ona.

Sebaka sa ho tekena ……. ka la (*letsatsi*)
…….. 20....

.....	.....
Motekeno oa monka-karolo	**Motekeno oa paki**

Boitlamo ka motho ea fuoang tumello

Nna *(lebitso)* …….. ke itlama hore:

- Ka ho hlaka le ka botlalo, ke hlalositse litaba tse ka tokomaneng ena ho

  ……

- Ke sebelisitse/ha kea sebelisa motoloki.
- Ke mo khothallelitse ho botsa lipotso 'me ka nka nako e lekaneng ho li araba.
- Ke khotsofetse hore o utloisisa ka botlalo lintlha tsa phuputso joalokaha ho hlalositsoe.

- Ke mo file nako ea ho buisana le ba bang ka hore na o lakatsa hon ka karolo.

Sebaka sa ho tekena ..... ka la (*letsatsi*)
…….…… 20....

.....
Motekeno oa motho ea fuoang tumello

Boitlamo ka mofuputsi

Nna *(lebitso)* ……..…… ke tlama hore:

- Ke hlophisitse hore litaba tse ka tokomaneng ena li hlalosetsoe mokuli ke …… eo ke mo rupetseng sebakeng sa morero ona.
- Ha kea sebelisa motoloki.
- Ke mo khothallelitse ho botsa lipotso 'me ka nka nako e lekaneng ho li araba kapa ke ne ke fumaneha sebakeng sa haeba a ka lakatsa ho botsa lipotso Nakong efe kapa efe.
- Tumello e batluoe ke motho ea ikemetseng.
- Ke khotsofetse hore o utloisisa ka botlalo lintlha tsa phuputso joalokaha ho hlalositsoe.
- Ke khotsofalletse hore o bile le nako ea ho buisana le ba bang ka hore na o batla ho nka karolo.

Sebaka sa ho tekena ..... ka la *(letsatsi)*…….. 20....

.....
Motekeno oa mofuputsi

ANNEXURE III: CONFIDENTIALITY AGREEMENT (INDEPENDENT PERSON)

ANNEXURE J – CONFIDENTIALITY AGREEMENTS

NWU®
NORTH-WEST UNIVERSITY
NOORDWES-UNIVERSITEIT
YUNIWESITI YA BOKONE-BOPHIRIMA

CONFIDENTIALITY UNDERTAKING

ENTERED INTO BETWEEN:

NORTH-WEST UNIVERSITY a public higher education institution and a juristic person, regulated by and established in terms of the Higher Education Act No. 101 of 1997 and represented herein by Director of the Research Entity, Medicine Usage in South Africa, Prof Martie Lubbe duly authorised thereto. (Hereinafter referred to as **NWU**.)

AND

Full names: Miss SI Moshoeshoe (Passport number) RC380260

Physical address:
Ha Matala,
Phase 1,
Maseru,
Lesotho.
Postal address:
P.O. Box 11025,
Maseru 100,
Lesotho.
Contact details:
Cell phone numbers: (+266) 58182568
Email address: noshoeshoesenateirene@gmail.com

(Hereinafter "the **post graduate student or member of personnel of the Faculty of Health Sciences**").

S.M
T.M
M.S

WHEREAS the research entity, Medicine Usage in South Africa (MUSA) in the School of Pharmacy, Faculty of Health Sciences requested the Ministry of Health of Lesotho that one of our post-graduate students Miss Refeletse K Mafisa may interview high blood pressure patients with the aim of determining factors that lead to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng Government Hospital in the district of Mafeteng, Lesotho.

AND WHEREAS

- the member of the personnel of the Faculty of Health Sciences at the NWU will be involved in research activities related to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication.
- the post-graduate students of the Faculty of Health Sciences at the NWU will be involved in research activities related to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication.

AND WHEREAS the member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU shall during the course of determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication project be privy to sensitive and confidential Information, which information may be made available to the post-graduate student / member of the personnel of the Faculty of Health Sciences verbally or in writing, in respect to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Lesotho.

AND WHEREAS NWU requires the member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU to treat all such Information as sensitive and confidential.

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:

1. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU undertakes to maintain the confidentiality of any and all Information relating to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Lesotho project to which the member of the personnel / post-graduate student should be allowed access by NWU during the course of project, whether before or after date of this agreement and whether divulged verbally or in writing. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU will not divulge or permit to be divulged to any person any aspect of such Information. .

S.M

T.M

M.S

2. This undertaking shall remain in force for the entire period of the post-graduate student's studies / employment of the member of the personnel of the Faculty of Health Sciences at the NWU and indefinitely thereafter.

3. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU acknowledges that all rights, title and interest in and to the Information vests in the Lesotho's Ministry of Health / NWU and that it has no claim of any nature in and to the information related to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication and that the information shall at all times remain the property of the NWU.

4. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU shall take all such steps as may be reasonably necessary to prevent the Information falling into the hands of an unauthorised third party.

5. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU shall not use or attempt to use the Information in any manner which will cause or be likely to cause injury or loss to Ministry of Health in Lesotho / NWU.

6. Any Information relating to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication project in material form of a confidential nature which comes into the possession of the member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU,

   6.1 shall be deemed to form part of the confidential Information of the Ministry of Health in Lesotho / NWU;

   6.2 shall be deemed to be the property of Ministry of Health in Lesotho / NWU;

   6.3 shall not be copied, reproduced, published or circulated by Ministry of Health in Lesotho / NWU; and

   6.4 shall be surrendered to Ministry of Health in Lesotho / NWU on demand; unless the Ministry of Health in Lesotho / NWU provides its prior written consent to the contrary.

7. It is acknowledged that the breach of this agreement by the member of the personnel / post-graduate student would cause NWU irreparable injury not compensable in monetary damages alone. Accordingly, in the event of a breach, or a threat of a breach, NWU, in addition to its other remedies, is entitled to a restraining order, preliminary injunction or similar relief so as to specifically enforce the terms of this agreement or prevent, cure or reduce the adverse effects of the breach.

S.M
T.M
M.S

8. The Ministry of Health in Lesotho / NWU and the member of the personnel / post-graduate student shall use reasonable endeavours to solve any dispute that will arise in connection to this agreement by mutual arrangement. Any disputes between the Parties arising under or relating to this agreement shall be referred to the Dean of the Faculty of Law of NWU for resolution, who will attempt to resolve the matter amicably and promptly. The parties confirm that any decision by the Dean of the Faculty of Law, NWU shall be final and binding on the parties.

Signed at Maseru, Lesotho **on the** 16 **day of** May **20**18

STUDENT / MEMBER OF RESEARCH TEAM / PERSONNEL

Name: Senate Moshoeshoe **Signature:** S.I.Moshoeshoe

DIRECTOR: MEDICINE USAGE IN SOUTH AFRICA NORTH-WEST UNIVERSITY

Name: Martha Susana Kubeka **Signature:**

WITNESSES:

1. **Name:** Thakane Malafahana **Signature:**
2. **Name:** MOLEFE SETLOBOKO **Signature:**

ANNEXURE IV: CONFIDENTIALITY AGREEMENT (ASSISTANT DATA-COLLECTOR)

ANNEXURE G – CONFIDENTIALITY AGREEMENT

NWU®
NORTH-WEST UNIVERSITY
NOORDWES-UNIVERSITEIT
YUNIBESITI YA BOKONE-BOPHIRIMA

CONFIDENTIALITY UNDERTAKING

ENTERED INTO BETWEEN:

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AND

Full names: Miss K Mapitse (ID number / Passport number) RB046415

Physical address:
Hospital Area,
Mafeteng,
Lesotho.
Postal address:
P.O. Box 1356,
Mafeteng 900,
Lesotho.
Contact details:
Cell phone numbers: (+266) 56528800
Email address: khahlymapitse11@gmail.com

(Hereinafter "**the post graduate student or member of personnel of the Faculty of Health Sciences**").

KM M.R N.R

WHEREAS the research entity, Medicine Usage in South Africa (MUSA) in the School of Pharmacy, Faculty of Health Sciences requested the Ministry of Health of Lesotho that one of our post-graduate students Miss Refeletse K Mafisa may interview high blood pressure patients with the aim of determining factors that lead to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng Government Hospital in the district of Mafeteng, Lesotho.

AND WHEREAS

- the member of the personnel of the Faculty of Health Sciences at the NWU will be involved in research activities related to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication.
- the post-graduate students of the Faculty of Health Sciences at the NWU will be involved in research activities related to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication.

AND WHEREAS the member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU shall during the course of determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication project be privy to sensitive and confidential Information, which Information may be made available to the post-graduate student / member of the personnel of the Faculty of Health Sciences verbally or in writing, in respect to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Lesotho.

AND WHEREAS NWU requires the member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU to treat all such Information as sensitive and confidential.

NOW THEREFORE THE PARTIES AGREE AS FOLLOWS:

1. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU undertakes to maintain the confidentiality of any and all Information relating to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Lesotho project to which the member of the personnel / post-graduate student should be allowed access by NWU during the course of project, whether before or after date of this agreement and whether divulged verbally or in writing. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU will not divulge or permit to be divulged to any person any aspect of such Information.

K.M Mar

2. This undertaking shall remain in force for the entire period of the post-graduate student's studies / employment of the member of the personnel of the Faculty of Health Sciences at the NWU and indefinitely thereafter.

3. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU acknowledges that all rights, title and interest in and to the Information vests in the Lesotho's Ministry of Health / NWU and that it has no claim of any nature in and to the information related to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication and that the information shall at all times remain the property of the NWU.

4. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU shall take all such steps as may be reasonably necessary to prevent the Information falling into the hands of an unauthorised third party.

5. The member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU shall not use or attempt to use the Information in any manner which will cause or be likely to cause injury or loss to Ministry of Health in Lesotho / NWU.

6. Any Information relating to determining factors leading to uncontrolled blood pressure in patients taking antihypertensive medication project in material form of a confidential nature which comes into the possession of the member of the personnel / post-graduate student of the Faculty of Health Sciences at the NWU,

   6.1 shall be deemed to form part of the confidential Information of the Ministry of Health in Lesotho / NWU;

   6.2 shall be deemed to be the property of Ministry of Health in Lesotho / NWU;

   6.3 shall not be copied, reproduced, published or circulated by Ministry of Health in Lesotho / NWU; and

   6.4 shall be surrendered to Ministry of Health in Lesotho / NWU on demand; unless the Ministry of Health in Lesotho / NWU provides its prior written consent to the contrary.

7. It is acknowledged that the breach of this agreement by the member of the personnel / post-graduate student would cause NWU irreparable injury not compensable in monetary damages alone. Accordingly, in the event of a breach, or a threat of a breach, NWU, in addition to its other remedies, is entitled to a restraining order, preliminary injunction or similar relief so as to specifically enforce the terms of this agreement or prevent, cure or reduce the adverse effects of the breach.

K.M M-R

8. The Ministry of Health in Lesotho / NWU and the member of the personnel / post-graduate student shall use reasonable endeavours to solve any dispute that will arise in connection to this agreement by mutual arrangement. Any disputes between the Parties arising under or relating to this agreement shall be referred to the Dean of the Faculty of Law of NWU for resolution, who will attempt to resolve the matter amicably and promptly. The parties confirm that any decision by the Dean of the Faculty of Law, NWU shall be final and binding on the parties.

Signed at Hospital Area **on the** 24 **day of** March **20**18

STUDENT / MEMBER OF RESEARCH TEAM / PERSONNEL

Name: KHAHLISO MAPITSE **Signature:** [signature]

DIRECTOR: MEDICINE USAGE IN SOUTH AFRICA NORTH-WEST UNIVERSITY

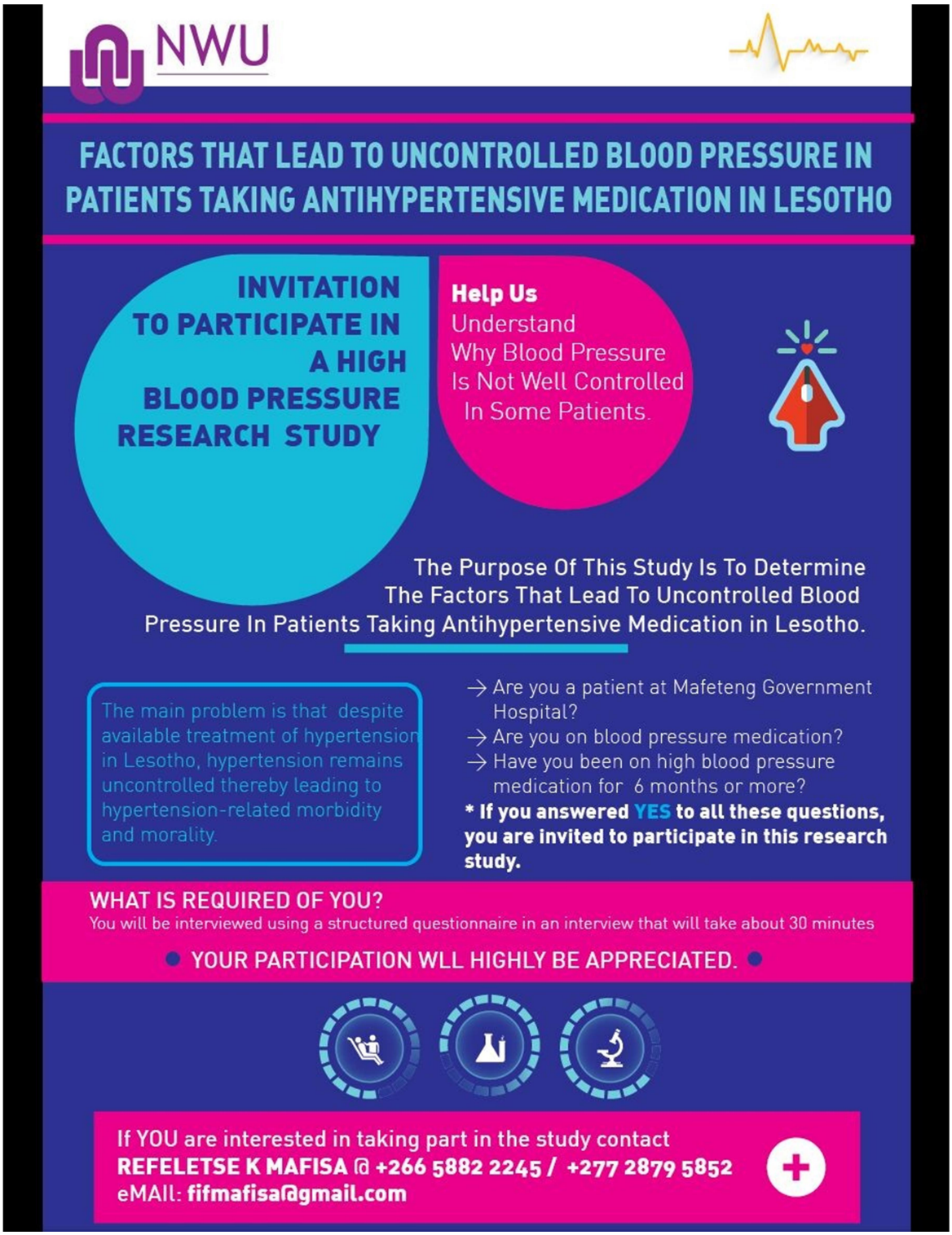
Name: _____ **Signature:** _____

WITNESSES:

1. **Name:** MAMONYANE RAMOLEKO **Signature:** [signature]
2. **Name:** MTHETHE RAMOLEKO **Signature:** [signature]

K.M M.R MK

ANNEXURE V: ADVERTISEMENT POSTER



ANNEXURE VI: DATA-COLLECTION TOOL (ENGLISH)

Factors leading to uncontrolled blood pressure in patients taking antihypertensive treatment in Mafeteng, Lesotho

SECTION A: DEMOGRAPHIC INFORMATION

Patient identification code _____ Date of visit DD/MM/YYYY

Sex:_____ DOB_____ Age_____**years**

Village _____

SECTION B: MEDICAL HISTORY

Duration of hypertension:

6-9 months ☐ 10-12 months ☐ >12months ☐

Other chronic conditions

Heart disease ☐ Kidney disease ☐ Diabetes mellitus ☐ Asthma ☐

COPD ☐ Epilepsy ☐ Other (specify) _____

Blood pressure readings and medication history

Date	BP reading (mmHg)	Prescribed BP Medication, dose, frequency
Today		
1-3months ago		
4-6months ago		
7-9months ago		
10-12months ago		
First available BP reading ***Diagnosis*** ☐ ***First BP reading in the booklet*** ☐		

Current hypertension medication as per Lesotho standard treatment guidelines

Medication	***Dose (mg)***	***Frequency (od, bd, tds, qid)***	***Received (Yes/No)***
1. Hydrochlorothiazide (HCTZ)			
2. Atenolol			
3. Captopril			
4. Hydralazine			
5. HCTZ/Amiloride			
6. Spironolactone			
7. Nifedipine			
8. Furosemide			
9. Propranolol			
10. Enalapril			
11. Methyldopa			
12. Indapamide			
13. Amiloride			
14. Losartan			
15. Aspirin (ASA)			

SECTION C: QUESTIONS

1. **Provision of patient education**

a) Does any member of the hospital staff ever give you information about high blood pressure?
Yes ☐ No ☐

If yes, how often?
Every visit ☐ Once in 3 months ☐ Once in 6 months ☐
Other (specify)_____

From whom do you get the information? (more than one option allowed)

Doctor ☐ Nurse ☐ Pharmacy personnel ☐

b) Do you get information on high blood pressure elsewhere other than from the hospital staff members? Yes ☐ No ☐

If yes, where do you get information from?
Radio ☐ TV ☐ Newspapers ☐ Magazines ☐

Other (specify)_____

2. **Availability of high blood pressure medication**

a) Did you get all your prescribed medication today? Yes ☐ No ☐

If no, which medication did you not get? _____

_____

b) How often do you not get some or all your medication?
Always get them ☐ Seldom ☐ Often ☐ Always ☐

c) What action do you take for missing (out of stock) medication? (more than one option allowed)
Buy ☐ Borrow ☐ Get from another facility ☐ Wait for the next refill date ☐

3. **Compliance to follow-up by the patient**

a) Do you sometimes miss your day of check-up? Yes ☐ No ☐
Never ☐ Seldom ☐ Often ☐ Always ☐

b) What action do you take when you have missed the check-up? (more than one option allowed)
Go the next day ☐ Go the next week ☐
Buy high blood pressure medication ☐ Go the next month ☐

4. **Adherence to lifestyle modifications before and after diagnosis:**

Lifestyle behaviour	Before diagnosis (Yes or No)	After diagnosis (Yes or No)
Do you engage in physical activity for ≥4 days per week?		
Do you follow any special diet? (reduced fat intake, high fibre intake, high vegetable intake, high fruit intake)		
Do you drink alcohol?		
Do you smoke?		

Compliance to medication assessment: Hill-Bone compliance scale

HILL-BONE HIGH BLOOD PRESSURE COMPLIANCE SCALE						
NA=not applicable / DK=don't know	**None of the time**	**Some of the time**	**Most of the time**	**All the time**	**NA**	**DK**
1. How often do you forget to take your HBP medicine?	1	2	3	4	8	9
2. How often do you decide not to take your HBP medicine?	1	2	3	4	8	9
3. How often do you eat salty food?	1	2	3	4	8	9
4. How often do you shake salt, fondor, or aromat on your food before you eat it?	1	2	3	4	8	9
5. How often do you eat fast food? (KFC, McDonalds, fat cook, fish and chips?	1	2	3	4	8	9
6. How often do you get notified about the next appointment before you leave the clinic?	1	2	3	4	8	9
7. How often do you miss scheduled appointments?	1	2	3	4	8	9
8. How often do you leave the dispensary without obtaining your prescribed pills? (due to long line, closure of clinic, forgot)	1	2	3	4	8	9
9. How often do you run out of HBP pills?	1	2	3	4	8	9
10. How often do you skip your HBP medicine 1–3 days before you go to the clinic?	1	2	3	4	8	9
11. How often do you miss taking your HBP pills when you feel better?	1	2	3	4	8	9
12. How often do you miss taking your HBP pills when you feel sick?	1	2	3	4	8	9
13. How often do you take someone else's HBP pills?	1	2	3	4	8	9
14. How often do you miss taking your HBP pills when you care less?	1	2	3	4	8	9

ANNEXURE VII: DATA-COLLECTION TOOL (SESOTHO)

Lintho tse lebisang khatellong ea mali e sa laoleheng ho bakuli ba sebelisang litlhare tsa kalafo ea khatello e phahameng ea mali Mafeteng, Lesotho

KAROLO A: LINTLHA TSA MOKULI

Nomoro ea mokuli _____ Letsatsi la ketelo DD/MM/YYYY

Botho: Motona ☐ Mot'sehali ☐ Letsatsi la tlhaho_____ Lilemo_____**years**

Motse _____

KAROLO B: HISTORI EA BOKULO

Nako ea khatello e phahameng ea mali:

Likhoeli tse 6-9 ☐ Likhoeli tse 10-12 ☐ >Likhoeli tse 12 ☐

Mafu a mang

Lefu la pelo ☐ Lefu la lipheo ☐ Lefu la tsoekere ☐ Lets'oea ☐
COPD ☐ Lefu la sethoathoa ☐ A mang (hlakisa)
_____

Linomoro tsa khatello ea mali le litlhare tse sebelisitsoeng

Letsatsi	Boemo ba khatello ea mali (mmHg)	Litlhare, boima, nako
Kajeno		
Likhoeli tse 1-3 tse felieng		
Likhoeli tse 4-6 tse felieng		
Likhoeli tse 7-9 tse felieng		
Likhoeli tse 10-12 tse felieng		
Boemo ba khatello ea mali ba pele bo fumanehang *Tlhahlojong* ☐		

Letsatsi	Boemo ba khatello ea mali (mmHg)	Litlhare, boima, nako
Boemo ba pele bo fumanehang kahare ho bukana ☐		

Litlhare tsa mokuli tsa khatello e phahameng ea mali ho ea ka tataiso ea kalafo ea Lesotho

Litlhare	***Boima (mg)***	***Nako (od, bd, tds, qid)***	***Li teng (Yes/No)***
16. Hydrochlorothiazide (HCTZ)			
17. Atenolol			
18. Captopril			
19. Hydralazine			
20. HCTZ/Amiloride			
21. Spironolactone			
22. Nifedipine			
23. Furosemide			
24. Propranolol			
25. Enalapril			
26. Methyldopa			
27. Indapamide			
28. Amiloride			
29. Losartan			
30. Aspirin (ASA)			

KAROLO C: LIPOTSO

5. Phano ea thuto ho bakuli

c) A na ho na le mosebeletsi oa sepetlele ea keng a u fe thuto mabapi le khatello ea mali e phahameng? E ☐ Che ☐

Haeba ho joalo, ke ka makhetlo a makae?
Ka ketelo tsohle ☐ Hanngoe likhoeling tse 3 ☐ Hanngoe likhoeling tse 6 ☐

Tse ling (Hlakisa)_____

U e fumana ho tsoa ho mang thuto ee? (u ka khetha likarabo tse fetang bonngoe)

Ngaka ☐ Mooki ☐ Mosebeletsi oa ka litlhareng ☐

d) U fumana thuto ka khatello ea mali e phahameng nqa e nngoe ntle le ho tsoa basebeletsi ba sepetlele? E ☐ Che ☐

Haeba ho joalo, u e fumana hokae?
Se-ea-le-moeeng ☐ Thelefishining ☐ Koranteng ☐ Makasining ☐ Tse ling (Hlakisa)_____

6. Phumaneho ea litlhare tsa khatello e holimo ea mali

d) U thotse litlhare tsohle tseo u li ngoletsoeng? E ☐ Che ☐

Haeba ho na le tseo u sa li tholang, ke lifeng tseo?
_____

e) Ke hakae u sa fumaneng litlhare tsa hao li felletse?
Ke lula ke li fumana ☐ Hanyane ☐ Khafetsa ☐ Nako eohle ☐

f) U ee u nke mehato e fe ha u sa thola litlhare kaofela?
Kea li reka ☐ Kea li kalima ☐ Ke li batla setsing se seng ☐ Ke emela nako e latelang ea ho eketsa litlhare ☐

7. Tsepahallo ea mokuli ea ho etela setsing

a) U ee u iphumane u sa etela setsing ka nako e baletsoeng?
Hohang ☐ Hanyane ☐ Khafetsa ☐ Kamehla ☐

b) U nka bohato bofeng ha u sa etela setsing ka nako e baletsoeng?
Ke ea letsatsi le hlahlamang ☐
Ke ea beke e latelang ☐
Ke reka litlhare tsa khatello e phahameng ea mali ☐
Ke ea khoeli e latelang ☐

8. Khomarelo ho liphetoho tsa bophelo pele le kamora ho fumanoa ka khatello e phahameng ea mali:

Litloaelo tsa ho phela	Pele ho lefu lena (E kapa Che)	Kamora lefu lena (E kapa Che)
Oa ikoetlisa bonyane matsatsi a 4 kapa ho feta bekeng?		
U latela mokhoa o ikhethileng oa ho ja? (mafura a manyane, litlheferetsi tse ngata, meroho e mengata, litholoana tse ngata)		
U noa joala?		
Oa tsuba?		

Tlhahlobo ea tatelo ea litlhare: Hill-Bone compliance to high blood pressure therapy scale

HILL-BONE COMPLIANCE TO HIGH BLOOD PRESSURE THERAPY SCALE						
(NA=Ha ho na maikutlo / DK=Ha u tsebe)	**Hohang**	**Ka linako tse ling**	**Khafetsa**	**Ka linako tsohle**	**NA**	**DK**
1.Ke hakae u lebalang ho noa litlhare tsa hao tsa khatello e phahameng ea mali?	1	2	3	4	8	9
2. Ke hakae u nkang qeto ea ho se noe litlhare tsa khatello e phahameng ea mali?	1	2	3	4	8	9
3. Ke hakae u jang lijo tse letsoai?	1	2	3	4	8	9
4. U hlokohla botloloana ya letsoai kapa ya aromat hakae ha u noka lijo pele u ja?	1	2	3	4	8	9
5. Ke hakae u jang lijo tse halikiloeng? (KFC, McDonalds, makoenya, tlhapi le lichips)	1	2	3	4	8	9
6.Ke hakae u tlohang tliliniking u tseba hore na u lokela ho khutlela tliliniking neng hape?	1	2	3	4	8	9
7. Ke hakae u sa eteleng tliliniking ka nako e baletsoeng?	1	2	3	4	8	9
8. Ke hakae u tlohang litlhareng u sa fumana litlhare tsa hao? (hoba mola o le motelele, hoba ho se ho koetsoe, hoba u lebetse)	1	2	3	4	8	9
9. Ke hakae u felloang ke litlhare tsa khatello e phahameng ea malipele u lo eketsa?	1	2	3	4	8	9
10. Ke hakae u sa noeng litlhare tsa hao letsatsi ho isa ho a mararo pele u ea tliliniking?	1	2	3	4	8	9
11. Ke hakae u sa noeng litlhare tsa hao tsa khatello e phahameng ea maliha u ikutloa u le betere?	1	2	3	4	8	9
12. Ke hakae u sa noeng litlhare tsa hao ha u ikutloa u kula?	1	2	3	4	8	9
13. Ke hakae u eeng u noe litlhare tsa motho e mong?	1	2	3	4	8	9
14. Ke hakae u sa noeng litlhare tsa hao ha u utloa u sa tsotelle?	1	2	3	4	8	9

ANNEXURE VIII: NWU HREC APPROVAL

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Health Sciences Ethics Office for Research, Training and Support

Health Research Ethics Committee (HREC)
Tel: 018-285 2291
Email: Wayne.Towers@nwu.ac.za

Dr R Joubert
Pharmacy
MUSA

8 October 2018

Dear Dr Joubert

APPROVAL OF YOUR APPLICATION BY THE HEALTH RESEARCH ETHICS COMMITTEE (HREC) OF THE FACULTY OF HEALTH SCIENCES

Ethics number: NWU-00027-18-S1

Kindly use the ethics reference number provided above in all future correspondence or documents submitted to the administrative assistant of the Health Research Ethics Committee (HREC) secretariat.

Study title: Factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Mafeteng, Lesotho

Study leader: Dr R Joubert

Student: RF Mafisa-29400589

Application type: Single study

Risk level: Minimal (monitoring report required annually)

Expiry date: 31 October 2019 (monitoring report is due at the end of August annually until completion)

You are kindly informed that after review by the HREC, Faculty of Health Sciences, North-West University, your ethics approval application has been successful and was determined to fulfil all requirements for approval. Your study is approved for a year and may commence from 08/10/2018. It, however, requires the following further conditions specific to *the progress* of the study:

a. Please provide the HREC with a copy of the goodwill permission letter from the Medical Director of Mafeteng Government Hospital.
b. Please provide the HREC with copies of the signed confidentiality agreements from the independent person who will act as a mediator of the study and the assistant data collector.
c. Please provide the HREC with a copy of the signed indemnity form from the assistant data collector

As the study progresses the aforementioned conditions should be submitted to Ethics-HRECProcess@nwu.ac.za with a cover letter with a specific subject title indicating "Outstanding documents for approval: NWU-XXXXX-XX-XX." The letter should include the title of the approved study, the names of the researchers involved, that the documents are being submitted as part of the conditions of the approval set by the HREC, the nature of the document i.e. which condition is being fulfilled and any further explanation to clarify the submission.

The *e-mail*, to which you attach the documents that you send, should have a *specific subject line* indicating the nature of the submission e.g. "Outstanding documents for approval: NWU-XXXXX-XX-XX". The e-mail should indicate the nature of the document being sent. This submission will be handled via the expedited process.

Continuation of the study is dependent on receipt of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation. A monitoring report should be submitted two months prior to the reporting dates as indicated i.e. annually for minimal risk studies, six-monthly for medium risk

studies and three-monthly for high risk studies, to ensure timely renewal of the study. A final report must be provided at completion of the study or the HREC, Faculty of Health Sciences must be notified if the study is temporarily suspended or terminated. The monitoring report template is obtainable from the Faculty of Health Sciences Ethics Office for Research, Training and Support at Ethics-HRECMonitoring@nwu.ac.za. Annually, a number of studies may be randomly selected for an internal audit.

The HREC, Faculty of Health Sciences requires immediate reporting of any aspects that warrants a change of ethical approval. Any amendments, extensions or other modifications to the proposal or other associated documentation must be submitted to the HREC, Faculty of Health Sciences prior to implementing these changes. These requests should be submitted to Ethics-HRECApply@nwu.ac.za with a cover letter with a specific subject title indicating, "Amendment request: NWU-XXXXX-XX-XX". The letter should include the title of the approved study, the names of the researchers involved, the nature of the amendment/s being made (indicating what changes have been made as well as where they have been made), which documents have been attached and any further explanation to clarify the amendment request being submitted. The amendments made should be indicated in yellow highlight in the amended documents. The *e-mail*, to which you attach the documents that you send, should have a *specific subject line* indicating that it is an amendment request e.g. "**Amendment request**: NWU-XXXXX-XX-XX". **This e**-mail should indicate the nature of the amendment. This submission will be handled via the expedited process.

Any adverse/unexpected/unforeseen events or incidents must be reported on either an adverse event report form or incident report form to Ethics-HRECIncident-SAE@nwu.ac.za. The *e-mail*, to which you attach the documents that you send, should have a specific subject line indicating that it is a notification of a serious adverse event or incident in a specific project e.g. "**SAE/Incident notification**: NWU-XXXXX-XX-XX". Please note that the HREC, Faculty of Health Sciences has the prerogative and authority to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.

The HREC, Faculty of Health Sciences complies with the South African National Health Act 61 (2003), the Regulations on Research with Human Participants (2014), the Ethics in Health Research: Principles, Structures and Processes (2015), the Belmont Report and the Declaration of Helsinki (2013).

We wish you the best as you conduct your research. If you have any questions or need further assistance, please contact the Faculty of Health Sciences Ethics Office for Research, Training and Support at Ethics-HRECApply@nwu.ac.za.

Yours sincerely



Prof Wayne Towers
HREC Chairperson



Prof Minrie Greeff
Ethics Office Head

Current details: (23239522) G:\My Drive\9. Research and Postgraduate Education\9.1.5 Ethics\NWU-00027-18-S1\9.1.5.4.1_AL_NWU-00027-18-S1_08-10-2018.docm
8 October 2018

File reference: 9.1.5.4.1

ANNEXURE IX: NATIONAL REVIEW BOARD AND ETHICS COMMITTEE OF LESOTHO APPROVAL

LESOTHO

Ministry of Health
PO Box 514
Maseru 100

REF: ID112-2018

Date: July 26, 2018

Category of Review:
[x] Initial Review
[ ] Continuing Annual Review
[ ] Amendment/Modification
[ ] Reactivation
[ ] Serious Adverse Event
[ ] Other _____

To
Refeletse K Mafisa
Master in Pharmacy Practice student
North West University
South Africa

Dear Ms. Refeletse,

RE: Factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Lesotho

This is to inform you that the Ministry of Health Research and Ethics Committee reviewed and **APPROVED** the above named protocol and hereby authorizes you to conduct the study according to the activities and population specified in the protocol. Departure from the approved protocol will constitute a breach of this permission.

This approval includes review of the following attachments:
[x] Protocol
[x] English & Sesotho informed consent forms
[x] Data collection forms/ questionnaires in English and Sesotho
[ ] Data collection forms/question guide in English
[ ] Participant materials *[insert types, versions, dates]*
[x] Other materials: Advertisement materials & CV of the PI
This approval is **VALID** until July 25, 2019.

Please note that an annual report and request for renewal, if applicable, must be submitted at least 6 weeks before the expiry date.

All serious adverse events associated with this study must be reported promptly to the MOH Research and Ethics Committee. Any modifications to the approved protocol or consent forms must be submitted to the committee prior to implementation of any changes.

We look forward to receiving your progress reports and a final report at the end of the study. If you have any questions, please contact the Research and Ethics Committee at rcumoh@gmail.com (or) 22226317.

Sincerely,

Dr. Nyane Letsie
Director General Health Services

Mrs. V. T. Lehana
Co-chairperson NH-IRB

ANNEXURE X: GOODWILL PERMISSION FROM MAFETENG GOVERNMENT HOSPITAL

LESOTHO

Mafeteng Government Hospital

PO Box 16

Mafeteng 900

08 August 2018

To

Refeletse K Mafisa

Master in Pharmacy Practice Student

North West University

South Africa

Dear Ms. Refeletse,

Re: Permission to conduct Research (Factors leading to uncontrolled blood pressure in patients taking antihypertensive medication in Lesotho)

in Mafeteng Hospital

This letter serves to address that the above mentioned study has been granted permission to conduct research in Mafeteng Government hospital. It is advisable thereof for investigator to adhere to Ministry of Health Research and Ethics Committee terms. The permission is valid until July 25, 2019.

We look forward to you to start on the study.

Sincerely,

Dr SJ Makiti

District Medical officer

Contact : 22700218

ANNEXURE XI: PERMISSION TO USE THE HILL-BONE SCALE

Gmail Refeletse Mafisa <fifimafisa@gmail.com>

Permission to use the Hill-Bone Scale

1 message

SON-HillBone <SON-HillBone@jhu.edu> Thu, Jan 24, 2019 at 5:23 PM
To: "fifimafisa@gmail.com" <fifimafisa@gmail.com>
Cc: SON-HillBone <SON-HillBone@jhu.edu>

Dear Refeletse,

Thank you for your interest in using the Hill-Bone Scale.

Please consider this email as permission to use the Hill-Bone Scale.

I have attached the Hill-Bone Compliance Scale along with several relevant articles reporting on the validation and use of the scale. Please cite the scale using the references provided. We would appreciate you sharing the findings of your research with us.

We wish you the very best in your project and please don't hesitate to reach out to us if you have any follow-up questions.

Best,

Yvonne

Yvonne Commodore-Mensah, PhD, RN | Assistant Professor

Community-Public Health Nursing

Johns Hopkins School of Nursing

525 N. Wolfe Street, Room 419, Baltimore, MD 21205

P. 410-614-1519 | **E.** ycommod1@jhu.edu

nursing.jhu.edu

4 attachments

Hill-BoneComplianceScale.doc
37K

Kim et al 2007 Does Knowledge Matter - Intentional Medication Nonadherec....pdf
429K

Lambert 2006ethn-16-01-286.pdf
84K

Hill-Bone Compliance to High Blood Pressure Therapy Scale.pdf
1436K

ANNEXURE XII: SOUTH AFRICAN MEDICAL JOURNAL AUTHORS GUIDELINES

SAMJ The South African Medical Journal
Leading research impacting clinical care in Africa

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Now, get medical aid cover that serves you and your family.

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» Author Guidelines
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GO TO REGISTRATION
Registration and login are required to submit items online and to check the status of current submissions.

Author Guidelines

The *SAMJ* has launched a new submission and tracking system. Authors will be required to register a profile on the Editorial Manager platform in order to submit a manuscript.

To submit a manuscript, please proceed to the *SAMJ* Editorial Manager website:
www.editorialmanager.com/samj

To access and submit an article already in production, please see the guidelines here.

Author Guidelines

Please view the Author Tutorial for guidance on how to submit on Editorial Manager.

Please take the time to familiarise yourself with the policies and processes below. If you still have any questions, please do not hesitate to ask our editorial staff (tel.: +27 (0)21 532 1281, email: submissions@hmpg.co.za).

SAMJ policies

- Types of articles considered by the SAMJ
- Article Processing Charges
- Authorship
- Conflict of interest
- Research ethics committee approval
- Clinical trials
- Protection of patient's rights to privacy
- Copyright notice

Focus and scope
Editorial team
Submit an article
Receive notifications
Support
Contact

Impact factor: 1.500

JOURNAL CONTENT
Search
All
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Browse
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- By Author
- By Title

SOUTH AFRICAN MEDICAL ASSOCIATION
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POPULAR ARTICLES
» Emergency management of calcium channel blocker overdose
» Prevalence of isoniazid resistance-conferring mutations associated with multidrug-resistant tuberculosis in Free State Province, South Africa
» The prevalence of burnout among registrars in the School of Clinical Medicine at the University of the Witwatersrand, Johannesburg, South Africa
» Neural tube defect diagnosis and outcomes at a tertiary South African hospital with intensive case ascertainment
» Symptomatic congenital syphilis in a tertiary neonatal unit in Cape Town, South Africa:

- Privacy statement
- Ethnic classification
- CPD

Manuscript preparation

- Preparing an article for anonymous review
- General article format/layout
- Preparation notes by article type
- Illustrations
- Tables
- References

From submission to acceptance

- Submission and peer-review
- Production process
- Changing contact details or authorship

Publication

- Online versus print
- Errata and retractions
- Indexing

SAMJ Policies

Type of articles considered by the SAMJ

The *SAMJ* will no longer limit the articles accepted to those that have 'general medical content', but is intending to capture the spectrum of medical and health sciences, grouped by relevance to the country's burdens of disease. This content will include research in the social sciences and economics that is relevant to the medical issues around our burden of disease. Please see 'A new vision for the *SAMJ* – and a call for papers' for a full discussion of the new directions for the *SAMJ*.

We accept the following types of articles:

- Research
- Reviews
- Clinical trials
- Editorials
- In Practice (Previously Forum incl. Case Reports)
- Correspondence
- Obituaries
- Book reviews
- Ad hoc supplements e.g. guidelines, conference/congress abstracts, Festschrifts*

The following articles are by invitation only:

- Guest editorial
- Continuing Medical Education (CME)

*Contact claudian@hmpg.co.za for information on submitting ad hoc/commissioned supplements, including guidelines, conference/congress abstracts, Festschrifts, etc.

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All articles published in the *South African Medical Journa*l are open access and freely available online upon publication. This is made possible by applying a business model to offset the costs of peer review management, copyediting, design and production, by charging a publication fee of R5 250 (ex vat) for each

High morbidity and mortality in a preventable disease

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KEYWORDS

AIDS Africa Antibiotic resistance Book review Children Epidemiology Ethics Guidelines HIV HIV/AIDS Influenza Malaria Mental health National Health Insurance South Africa Stroke Trauma Tuberculosis children epidemiology pregnancy

research article published. The charge applies only to **Research** articles submitted after 1 March 2017. The publication fee is standard and does not vary based on length, colour, figures, or other elements.

When submitting a Research article to the *SAMJ*, the submitting author must agree to pay the publication fee should the article be accepted for publication. The publicaiton fee is payable when your manuscript is editorially accepted and before production commences for publication. The submitting author will be notified that payment is due and given details on the available methods of payment. Prompt payment is advised; the article will not enter into production until payment is received.
Queries can be directed to claudian@hmpg.co.za.

Please refer to the section on 'Sponsored Supplements' regarding the publication of supplements, where a charge is applicable. Queries can be directed to dianes@hmpg.co.za or claudian@hmpg.co.za

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Named authors must consent to publication. Authorship should be based on: (*i*) substantial contribution to conceptualisation, design, analysis and interpretation of data; (*ii*) drafting or critical revision of important scientific content; or (*iii*) approval of the version to be published. These conditions must all be met (uniform requirements for manuscripts submitted to biomedical journals; refer to www.icmje.org)

If authors' names are added or deleted after submission of an article, or the order of the names is changed, all authors must agree to this in writing.

Please note that co-authors will be requested to verify their contribution upon submission. Non-verification may lead to delays in the processing of submissions.
Author contributions should be listed/described in the manuscript.

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Research ethics committee approval

Authors must provide evidence of Research Ethics Committee approval of the research where relevant. Ensure the correct, full ethics committee name and reference number is included in the manuscript.
If the study was carried out using data from provincial healthcare facilities, or required active data collection through facility visits or staff interviews, approval should be sought from the relevant provincial authorities. For South African authors, please refer to the guidelines for submission to the National Health Research Database. Research involving human subjects must be conducted according to the principles outlined in the Declaration of Helsinki. Please refer to the National Department of Health's guideline on Ethics in Health research: principles, processes and

structuresto ensure that the appropriate requirements for conducting research have been met, and that the HPCSA's General Ethical Guidelines for Health Researchers have been adhered to.

Clinical trials

As per the recommendations published by the International Committee of Medical Journal Editors (ICMJE), clinical trial research is any research that assigns individuals to an intervention, with or without a concurrent comparison/control group to study the cause-and-effect relationship between the intervention and health outcomes. All clinical trials should be registered with the appropriate national clinical trial registry (or any international primary register, if relevant), and the trial registration number should be cited at the end of the abstract. All clinical trial reports must also contain a data sharing statement as per the recommendations of the ICMJE. Statements are to indicate:

- whether individual deidentified participant data will be shared;
- what data in particular will be shared; whether additional, related documents will be available;
- when the data will become available and for how long; by what access criteria data will be shared.

Please see the ICJME announcement for further details and illustrative examples of data sharing statements: ICMJE Data Sharing Statements for Clinical Trials

Since 1st December 2005, all clinical trials conducted in South Africa have been required to be registered in the South African National Clinical Trials Register. The SAMJ therefore requires that clinical trials be registered in the relevant public trials registry at or before the time of first patient enrollment as a condition for publication. The trial registry name and registration number must be included in the manuscript.

Please refer to the general guidelines for all papers at the top of this article for additional requirements with respect to ethics approval, funding, author contributions, etc. The format of original research articles should be followed for reporting of clinical trial results.

Patient Consent

Information that would enable identification of individual patients should not be published in written descriptions, photographs, and pedigrees unless the information is essential for scientific purposes and the patient (or parent or guardian) has given informed written consent for publication and distribution. We further recommend that the published article is disseminated not only to the involved researchers but also to the patients/participants from whom the data was drawn. Refer to Protection of Research Participants. The signed consent form should be submitted with the manuscript to enable verification by the editorial team.

Other individuals

Any individual who is identifiable in an image must provide written agreement that the image may be used in that context in the *SAMJ*.

Copyright notice

Copyright remains in the Author's name. The work is licensed under a Creative Commons Attribution - Noncommercial Works License. Authors are required to complete and sign an Author Agreement form that outlines Author and Publisher rights and terms of publication. The **Author Agreement form** should be uploaded along with other submissions files and any submission will be considered incomplete without it.

Material submitted for publication in the *SAMJ* is accepted provided it has not been published or submitted for publication elsewhere. Please inform the editorial team if the main findings of your paper have been presented at a conference and published in abstract form, to avoid copyright infringement. All research already published as 'Conference proceedings' needs to be substantially re-written, with a new title, a new abstract and new and important results to back up any study before it will be considered for a new publication. The *SAMJ* does not hold itself responsible for statements made by the authors.

Previously published images

If an image/figure has been previously published, permission to reproduce or alter it must be obtained by the authors from the original publisher and the figure legend must give full credit to the original source. This credit should be accompanied by a letter indicating that permission to reproduce the image has been granted to the author/s. This letter should be uploaded as a supplementary file during submission.

Privacy statement

The *SAMJ* is committed to protecting the privacy of its website and submission system users. The names, personal particulars and email addresses entered in the website or submission system will not be made available to third parties without the user's permission or due process. By registering to use the website or submission system, users consent to receive communication from the *SAMJ* or its publisher HMPG on matters relating to the journal or associated publications. Queries with regard to privacy may be directed to publishing@hmpg.co.za.

Ethnic/race classification

Use of racial or ethnicity classifications in research is fraught with problems. If you choose to use a research design that involves classification of participants based on race or ethnicity, or discuss issues with reference to such classifications, please ensure that you include a detailed rationale for doing so, ensure that the categories you describe are carefully defined, and that socioeconomic, cultural and lifestyle variables that may underlie perceived racial disparities are appropriately controlled for. Please also clearly specify whether race or ethnicity is classified as reported by the patient (self-identifying) or as perceived by the investigators. Please note that is not appropriate to use self-reported or investigator-assigned racial or ethnic categories for genetic studies.

Continuing Professional Development (CPD)

SAMJ is an HPCSA-accredited service provider of CPD materials. Principal authors can earn up to 15 CPD continuing education units (CEUs) for publishing an article; co-authors are eligible to earn up to 5 CEUs; and reviewers of articles can earn 3 CEUs. Each month, *SAMJ* also publishes a CPD-accredited questionnaire relating to the academic content of the journal. Successful completion of the questionnaire with a pass rate of 70% will earn the reader 3 CEUs. Administration of our CPD programme is managed by Medical Practice Consulting. To complete questionnaires and obtain certificates, please visit MRP Consulting

Manuscript preparation

Preparing an article for anonymous review

To ensure a fair and unbiased review process, all submissions are to include an anonymised version of the manuscript. The exceptions to this are Correspondence, Book reviews and Obituary submissions.

Submitting a manuscript that needs additional blinding can slow down your review process, so please be sure to follow these simple guidelines as much as possible:

- An anonymous version should not contain any author, affiliation or particular institutional details that will enable identification.
- Please remove title page, acknowledgements, contact details, funding grants to a named person, and any running headers of author names.
- Mask self-citations by referring to your own work in third person.

General article format/layout

Accepted manuscripts that are not in the correct format specified in these guidelines will be returned to the author(s) for correction, which will delay publication.

General:

- Manuscripts must be written in UK English.
- The manuscript must be in Microsoft Word format. Text must be single-spaced, in 12-point Times New Roman font, and contain no unnecessary formatting (such as text in boxes).
- Please make your article concise, even if it is below the word limit.
- Qualifications, ***full*** affiliation (department, school/faculty, institution, city, country) and contact details of ALL authors must be provided in the manuscript and in the online submission process.
- Abbreviations should be spelt out when first used and thereafter used consistently, e.g. 'intravenous (IV)' or 'Department of Health (DoH)'.
- Include sections on Acknowledgements, Conflict of Interest, Author Contributions and Funding sources. If none is applicable, please state 'none'.
- Scientific measurements must be expressed in SI units except: blood pressure (mmHg) and haemoglobin (g/dL).
- Litres is denoted with an uppercase L e.g. 'mL' for millilitres).
- Units should be preceded by a space (except for % and ºC), e.g. '40 kg' and '20 cm' but '50%' and '19ºC'.
- Please be sure to insert proper symbols e.g. µ not u for micro, a not a for alpha, b not B for beta, etc.
- Numbers should be written as grouped per thousand-units, i.e. 4 000, 22 160.
- Quotes should be placed in single quotation marks: i.e. The respondent stated: '…'
- Round brackets (parentheses) should be used, as opposed to square brackets, which are reserved for denoting concentrations or insertions in direct quotes.
- If you wish material to be in a box, simply indicate this in the text. You may use the table format –this is the *only* exception. Please DO NOT use fill, format lines and so on.

SAMJ is a generalist medical journal, therefore for articles covering genetics, it is the responsibility of authors to apply the following:

- Please ensure that all genes are in italics, and proteins/enzymes/hormones are not.

- Ensure that all genes are presented in the correct case e.g. TP53 not Tp53.

**NB: Copyeditors cannot be expected to pick up and correct errors wrt the above, although they will raise queries where concerned.

- Define all genes, proteins and related shorthand terms at first mention, e.g. '188del11' can be glossed as 'an 11 bp deletion at nucleotide 188.'

- Use the latest approved gene or protein symbol as appropriate:

- Human Gene Mapping Workshop (HGMW): genetic notations and symbols
- HUGO Gene Nomenclature Committee: approved gene symbols and nomenclature
- OMIM: Online Mendelian Inheritance in Man (MIM) nomenclature and instructions
- Bennet et al. Standardized human pedigree nomenclature: Update and assessment of the recommendations of the National Society of Genetic

Counselors. J Genet Counsel 2008;17:424-433: standard human pedigree nomenclature.

Preparation notes by article type

- Research
- Editorials
- CME
- In Practice and Case reports
- Reviews
- Clinical trials
- Correspondence
- Obituaries
- Book reviews
- Guidelines

Research

Guideline word limit: 4 000 words

Research articles describe the background, methods, results and conclusions of an original research study. The article should contain the following sections: introduction, methods, results, discussion and conclusion, and should include a structured abstract (see below). The introduction should be concise – no more than three paragraphs – on the background to the research question, and must include references to other relevant published studies that clearly lay out the rationale for conducting the study. Some common reasons for conducting a study are: to fill a gap in the literature, a logical extension of previous work, or to answer an important clinical question. If other papers related to the same study have been published previously, please make sure to refer to them specifically. Describe the study methods in as much detail as possible so that others would be able to replicate the study should they need to. Results should describe the study sample as well as the findings from the study itself, but all interpretation of findings must be kept in the discussion section, which should consider primary outcomes first before any secondary or tertiary findings or post-hoc analyses. The conclusion should briefly summarise the main message of the paper and provide recommendations for further study.

Select figures and tables for your paper carefully and sparingly. Use only those figures that provided added value to the paper, over and above what is written in the text.

Do not replicate data in tables and in text .

Structured abstract

- This should be 250-400 words, with the following recommended headings:
  - **Background:** why the study is being done and how it relates to other published work.
  - **Objectives:** what the study intends to find out
  - **Methods:** must include study design, number of participants, description of the intervention, primary and secondary outcomes, any specific analyses that were done on the data.
  - **Results:** first sentence must be brief population and sample description; outline the results according to the methods described. Primary outcomes must be described first, even if they are not the most significant findings of the study.
  - **Conclusion:** must be supported by the data, include recommendations for further study/actions.
- Please ensure that the structured abstract is complete, accurate and clear and has been approved by all authors.
- Do not include any references in the abstracts.

Here is an example of a good abstract.

Main article

All articles are to include the following main sections: Introduction/Background, Methods, Results, Discussion, Conclusions.

The following are additional heading or section options that may appear within these:

- Objectives (within Introduction/Background): a clear statement of the main aim of the study and the major hypothesis tested or research question posed
- Design (within Methods): including factors such as prospective, randomisation, blinding, placebo control, case control, crossover, criterion standards for diagnostic tests, etc.
- Setting (within Methods): level of care, e.g. primary, secondary, number of participating centres.
- Participants (instead of patients or subjects; within Methods): numbers entering and completing the study, sex, age and any other biological, behavioural, social or cultural factors (e.g. smoking status, socioeconomic group, educational attainment, co-existing disease indicators, etc)that may have an impact on the study results. Clearly define how participants were enrolled, and describe selection and exclusion criteria.
- Interventions (within Methods): what, how, when and for how long. Typically for randomised controlled trials, crossover trials, and before and after studies.
- Main outcome measures (within Methods): those as planned in the protocol, and those ultimately measured. Explain differences, if any.

Results

- Start with description of the population and sample. Include key characteristics of comparison groups.
- Main results with (for quantitative studies) 95% confidence intervals and, where appropriate, the exact level of statistical significance and the number need to treat/harm. Whenever possible, state absolute rather than relative risks.
- Do not replicate data in tables and in text.
- If presenting mean and standard deviations, specify this clearly. Our house style is to present this as follows:
- E.g.: The mean (SD) birth weight was 2 500 (1 210) g. Do not use the ± symbol for mean (SD).
- Leave interpretation to the Discussion section. The Results section should just report the findings as per the Methods section.

Discussion

Please ensure that the discussion is concise and follows this overall structure – sub-headings are not needed:

- Statement of principal findings
- Strengths and weaknesses of the study
- Contribution to the body of knowledge
- Strengths and weaknesses in relation to other studies
- The meaning of the study – e.g. what this study means to clinicians and policymakers
- Unanswered questions and recommendations for future research

Conclusions

This may be the only section readers look at, therefore write it carefully. Include primary conclusions and their implications, suggesting areas for further research if appropriate. Do not go beyond the data in the article.

Editorials

Guideline word limit: 1 000 words

These opinion or comment articles are usually commissioned but we are happy to consider and peer review unsolicited editorials. Editorials should be accessible and interesting to readers without specialist knowledge of the subject under discussion

and should have an element of topicality (why is a comment on this issue relevant now?) There should be a clear message to the piece, supported by evidence.

Please make clear the type of evidence that supports each key statement, e.g.:

- expert opinion
- personal clinical experience
- observational studies
- trials
- systematic reviews.

CME (by invite only)

CME is intended to provide readers with practical, up-to-date information on medical and related matters. It is aimed at those who are not specialists in the field.

From January 2016, all CME articles will be printed in full in the *SAMJ*. Please try to adhere strictly to the guidelines on word count as we have a page limit for the print issue of the *SAMJ*. We reserve the right to place some tables and reference lists online if this is necessary for space.

In practice, this means that each CME topic usually covers two issues of the print issue of the *SAMJ*.

The guest editor, in consultation with the editor, is responsible for convening a team of authors, deciding on the subjects to be covered and for reviewing the manuscripts submitted. The suggestion is for 4 - 5 articles, although there is some room for flexibility contingent on discussions with the editor.

For queries about these guidelines please feel free to contact the CME editor, Dr Bridget Farham, by email (ugqirha@iafrica.com) or telephone (+27 (0)21 789 2331).

Review process

The guest editor reviews the articles and returns them to the CME editor for review and final approval.

Guest editorials

Guideline word limit: 1 000 words

- Include the guest editor's personal details (qualifications, positions, affiliation, e-mail address, and a short personal profile (50words)).
- If possible, include a photograph of the author(s) at high enough resolution for print. It is preferable to provide two guest editorials, one for each issue, so that the content of the articles in each issue is covered.

Articles

Guideline word limit: 2 000 - 3 000 words

- Each article requires an abstract of ±200 words.
- The editor reserves the right to shorten articles but will send a substantially shortened article back for author approval.

Personal details

Please supply: Your qualifications, position and affiliations and MP number (used for CPD points); Address, telephone number and fax number, and your e-mail address; and a short personal profile (50words)and a few words about your current fields of interest.

In Practice

Guideline word limit: 2 000 - 3 000words

This section includes articles that would previously have been accepted into the Forum section, and case reports.

In practice articles are those that draw attention to specific issues of clinical, economic or political interest regarding medicine and healthcare in southern Africa. They are assigned to a topic:

- Case report
- Clinical practice
- Clinical alert
- Issues in medicine
- Issues in public health
- Healthcare delivery
- Medicine and the environment
- Medicine and the law
- Cochrane corner

An In Practice article should follow the following format – sub-headings are not necessary, but may be used for clarity:

- Author affiliations and qualifications: to be the same as for Research. Provide all authors' names and initials, qualifications and full affiliations, and corresponding author.
- Short abstract: does not need to be structured, but should capture the essential features of the article
- Introduction: the reason for the article and the issue being addressed
- Recent research, discussion, local policy around the issue – include your own research where appropriate
- All statements should be referenced and, if opinion only, this should be stated
- Discussion: how this article adds to the discussion around a particular topic
- If a clinical practice or policy point is at issue, this needs to be emphasised, using a box with highlights if appropriate.

Essentially In practice is an opportunity for a more discursive approach to topics of clinical, economic or political importance in southern African health systems. It is not an opportunity to put forward unsubstantiated opinions!

Case reports

The *SAMJ* has recently started to accept case reports. The cases must come from Africa, preferably southern Africa unless the condition is common to all African countries, and must be either a completely new description of a clinical condition or result (use Google!) or a case that highlights important practice or management issues.

Please use the following format for case reports:

- Title of case: do not include the words 'a case report' in the title
- Summary/abstract: up to 150 words summarising the case presentation and outcome
- Background: why is this case important and why did you write it up?
- Case presentation: presenting features, medical, social, family history as appropriate
- Case management: should be according to best practice, and if not, please explain why
- Investigations, if relevant: save space by simply saying 'normal' if, for example, renal function was completely normal, rather than listing normal results, highlight the abnormal – or indeed the normal if this is clinically significant
- Differential diagnosis, if relevant
- Treatment, if relevant
- Outcome and follow-up
- Discussion – a VERY BRIEF review of similar published cases
- Teaching points: 3 - 5 bullet points
- References: as per the *SAMJ* house style
- Tables and figures: keep to a minimum. Use clinical images where relevant – we need hi-res versions for print, and identifiable persons must have a consent form

- Patient consent: please include a statement about patient consent to a written case report. This should be uploaded as a supplementary file.

Clinical trials

Guideline word limit: 4000 words

As per the recommendations published by the International Committee of Medical Journal Editors (ICMJE), clinical trial research is any research that assigns individuals to an intervention, with or without a concurrent comparison/control group to study the cause-and-effect relationship between the intervention and health outcomes. All clinical trials should be registered with the appropriate national clinical trial registry (or any international primary register, if relevant), and the trial registration number should be cited at the end of the abstract. Since 1st December 2005, all clinical trials conducted in South Africa have been required to be registered in the South African National Clinical Trials Register. The *SAMJ* therefore requires that clinical trials be registered in the relevant public trials registry at or before the time of first patient enrollment as a condition for publication. The trial registry name and registration number must be included in the manuscript.

Please refer to the general guidelines for all papers at the top of this article for additional requirements with respect to ethics approval, funding, author contributions, etc. The format of original research articles should be followed for reporting of clinical trial results.

Review articles

Guideline word limit: 4 000 words

These are welcome, but should be either commissioned or discussed with the Editor before submission. A review article should provide a clear, up-to-date account of the topic and be aimed at non-specialist hospital doctors and general practitioners.

Please ensure that your article includes:

- Abstract: unstructured, of about 100-150 words, explaining the review and why it is important
- Methods: Outline the sources and selection methods, including search strategy and keywords used for identifying references from online bibliographic databases. Discuss the quality of evidence.
- When writing: clarify the evidence you used for key statements and the strength of the evidence. Do not present statements or opinions without such evidence, or if you have to, say that there is little or no evidence and that this is opinion. Avoid specialist jargon and abbreviations, and provide advice specific to southern Africa.
- Personal details: Please supply your qualifications, position and affiliations and MP number (used for CPD points); address, telephone number and fax number, and your e-mail address; and a short personal profile (50 words) and a few words about your current fields of interest.

Correspondence (Letters to the Editor)

Guideline word limit: 500 words

Letters to the editor should relate either to a paper or article published by the SAMJ or to a topical issue of particular relevance to the journal's readership

- May include only one illustration or table
- Must include a correspondence address.

Book reviews

Guideline word limit: 400 words

Should be about 400 words and must be accompanied by the publication details of the book. Provide a hi-res image of the cover if possible (with permission from the copyright holder).

Obituaries

Guideline word limit: 400 words

Should be offered within the first year of the practitioner's death, and may be accompanied by a photograph.

Guidelines

Guidelines should always be discussed with the Editor prior to submission.

Because of the intensive review process required to ensure Guidelines are independent, evidence-based and free from commercial bias, they are usually published as a supplement to the *SAMJ*, the costs of which must be covered by sponsorship, advertising or payment by the guideline authors/association. We will provide a quote based on the expected length of the guideline and whether it is to appear online only, or in print, which must be accepted by the body putting the guidelines together before submitting the work to the SAMJ.

The Editor reserves the right to determine the scheduling of supplements. Understandably, a delay in publication must be anticipated dependent upon editorial workflow.

All guidelines should include a clear, transparent statement about all sources of funding and an explicit, clear statement of conflicts of interest of any of the participants in the guidelines about industry funding for lectures, research, conference participation etc.

All guidelines should be structured according to Agree II.

Please access this website before putting the guidelines together, download the Agree 11 instrument and use this to put the guidelines together.

All submitted guidelines will be sent to the local Agree II appraisal committee for review and must be endorsed by an appropriate body prior to consideration and all conflicts of interest expressed.

A structured abstract not exceeding 400 words (recommended sub-headings: *Background, Recommendations, Conclusion*) is required. Sections and sub-sections must be numbered consecutively (e.g. 1. Introduction; 1.1 Definitions; 2.etc.) and summarised in a Table of Contents.

Illustrations/photos/scans

- If illustrations submitted have been published elsewhere, the author(s) should provide consent to republication obtained from the copyright holder.
- Figures must be numbered in Arabic numerals and referred to in the text e.g. '(Fig. 1)'.
- Each figure must have a caption/legend: Fig. 1. Description (any abbreviations in full).
- All images must be of high enough resolution/quality for print.
- All illustrations (graphs, diagrams, charts, etc.) must be in PDF or jpeg form.
- Ensure all graph axes are labelled appropriately, with a heading/description and units (as necessary) indicated. Do not include decimal places if not necessary e.g. 0; 1.0; 2.0; 3.0; 4.0 etc.
- Scans/photos showing a specific feature e.g. *Intermediate magnification micrograph of a low malignant potential (LMP) mucinous ovarian tumour. (H&E stain).* –include an arrow to show the tumour.
- Each image must be attached individually as a 'supplementary file' upon submission (not solely embedded in the accompanying manuscript) and named Fig. 1, Fig. 2, etc.

Tables

- Tables should be constructed carefully and simply for intelligible data representation. Unnecessarily complicated tables are strongly discouraged.
- Large tables will generally not be accepted for publication in their entirety. Please consider shortening and using the text to highlight specific important sections, or offer a large table as an addendum to the publication, but available in full on request from the author
- Embed/include each table in the manuscript Word file - do not provide separately as supplementary files.
- Number each table in Arabic numerals (Table 1, Table 2, etc.) and refer to consecutively in the text.
- Tables must be cell-based (i.e. not constructed with text boxes or tabs) and editable.
- Ensure each table has a concise title and column headings, and include units where necessary.
- Footnotes must be indicated with consecutive use of the following symbols: * † ‡ § ¶ || then ** †† ‡‡ etc.

Do not: Use [Enter] within a row to make 'new rows':

Rather:
Each row of data must have its own proper row:

Do not: use separate columns for *n* and %:

Rather:
Combine into one column, *n* (%):

Do not: have overlapping categories, e.g.:

Rather:
Use <> symbols or numbers that don't overlap:

References

NB: *Only complete, correctly formatted reference lists in Vancouver style will be accepted. Reference lists must be generated manually and not with the use of reference manager software. Endnotes must* ***not*** *be used.*

- Authors must verify references from original sources.
- Citations should be inserted in the text as superscript numbers between square brackets, e.g. These regulations are endorsed by the World Health Organization,[2] and others.[3,4-6]
- All references should be listed at the end of the article in numerical order of appearance in the Vancouver style (not alphabetical order).
- Approved abbreviations of journal titles must be used; see the List of Journals in Index Medicus.
- Names and initials of all authors should be given; if there are more than six authors, the first three names should be given followed by et al.
- Volume and issue numbers should be given.
- First and last page, in full, should be given e.g.: 1215-1217 **not** 1215-17.
- Wherever possible, references must be accompanied by a digital object identifier (DOI) link). Authors are encouraged to use the DOI lookup service offered by CrossRef:
  - On the Crossref homepage, paste the article title into the 'Metadata search' box.
  - Look for the correct, matching article in the list of results.
  - Click Actions > Cite
  - Alongside 'url =' copy the URL between { }.
  - Provide as follows, e.g.: https://doi.org/10.7196/07294.937.98x

Some examples:

- *Journal references:* Price NC, Jacobs NN, Roberts DA, et al. Importance of asking about glaucoma. Stat Med 1998;289(1):350-355. http://dx.doi.org/10.1000/hgjr.182
- *Book references:* Jeffcoate N. Principles of Gynaecology. 4th ed. London: Butterworth, 1975:96-101.
- *Chapter/section in a book:* Weinstein L, Swartz MN. Pathogenic Properties of Invading Microorganisms. In: Sodeman WA, Sodeman WA, eds. Pathologic Physiology: Mechanisms of Disease. Philadelphia: WB Saunders, 1974:457-472.
- *Internet references:* World Health Organization. The World Health Report 2002 - Reducing Risks, Promoting Healthy Life. Geneva: WHO, 2002. http://www.who.int/whr/2002 (accessed 16 January 2010).
- Legal references

- Government Gazettes:

National Department of Health, South Africa. National Policy for Health Act, 1990 (Act No. 116 of 1990). Free primary health care services. Government Gazette No. 17507:1514. 1996.

In this example, 17507 is the Gazette Number. This is followed by :1514 - this is the notice number in this Gazette.

- Provincial Gazettes:

Gauteng Province, South Africa; Department of Agriculture, Conservation, Environment and Land Affairs. Publication of the Gauteng health care waste management draft regulations. Gauteng Provincial Gazette No. 373:3003, 2003.

- Acts:

South Africa. National Health Act No. 61 of 2003.

- Regulations to an Act:

South Africa. National Health Act of 2003. Regulations: Rendering of clinical forensic medicine services. Government Gazette No. 35099, 2012. (Published under Government Notice R176).

- Bills:

South Africa. Traditional Health Practitioners Bill, No. B66B-2003, 2006.

- Green/white papers:

South Africa. Department of Health Green Paper: National Health Insurance in South Africa. 2011.

- Case law:

Rex v Jopp and Another 1949 (4) SA 11 (N)

Rex v Jopp and Another: Name of the parties concerned

1949: Date of decision (or when the case was heard)

(4): Volume number

SA: SA Law Reports

11: Page or section number

(N): In this case Natal - where the case was heard. Similarly, (C) woud indicate Cape, (G) Gauteng, and so on.

NOTE: no . after the v

- *Other references (e.g. reports) should follow the same format:* Author(s). Title. Publisher place: Publisher name, year; pages.
- Cited manuscripts that have been accepted but not yet published can be included as references followed by '(in press)'.
- Unpublished observations and personal communications in the text must **not** appear in the reference list. The full name of the source person must be provided for personal communications e.g. '...(Prof. Michael Jones, personal communication)'.

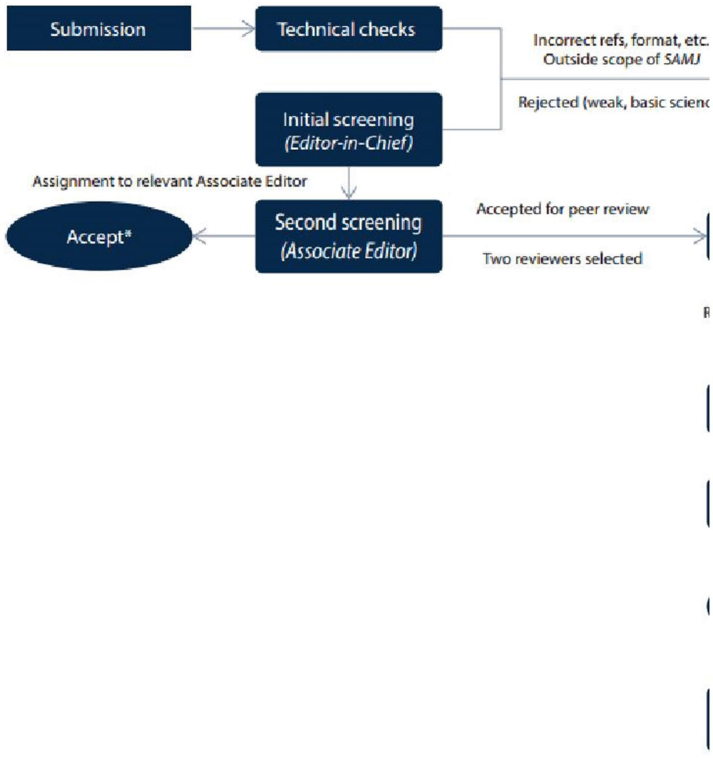
From submission to acceptance

Submission and peer-review

To submit an article:

- Please ensure that you have prepared your manuscript in line with the SAMJ requirements.
- All submissions should be submitted via Editorial Manager
- The following are required for your submission to be complete:
  - Anonymous manuscript (unless otherwise stated)
  - Manuscript
  - Any supplementary files: figures, datasets, patient consent form, permissions for published images, etc.
- Once the submission has been successfully processed on Editorial Manager, it will undergo a technical check by the Editorial Office before it will be assigned to an editor who will handle the review process. If the author guidelines have not been appropriately followed, the manuscript may be sent back to the author for correcting.

Peer-review process



*Manuscripts accepted at this point are limited to Editorials, Correspondence, Obituaries, Book reviews, Abstract
**Some minor revisions may be requested

Production process

Please note that there is a 6-month waiting time for publication, once an article has been sent to the production team.

The following process will follow:

1. An accepted manuscript is passed to a Managing Editor to assign to a copyeditor (CE).
2. The CE copyedits in Word, working on house style, format, spelling/grammar/punctuation, sense and consistency, and preparation for typesetting.
3. If the CE has an author queries, he/she will contact the corresponding author and send them the copyedited Word doc, asking them to solve the queries by means of track changes or comment boxes.
4. The authors are typically asked to respond within 1-3 days. Any comments/changes must be clearly indicated e.g. by means of track changes. Do not work in the original manuscript - work in the copyedited file sent to you and make your changes clear.
5. The CE will finalise the article and then it will be typeset.
6. Once typeset, the CE will send a PDF of the file to the authors to complete their final check, while simultaneously sending to the 2nd-eye proofreader.
7. The authors are typically asked to complete their final check and sign-off within 1-2 days. No major additional changes can be accommodated at this point.
8. The CE implements the authors' and proofreader's mark-ups, finalises the file, and prepares it for the upcoming issue.

Changing contact details or authorship

Please notify the Editorial Department of any contact detail changes, including email, to facilitate communication.

Publication

Online v. print

The *SAMJ* is an online journal. The online version of the journal is the one that has the widest circulation, is indexed by bibliographic databases including PubMed and SciELO, and is accessible in academic libraries. A printed edition , containing material selected by the Editor is also published each month and distributed to the membership of the South African Medical Association.

Online

- The full text of all accepted articles is published in full online, open access.
- Citation information of each article is based on its online publication.
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DEPARTMENT OF ENGLISH

25th November 2019

Editorship of Refeletse Mafisa's Thesis

This is to confirm that I, Taelo Qhala, have edited Ms Refeletse Mafisa' thesis entitled "**Factors Leading to Uncontrolled Blood Pressure in Patients Taking Antihypertensive Medication in Mafeteng Lesotho**". I have read though the document and edited it only for language.

Taelo Qhala

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