

The prevalence of high blood pressure among the University of Venda academic staff, South Africa.

By:

Thizwilondi Madzaga

Student Number: 11531072

A mini-dissertation submitted in partial fulfilment of the requirements for the degree of Masters in Public Health at the School of Health Sciences, University of Venda

Supervisor: Dr T. G Tshitangano

Co-supervisor: Dr J.T Mabunda

April 2017

### Declaration

I, Thizwilondi Madzaga, student number 11531072, hereby declare that this mini- dissertation, hereby submitted by me to the School of Health Sciences, Higher Degrees Committee, University of Venda, titled “**The prevalence of high blood pressure among the University of Venda academic staff, South Africa**”, has not previously been submitted for a degree at this or any other University, and that it is my own work in design and that all reference material contained herein has been duly acknowledged.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Dedication

I dedicate this study to my daughter, mother, grandmother and brothers.

## Acknowledgements

I would like to thank the Almighty God who had given me strength to start and finish this study. It was not an easy road but He was always there for me.

I would like to appreciate my supervisors, Dr Mabunda, J.T and Dr Tshitangano, T. G, for their guidance and support throughout the study. You were always available to meet me. Thank you so much.

I would like to thank the National Research Fund for funding this study.

To my mother, Mrs Madzaga E.M, thank you for taking care of my child when I was busy with my studies. My sincere thanks to my grandmother, Mrs Madzaga Munzhedzi, for her support and to my lovely daughter, Joy Vhulenda, for being so understanding when I was not always there for her.

I would like to thank my mentors Dr Mabunda J.T, Prof Strydom and his wife Mrs Strydom for their support and always believing that I can do it.

To the University of Venda, thanks a million for granting me permission to conduct my study at University of Venda. Without your approval it would have been impossible for me to complete my study.

I would like to extend my gratitude to all the University of Venda academic staff who participated in my study. May the Almighty God bless you all.

## Abstract

High blood pressure is a global public health problem. High blood pressure shows no signs or symptoms and it can only be detected through BP measurements by a health professionals. It's a chronic condition which requires long term management. Poor control of high blood pressure can lead to complications and even death. The aim of the study was to determine the prevalence of high blood pressure among University of Venda academic staff. UNIVEN is situated in Thohoyandou, Vhembe District in Limpopo. A cross-sectional design was used. A modified WHO stepwise questionnaire for non-communicable diseases version 3.1 was used to collect data regarding demographic characteristics, BP status, and stress and lifestyle characteristics. Charts and graphs were used to present the results of the study. The Statistical Package of Social Sciences was used to analyse data. The Chi-square test was used to determine the association between blood pressure and risk factors. A total of 179 respondents were selected, their ages of were ranged from 22 to 68 years. Their blood pressure, weight and height of the participants were also measured. The prevalence of high blood pressure was 20%, while 46% were on prehypertension stage and about 34% had a normal BP. About 23% had been previously diagnosed with HBP, while about 90% were on treatment for high blood pressure. Only 13% had their BP under control. The prevalence of high blood pressure was associated with gender, family history, vegetable intake and diabetes. Department of Sports need to introduce sports among academic staff as a way of prevention and management of high blood pressure.

Key words: Academic staff, Awareness, High blood pressure, Prevalence, treatment.

## Table of Contents

Content	Pages
Declaration .....	i
Dedication.....	ii
Acknowledgments.....	iii
Abstract.....	iv
Table of content.....	v
List of abbreviation and acronyms.....	viii
List of Figures.....	ix
List of Tables.....	x
<b>1. Chapter 1 Introduction.....</b>	<b>1</b>
1.1 Background of the study.....	1
1.2 Problem statement.....	4
1.3 Rationale of the study.....	4
1.4 Significance of the study.....	4
1.5 Purpose of the study.....	4
1.6 Study objectives.....	4
1.7 Research questions.....	4
1.8 Definition of terms.....	5
1.9 Conclusion.....	6
<b>2. Chapter 2 Literature review.....</b>	<b>7</b>
2.1 Introduction.....	7
2.2 Prevalence of HBP.....	7
2.3 Definition of HBP and classification of HBP.....	8
2.4 Awareness of HBP.....	9
2.5 Risk factors of HBP.....	10
2.5.1 Social risk Factors.....	10
(a) Age.....	11
(b) Gender.....	11
(c) Stress.....	12
2.5.2 Lifestyle risk factors.....	13
(a) Cigarette smoking.....	13
(b) Alcohol intake.....	13

(c) Physical inactivity.....	14
(d) Unhealthy diet.....	15
2.5.3 Metabolic risk factors.....	15
2.6 Consequences of HBP.....	16
2.7 Challenges in management of HBP.....	19
2.8 Management of HBP.....	19
2.8.1 Exercise.....	19
2.8.2 Diet.....	20
2.8.3 Medication.....	21
2.9 Conclusion.....	22
<b>3. Chapter 3 Methodology.....</b>	<b>23</b>
3.1 Introduction.....	23
3.2 Study design.....	23
3.3 Study setting.....	23
3.4 Population.....	24
3.5 Sampling.....	25
3.6. Exclusion criteria.....	27
3.7 Instrumentation.....	27
3.7.1 Questionnaire.....	27
3.7.2 Anthropometric instrument.....	27
3.8 Pre-test of the instrument.....	28
3.9 Data collection.....	28
3.9.1 Recruitment process.....	29
3.9.2 Data collection procedure.....	29
3.10 Data analysis.....	30
3.11 Ethical considerations.....	30
3.11.1 Permission.....	31
3.11.2 Informed consent form.....	31
3.11.3 Privacy.....	31
3.11.4 Confidentiality and anonymity.....	31
3.11.5 Rights of respondents.....	32
3.12 Validity and reliability of the study.....	32
3.13 Dissemination of results.....	34
3.14 Conclusion.....	34

<b>Chapter 4 Results</b> .....	<b>35</b>
4.1 Introduction.....	35
4.2 Demographic characteristic.....	35
4.3 HBP awareness and control.....	36
4.4 Risk factors associated with HBP.....	37
4.4.1 Lifestyles.....	37
4.4.1.1 Diet.....	37
4.4.1.2 Alcohol intake.....	40
4.4.1.3 Cigarette smoking.....	40
4.4.1.4 Exercise.....	45
4.4.2 Stress.....	42
4.4.3 Metabolic risk.....	43
4.5 Measurements results.....	44
4.5.2 HBP and lifestyle characteristics.....	47
4.5.3 HBP and stress.....	48
4.5.4 HBP and metabolic risk.....	49
4.6 Conclusion.....	50
<b>Chapter 5 Discussion, conclusion and recommendations</b> .....	<b>51</b>
5.1 Introduction.....	51
5.2 Prevalence, awareness and control of HBP.....	51
5.3 HBP and its associated risk factors.....	54
5.4 Conclusions.....	59
5.5 Limitations.....	59
5.6 Recommendations.....	60
<b>6. REFERENCES</b> .....	<b>61</b>
<b>APPENDICES</b> .....	<b>76</b>
Appendix A Questionnaire.....	76
Appendix B Information letter.....	81
Appendix C Consent.....	82
Appendix D Ethical Clearance.....	83
Appendix E Application for Permission conduct a study at UNIVEN.....	84
Appendix F Permission letter from UNIVEN HR.....	85

## List of Abbreviations

<b>Abbreviation</b>	<b>Concept</b>
ACE	Angiotensin converts enzyme inhibitors
ARB	Angiotensin II receptor blockers
BP	Blood pressure
BMI	Body mass index
BRICS	Brazil Russia Federation India China South Africa
CHD	Coronary heart disease
CVD	Cardiovascular disease
DASH	Dietary approaches to stop hypertension
DBP	Diastolic blood pressure
HBP	High Blood Pressure
GBD	Global burden of disease
NCDs	Non-communicable diseases
NHNES	National Health and Nutrition Examination Survey
PA	Physical activity
SBP	Systolic Blood Pressure
SPSS	Statistical Package of Social Sciences
UNZA	University of Zambia
USA	United States of America
UNIVEN	University of Venda
WHO	World Health Organization
WHR	Waist to hip ratio

## List of Figures

Figure 1 Prevalence of HBP in BRICS countries.....	2
Figure 4.1 Salt intake.....	37
Figure 4.2 Preferred method of cooking food.....	38
Figure 4.3 Frequency of fast food intake.....	38
Figure 4.4 Frequency of fruits intake in a week.....	39
Figure 4.5 Frequency of vegetables intake in a week.....	39
Figure 4.6 Frequency of alcohol intake in a week.....	40
Figure 4.7 Cigarette smoking.....	40
Figure 4.8 Intensity of exercise.....	41
Figure 4.9 Frequency of exercise.....	41
Figure 4.10 The number of respondents owning/not owning a car.....	42
Figure 4.11 Stress.....	42
Figure 4.12 History of obesity.....	43
Figure 4.13 Diabetes status.....	43
Figure 4.14 Classification of BP among the UNIVEN academic staff.....	44
Figure 4.15 Classification of BMI.....	45

## List of tables

Table 2.1 Classification of BP in adults.....	9
Table 2.2 Classification of BMI.....	17
Table 3.1 Distribution of Schools and Departments.....	24
Table 3.2 Distribution of the academic staff according to Schools.....	24
Table 3.3 Sample distributed according to the schools.....	26
Table 4.1 Demographic characteristic.....	36
Table 4.2 HBP and demographic characteristics.....	46
Table 4.3 Association between HBP and lifestyle characteristics.....	47
Table 4.4 HBP and stress.....	48
Table 4.5 Association between HBP and metabolic risk.....	49

## Chapter 1 Introduction

### 1.1 Background of the study

High blood pressure (HBP) is a global public health problem, which affect the countries economically (Kishore, Gupta, Kohli & Kumar, 2016). HBP has been rated by the World Health Organisation (WHO) as an important factor that contributes to early mortality. Globally, it is estimated that HBP has caused about 7.5 million deaths and about 12.8% of all total mortality (Bell, Twigg & Olin, 2015). Early detection and treatment of HBP reduces the complications which are associated with poor controlled HBP, such as stroke (Jaddou, Batieha, Khader, Kanaan, El-Khateeb & Ajlouni, 2011). HBP is associated with low level of physical activity(PA), unhealthy food, high cholesterol levels, family history of HBP, tobacco smoking, low socioeconomic status, obesity and diabetes (WHO, 2013).

HBP is also known as hypertension. HBP is a life-threatening chronic condition, which damages target, organs lead to disability or death if poorly treated (Erkoc, Isikli, Mentintas & Kalyoncu, 2012). HBP has been identified as a major contributor to coronary heart disease (CHD), stroke, congestive heart failure and renal disease (Ghadieh & Saab, 2015). This condition often does not show any signs or symptoms, even when extremely high. In rare cases symptoms such as dizziness, frequent nose bleeding, vomiting and dull headache are manifested. HBP can only be diagnosed through assessment of BP by a healthcare professional.

HBP has been identified as the most important risk factor that causes microvascular diseases and heart diseases (Rita & Carey, 2010). In 1990, HBP was ranked as the fourth risk factor in the global burden of disease (GBD). In 2010, a GBD study identified a shift in communicable diseases in children to non-communicable diseases (NCDs) in adults (Bromfield & Muntner, 2013). The prevalence of HBP differs from country to country. An Indian study indicates that lowest prevalence of HBP was in rural India at 3.4% among men and 6.8% among women. In Poland HBP was at 68.9% among men and 72.5% among women (Ali & Al-Asadi, 2009).

In a study which was conducted among female teachers in Barash, Iraq the prevalence of HBP was at 21.3%. The results further showed that 67% were inactive, 40.9% were overweight, 37.7% were obese, 18.1% were consuming a high salt diet, about 15.4% were eating a high fat diet and 6.5% were drinking coffee (Ali et al., 2009). Academic staffs are not immune to HBP. A study conducted among university staff in Zambia showed the prevalence

of HBP to be 40% (Mulenga & Siziya, 2013). In Romania, the prevalence of HBP among medical staff was 30% of which 51.1% were aware that they have HBP. The prevalence of HBP was associated with BMI (body mass index), waist circumference, age, lipids, and occupation category. The physicians had highest prevalence of HBP (Giurgiu, Bardac & raulea, 2013).

A conducted study among university staff members in Nigeria, showed that they had inadequate knowledge regarding HBP (Abdullahi & Amzat, 2011). In India, the prevalence of HBP among Warangal teachers was low due to awareness regarding HBP, and regular engagement in PA and exercise (Kumar, Laxmi, Pasula, Adepu & Ali, 2013). The prevalence of HBP was 32% in Cebu city among 300 public elementary and high school teachers. It has been suggested that the high prevalence among teachers might be as a result of work stress, diet and lifestyle (Padayhag, 2013). In Malaysia the prevalence of HBP among university academic staff was 34.4% and 33.9% were on the stage of prehypertension. The high prevalence of HBP was linked with BMI, gender, age, family history of HBP and high intake of alcohol (Rampal, Somayeh, Salmiah, Faisal & Zainiya, 2011).

The prevalence trend in the BRICS (Brazil, Russian Federation, India, China & South Africa) countries is presented in Figure 1.1 below. The Russian Federation has the highest prevalence at 33.3% followed by South Africa (SA) with a prevalence of 24.4% and the least prevalence was reported in China, at 19.8% (Shukla, Kumar & Singh, 2014).

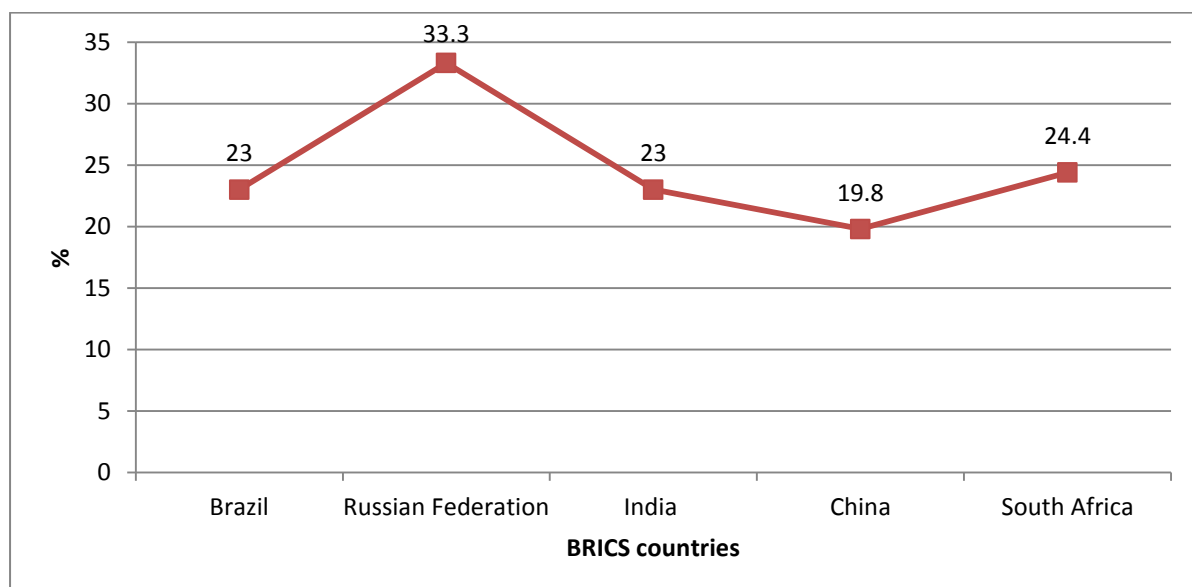


Figure 1.1: Prevalence of HBP in BRICS countries 2014

Source: Shukla et al., 2014

HBP is one of the commonest chronic diseases and it has been ranked as a second leading cause of deaths in SA, and those deaths occurred as a result of uncontrolled HBP. Though management strategies to control BP have been implemented such as medication and lifestyle modification, BP is still poorly controlled (Onwuke & Omole, 2012). A study conducted among SA adults shows that SA has a burden high of HBP and many of those who have HBP are not diagnosed. About 10.4% of health profession were previously diagnosed with HBP. The prevalence of HBP increased with age for both sexes. However the prevalence of HBP was higher in women than in men HBP was significantly associated with age (Hasumi & Jacobsen, 2012). A general household study conducted in 2011 in SA indicates that the prevalence of HBP by province was at 22.3% in the Northern Cape; 18.7% in the North West; 18.5% in Free State; 16.6% in the Western Cape; 15.9% in the Eastern Cape; 12.8% in Gauteng; 12.3% in Mpumalanga; 11.3% in Kwazulu Natal and 9% which was lowest, in Limpopo (Statistics South Africa, 2011).

In a community-based cross sectional study in 1407 adults from rural communities in Limpopo Province, the prevalence of HBP was at 41%. The high prevalence of HBP was linked to age and marital status (Ntuli, Maimela, Alberts, Choma & Dikotope, 2015). The results of a study conducted by Ramaano (2013) among adults at Folvhodwe village in Vhembe Municipality, shows that the major factors contributing to HBP are associated with low socio-economic status, age, lifestyle characteristics such as smoking and alcohol intake, high divorce rate, physical inactivity, and family history.

This study, therefore, seeks to determine the prevalence of HBP among the academic staff at the University of Venda (UNIVEN).

## **1.2 Problem statement**

The researcher worked as a part-time lecturer in UNIVEN biokinetics gym from 2013 to 2014. Of the few who attended the gym, their assessment revealed that the majority had high blood pressure. More important most of them were not aware of their BP status. The concern is that HBP is a silent killer, which rarely shows signs or symptoms. Thus, HBP should be diagnosed early and be properly treated. If not treated well, HBP may complicate into disability, death and other chronic debilitating diseases (Sawicka, Szczyrek, Jastrzebska, Prasal, Zwolak & Daniluk, 2011). Of more concern is that HBP can only be diagnosed during BP assessment. This study aims to measure academics blood pressure to determine the prevalence of hypertension and the associated factors.

### **1.3 Rationale of the study**

Many of the studies have been conducted on the prevalence of HBP, but there is still a gap on the prevalence of HBP around Vhembe district, especially in workplace. In 2011, Ravele conducted a study at UNIVEN where BP was also measured among the UNIVEN academic staff. The results of the study indicated that there was no prevalence of HBP among UNIVEN academic staff, but the sample size was too small.

### **1.4 Significance of the study**

The study might help UNIVEN academic staff members who do not know about their BP status to be aware of their BP status. The study might help UNIVEN management to create awareness campaigns that promote regular check-ups on BP among the academic staff.

### **1.5 Purpose of the study**

The purpose of this study is to determine the prevalence of high blood pressure and its associated risk factors among the UNIVEN academic staff members in South Africa.

### **1.6 Study objectives**

- 1.6.1 To determine the prevalence of high blood pressure among the UNIVEN academic staff.
- 1.6.2 To determine the risk factors associated with high blood pressure among the UNIVEN academic staff.

### **1.7 Research question**

- 1.7.1 How many UNIVEN academic staff with normal BP?
- 1.7.2 How many UNIVEN academic staff are at prehypertension stage?
- 1.7.3 How many UNIVEN academic staff are at stage 1 HBP?
- 1.7.4 How many UNIVEN academic staff are at stage 2 HBP?
- 1.7.5 What are the risk factors associated with HBP among the UNIVEN academic staff?

## 1.8 Definition of terms

Conceptual and operational terms that were used in the study are defined as follows:

### **High blood pressure**

High blood pressure is defined as blood pressure that is equal to or above 140 over 90 mmHg (Jaddou et al., 2011). In this study high blood pressure refers to systolic blood pressure equal/above 140 and diastolic blood pressure equal/above 90 mmHg.

### **Academic staff**

Academic staff include personnel whose primary assignment is instruction, research, or public service. This includes staff personnel who hold an academic rank with titles such as professor, lecturer or any of these academic ranks (OECD, 2003). In this study academic staff refers to permanent lecturers who are employed at UNIVEN during the study.

### **Prevalence**

Prevalence refers to a total number of people with a specific disease existing at a specific given time (Medical dictionary, 2007). In this study prevalence refers to a total number of academic staff who had high blood pressure at the time of the study.

### **Normal blood pressure**

Normal blood pressure refers to systolic blood pressure lower than 120 mmHg and diastolic blood pressure lower than 80 mmHg (Frese, Fick & Sadowsky, 2011). In this study normal blood pressure is when BP is below than 120 over 80mmHg.

### **Prehypertension**

Prehypertension is when systolic blood pressure is between 120 to 140mmHg and when diastolic blood pressure is between 80 and 90 mmHg (Frese et al., 2011). Prehypertension in this study refers to blood pressure higher that is at risk of having high blood pressure.

### **Stage 1 high blood pressure**

Stage 1 high blood pressure refers to systolic blood pressure between 140 to 159mmHg and when diastolic blood pressure is between 90 and 99mmHg (Frese et al., 2011). In this study stage 1 high blood pressure is when high blood pressure is at the initial stage.

### **Stage 2 high blood pressure**

Stage 2 high blood pressure is when systolic blood pressure is equal or greater than 160 mmHg and when diastolic blood pressure is between 100mmHg (Frese et al., 2011). In this study stage 2 refers to the second stage of high blood pressure which is more risky if left untreated.

### **1.9 Conclusion**

This chapter provides the background. It covers prevalence of HBP internationally, nationally, provincial including Vhembe District. It also covers the problem of the study, rationale, significance of the study and definition of concepts. The next chapter will describe the literature review.

## Chapter 2 Literature review

### 2.1 Introduction

In this chapter, international and national relevant literature to HBP is discussed. The literature covers, prevalence of HBP, definition of HBP and classification of HBP, BP awareness, risk factors of HBP, health consequences of HBP and management of HBP.

### 2.2 The prevalence of HBP

Non-communicable diseases (NCDs) are diseases that are of long duration or generally slow of low progression. South Africa is experiencing an increase in NCDs which are affecting their quality of life and it is leading to increase in health care expenses both at an individual and countries level. NCDs affect a large number of the labour force, and leading them to be unproductive at their workplace (Statistics South Africa, 2011). NCDs have been identified as one of the major health and development problems of the 21<sup>st</sup> century. They harm human beings and cause an impact on the socioeconomic status of the countries, especially in the low and middle-income countries. If care is not taken by government, NCDs will continue to increase and cause a negative impact on individuals both socially and economically. WHO has established a global coordination mechanism as a way to enhance the NCDs activities. There are many stakeholders that are involved across different sectors (Chestnow, 2014).

NCDs occur as a result of long-term risk factors that are linked with lifestyle characteristics and environmental factors. Lifestyle characteristics refer to activities such as cigarette smoking, alcohol intake, unhealthy diet and physical inactivity (Pankova, Kralikova, Fraser, Lajka, Svacina & Matoulek, 2015). The goal of 2010 among the people in the United State of America (USA) regarding HBP was that there must be at least 50% control in HBP (Egan, Zhao & Axon, 2010).

Lloyd-Sherlock, Beard, Minicuci and Chatters (2014) conducted a study in six countries, and the results of the study showed that the prevalence of HBP was linked with age and weight. In India the prevalence of HBP was high among women (32%). The lowest control was in Ghana (4%), which also had a high prevalence of HBP (71%). The study further reported on the effective treatment. In India it was at 55%, while the lowest effective treatment was in Russia (17%).

HBP was estimated to be the cause of 46 888 disabilities and 390 860 adjusted life years. In a general study the prevalence of HBP was 65.4% in South Africa, 72% in urban Zimbabwe, Malawi, Rwanda, and Tanzania 41% men and 36.6% in women. In Costa Rica 65%, in Brazil 55%, in rural China 57%-64.9%, in Turkey 71.2%-82.2%, and in Taiwan 31.1% to 38%. In SA HBP alone is the commonest reason for primary health care consultation. Maepe and Outhoff (2012), conducted among 1 696 gold miners in South Africa, the prevalence of HBP was 39.5%, with a higher prevalence of HBP among males at 40.5%, compared to 29% in females. The prevalence of HBP indicates an increase with age ranging from 15.97% in the age group 18-29 years, to 83.2% in the age group 60-69 years.

A study among the white collar job employees in Surat indicate that overall prevalence of HBP was at 30.4%, and half of white collar job employees were at a pre-hypertensive stage. In a sample of 6 928 adult USA workers, National health and Nutrition Survey (NHANES) fund that indicated that one in five employees was having HBP. The level of awareness, treatment and control of HBP was high and many of them had health insurance (Davila, Kuklina, Valderrama, Yoon, Rolle & Nsubuga, 2012). A study conducted among bankers and teachers in Nigeria indicates that there is inadequate knowledge of HBP. The prevalence of HBP among teachers was 33.3% and among bankers, 22.9% (Awosan, Ibrahim, Sabir & Ejimodu, 2013).

### **2.3 Definition of HBP and classification of BP**

HBP refers to an elevated blood pressure that is equal or above 140 over 90 mmHg. HBP is a syndrome of slow progression which arises from the complex and interrelated aetiologies. HBP is mainly associated with abnormalities of the heart and blood vessels which cause damage in the brain, vasculature, heart, kidneys, and other organs and also lead to death (Giles, Materson, Cohn & Kostis, 2009). HBP is referred to as a silent epidemic which is universally not diagnosed and/or poorly treated resulting from lack of knowledge about HBP. Poorly-controlled HBP is associated with poor treatment adherence (Maepe et al., 2012).

Table 2.1 below shows the classification of BP among adults. Normal BP is when BP is less than 120/80 mmHg, prehypertension is when SBP (systolic blood pressure) is between 120 and 139 mmHg and DBP (diastolic blood pressure) between 80 and 90 mmHg, stage 1 is when SBP is between 140 and 159 mmHg and DBP is between 90 and 99 mmHg, and stage 2 hypertension is when SBP is equal or greater than 160 mm Hg and DBP is equal or greater than 100 mmHg (Frese et al., 2011).

**Table 2.1 Classification of BP in adults**

BP classification	SBP (mmHg)	DBP (mmHg)
Normal	<120	<80
Prehypertension	120-139	80-89
Stage 1 HBP	140-159	90-99
Stage 2 HBP	≥160	≥100

Source: Blood pressure measurement guidelines for Physical Therapists (Frese et al., 2011).

## 2.4 Awareness of HBP

The prevention and control of NCDs are not given sufficient attention in West Africa especially in programmes that target workers who are working in both formal and informal sector. In addition, in West Africa there is a problem of lacking workplace programmes which will assist in protecting employees from disease that can happen as a result of the job that they do or work environment. Even in the formal sectors, there are employees who do not have access to pre-employment screening and periodic medical screening. HBP awareness is low (Bosu, 2015). It has been documented that raising HBP awareness improves patient cooperation with the healthcare practitioner and enable them to be more responsible for their own health. Patients who are diagnosed with HBP and given health education on HBP management are able to adhere to treatment better than patients who were just diagnosed and not given enough information regarding management of HBP (Mabuza, Omole, Govender, Ndimande & Schoeman, 2015). In most cases HBP individuals are not aware of their condition, and they only detected it accidentally during screening (Maepe et al., 2012).

A nationwide study was conducted among the Turkish population in order to increase public awareness on HBP. A nationwide project implemented a campaign in October 2005 to determine the baseline on awareness. A second campaign was conducted to raise awareness where mass and outdoor media were used. The main aim of the campaign was to increase knowledge on BP and encourage regular check-ups and the campaign was evaluated in 2006. The results showed that the people who did not know their blood pressure level decreased from 54.8% to 47.8%, which is decrease of 7%. The number of individuals who went for BP check-ups increased from 34.3% to 39.6%, which is an increase of 5.3%. Those who became aware about the optimal blood pressure increased from 51.8% to 58.6%, which is a 6.8% increase. The conclusion was that the campaign was very effective (Oto, Ergene, Jokgozoglu, Ongen, Kozan, Sahin, Erol, Jezel & Ozkan, 2011).

The results of the study conducted among non-academic employees in Niger Delta University shows that the non-academic employees do not have adequate knowledge about HBP (Odika, Joffa & Apiyanteide, 2011). The prevalence of HBP in Africa is still increasing and many of the individuals who have HBP are not aware that they have it (Adeloye & Basquill, 2014). In a study conducted among the US employees, the results of the study shows that about 70% of them were aware of the BP status and about 80% of them had a health insurance (Davila, Kuklina, Valderrama, Yoon, Rolle & Nsubuga, 2012).

## **2.5 Risk factors of HBP**

A number of risk factors contribute to the risk for an individual developing HBP. The risk factors include: social, lifestyle, metabolic risk factors.

### **2.5.1 Social risk factors**

Several social risk factors contribute in the development of HBP. In this study the social factors are discussed under the following sub-headings: socioeconomic status, age, gender and stress.

#### **(a) Socioeconomic status**

The rate of HBP is increasing in both low and middle income countries, and treatment and control level is very poor. In the past, HBP was associated with rich people or people living in urban areas. However, nowadays both rich and poor individuals are affected with HBP (Lloyd-Sherlock, Beard, Minicuci, Abraham & Chatters, 2014). Some assumptions have been made that poor people who resides in urban area are more likely to eat unhealthy diet, when compared with the rich people, as a results of inability to afford healthy diet, which makes them to be prone to HBP. Their HBP becomes poorly controlled or treated as a result of socioeconomic factors such as limited access to healthcare services (Olack, Wabwire-Mangen, Smeeth, Montgomery, Kiwanuka & Breiman, 2015).

Movement of people from rural to urban areas lifestyle changes contribute to increase in HBP prevalence. In South Africa, it has been noted that people living in urban areas are more prone to HBP than people living in rural areas, as a results of inadequate PA, high salt diet and reduced potassium intake (Rayner, 2010).

## **(b) Age**

HBP is a common condition among elderly people. Among people aged below 45 years, the risk of having HBP was higher in men than in women. Above the age of 65 years the risk of having HBP was higher in women than in men. In a study conducted among African American HBP was detected at early age, followed by Caucasians and Mexican Americans. Their BP increased with increase in age (Bell et al., 2015). In a study which was conducted among black adults at Ha-Mothapo village, Limpopo Province, the results of the study indicated that the high prevalence of HBP was associated with increase in age (Sengwayo, Moraba & Motaung, 2013).

Several studies have indicated that the patterns of HBP vary with age. After the age of 60 years, SBP increases whereas DBP decreases. Scientific literature describes several factors which lead to HBP, for example, endothelial dysfunction which increases oxygen delivery to tissues, increased concentration of active metabolism and increase myogenic constriction. Molecules such as telomeres shortening and endothelial progenitor's cells have been associated with HBP among elderly people (Mateos-caceres, Zamorano-Leon, Rodriguez-sierra, Macaya & Lopez-Farre, 2012).

HBP in adults is associated with large artery stiffness and remodelling, kidney damage, and cardiovascular diseases. In a conducted animal study the results of the study shows that chronic HBP leads to increase in aortic stiffness (Landsberg, Aronne, Bellin, Burke & Igel, 2016). HBP is influenced by age in a complex way. As an individual's age increases from birth, many of the biological and physiological changes occurs which result an increased risk of developing HBP (Chi, Kriva, Arnett, Myers, Pankow, Hunt & Rao, 2008). In a study which was conducted among SA adults the results indicate a positive relationship between age and HBP (Hasumi et al, 2012). The results of a study conducted among gold miners in South Africa, shows that the prevalence of HBP was 39.5%. The study further indicated that the prevalence of HBP indicates an increase with age, ranging from 15.97% in the age group 18-29 years, to 83.2% in the age group 60-69 years (Maepe et al., 2012).

## **(c) Gender**

Several studies have shown HBP to be associated with gender. In a population-based study among older adults in South Africa, the prevalence of HBP was 44.0%-52% among men and 51.6%-60.4% among women in 1998 (Peltzer & Phaswana-Mafuya, 2013). In a study which was conducted among 1 696 gold miners in South Africa, the prevalence of HBP was 39.5% with the higher prevalence of HBP among males of 40.5% compared to 29% in females. (Maepe et al., 2012).

The prevalence of HBP increased with age and it was significantly higher among male employees (32.5%), compared to female employees (23.1%) (Desai & Kavishwar, 2009).

#### **(d) Stress**

A current hypertension reported by Spruil (2010), shows that chronic stress is linked with the development of HBP. Stressors such as environmental, occupational, and low socioeconomic status are associated with HBP. Chronic stress has a negative impact on health. In another longitudinal study showed that strenuous job is associated with HBP. In a recent epidemiological evidence of a study conducted among white collar workers in Italy, psychosocial factors such as stress have been shown to influence cardiovascular morbidity and mortality, and also that they lead to acute myocardial infarction. Chronic stress increases cardiovascular risk (Lucini, Riva, Pizzinelli & Pagani, 2007). HBP and stress are the contributory factors for cardiovascular diseases. HBP and stress cause impact on the quality of life. Patients with HBP are vulnerable to stress (Santos, Chaves, Andradeb & Duarte, 2013).

Stressful situations as a result of personal preserves, low self-esteem, and failure to cope under stressful situations have been shown to have an effect in increased BP. A job that is demanding is associated with stress. Job related variables include work schedule, machine work, time pressure and repeated activities; physical conditions include lightning, heat, noise and active and inactive tasks, contact with the public such as talking to people, unfair treatment, and role overload. Stress at workplace and strenuous jobs which result in lack of balance between the job demands and job control, has been often associated with the HBP etiology at a psychological and physiological level (Rosenthal & Alter, 2012).

The prevalence of HBP was 37.6% among urban adults in North Karnataka. The high prevalence rate was associated with socioeconomic status and stress. However, the significant between HBP and stress was high (Madhumitha, Naraintran & Manohar, 2014). Mental stress is associated with HBP & other cardiovascular diseases. In a study conducted in Maharashtra, the results showed that the stress result in increase in BP. Stress had effect in BP increase in men, but it did not have any effect in women (Jadhav, Jatti, Jadhav, Rajderkar, Naik & Nandimath, 2014).

Many job-related stresses developed as a result of modern technology. Nature of job is linked with several diseases, such as cardiovascular disease, effective disorders, HBP, type 2 diabetes and muscular skeletal diseases HBP. A study conducted among health workers

the prevalence of HBP was 26%, and the prevalence of HBP was higher among the workers who experience stress at work than those without stress (Owabi, Owolaabi, Olaolorun & Olofin, 2012). Stress occurs as a result of environmental and biological factors. Acute stress is linked with increase in BP levels. However there is insufficient evidence to show that acute stress always causes increase in BP. Finally chronic stress is associated with increase in BP (Cichelero, Ascoli, Fonseca, Weiss, Berwanger, Fuchs, Moreira & Fuchs, 2009).

### **2.5.2 Lifestyle risk factors**

Lifestyle risk factors are discussed under the following subheadings: Cigarette smoking, alcohol intake, physical inactivity and unhealthy diet.

#### **(a) Cigarette smoking**

Each year about 3 million people die globally as a result of cigarette smoking, and half of them die before the age of 70 years. Cigarette contents had been found to cause a negative impact on hypertensive drugs among individuals who have HBP (Leone, 2011). HBP and smoking are the most important risk factors that contribute to cardiovascular risk. However researchers indicated that the effect of cigarette smoking on blood pressure is unclear (Gumus, Kayhan, Cinarka & Sahin, 2013). In a women's health study among 28 236 women, the results showed that smoking is associated with an increase in BP (Bowman, Gizzano & Sesso, 2007).

Cigarette smoking leads to immediate elevation in heart rate, BP and a myocardial contractibility. Cigarette smoking alters the level of hormones in both men and women. Cigarette smoking increases the stiffness of the blood arteries and also lead thickening of the carotid arteries (Pankova et al, 2015). Smoking has a strong effect on cardiovascular diseases, causing stiffness of arteries, inflammation, impairment on the function of the endothelial, alteration of atherothrombotic process, and lipid modification. Smoking effects also cause cardiovascular events. Acute smoking leads to an increase in BP. Finally, smoking, when an individual has HBP leads to severe attacks such as malignant and renovascular HBP as a result of an increased atherosclerosis (Viridis, Giannareli, Neves, Taddei & Ghiadoni, 2010).

#### **(b) Alcohol intake**

High intake of alcohol is linked with high rate of mortality, cardiomyopathy, stroke and certain types of cancers. Excessive alcohol intake increases the risk of developing HBP (Djousse & Mukamal, 2009).

The effect of alcohol intake on BP has been documented by clinical trial, it is estimated that 1mm per 10g of alcohol can lead to increase in SBP. Excessive intake of alcohol intake is also associated with increase in body weight which in turn increases a risk of having HBP (Landsberg et al., 2013). Even little alcohol intake impairs the functioning of the lower left heart chamber, which is very important in pumping blood throughout the body (Reinberg, 2016).

Regular intake of alcohol increases the level of BP. Alcohol intake is estimated to have caused 6% of HBP globally. Approximately 1 mmHg for each 10g of alcohol intake within 2 to 4 weeks elevates BP. An increase in BP as a result of alcohol intake occurs irrespective of the type of alcohol beverage intake. There are many HBP patients as a result of alcohol consumption than the conventional cause of remedial secondary HBP. In a report of Australia, it was found that alcohol withdrawal has more effect on lowering BP than exercise and sodium restriction (Klatsky, 2004).

Alcohol intake has complex effect on the heart. High intake of alcohol is linked with many of the cardiovascular diseases for example stroke, heart failure, arrhythmia and other disorders. Heavy alcohol intake is not only associated with medical problems, but social problems as well (Kawano, 2010).

Heavy drinking such as three or more drinks per day is associated with stiffness of the arteries. A heavy intake of alcohol has been associated with an increase in BP levels and less compliant vasculature. Heavy alcohol intake among pre-hypertensive individuals increases the risk of primary HBP. The results of logic regression analyses congruent with a large body of epidemiology reports reveal that daily heavy alcohol consumption to be a risk of HBP. Data collected among the university students indicated that heavy alcohol intake and pre-HBP contribute to the early emerging of primary HBP and related cardiovascular disease (CVD) (Jorgeason & Maisto, 2008). In a 16 prospective studies, it has been indicated that heavy intake of alcohol increase the risk of HBP in both men and women, however in light to moderate alcohol intake the risk of HBP was higher in both men and women (Briasoulis, Agarwal & Messerli, 2012).

### **(c) Physical inactivity**

Physical inactivity has been identified as the fourth leading cause of death globally. About 3.2 million deaths globally have been associated with insufficient physical activity (WHO, 2010). Physical inactivity is a global health problem, especially in countries such as North America and Europe. Physical inactivity has progressively increased over the past decades.

Physical inactivity is a major risk factor for NCDs and disorders which is also a contributory factor for HBP and mortality (Knight, 2012). Physical inactivity has been associated with many risks factors for chronic diseases such as CHD, obesity, HBP, fibromyalgia and diabetes. In 2008 physical inactivity has contributed about 9% of the premature deaths (Aliyu, Chiroma, Jajere & Gujba, 2015).

Physical inactivity is a major contributory factor for many chronic diseases. In a study which was conducted among bus drivers and bus conductors, the prevalence of CHD was high in bus drivers. Among bus conductors the prevalence was lower by 30%. The high prevalence among bus drivers was due to physical inactivity (Booth, Roberts & Laye, 2012). In a cross-sectional study conducted in US the results indicated a higher prevalence of HBP among individuals who were inactive than those who were physically active (Aljadhey, 2012).

#### **(d) Unhealthy diet**

Worldwide there is an increase in junk food intake. Clinicians have recognized that junk food intake is linked with premature heart diseases. Saturated fat in junk food increases the risk of having obesity, hyperlipidaemia and diabetes. High salt content in junk food increase the risk of HBP (Bains & Rashid, 2013). High intake of salt increases the risk of having HBP especially among elderly people, African Americans, and obese people as a result of high salt sensitivity (Friso, Schmider, Grodzicki & Messerli, 2012). Intake of fatty food increases the absorption of cholesterol. Fatty food contains triglycerides which are the same as cholesterol and saturated fat. Restaurant foods are the commonest foods which contain high fat content. Fatty foods increase cholesterol level in the body, and this in turn increase the risk of HBP. In Ghana, rural population are not likely to buy food from restaurants and fast food joints, which reduce their risk of having HBP (Addo, Agyemang, Smeeth, De-Graft Aikins, Edusei & Ogedegbee, 2012).

#### **2.5.3 Metabolic factors**

Discussion of metabolic risk factors is covered under the following subheadings: diabetes and obesity.

##### **(a) Diabetes**

HBP affects about 70% of the individuals with diabetes. The risk of having HBP is twice higher among individuals with diabetes than those without it. Diabetes increases the risk of vascular complications among diabetic individuals. The presence of HBP and diabetes increase the risk of retinopathy, sexual dysfunction and ischemic cerebrovascular disease.

Diabetes is a risk factor for coronary artery disease the risk increases when an individual also has HBP. Among individuals with type 1 diabetes, diabetic nephropathy is the commonest cause of HBP (Lago, Singh & Nesto, 2007). Diabetes and HBP frequently occur at the same time. There is an overlap between diabetes and HBP in etiology and mechanisms. HBP and diabetes are two of the leading risk factors for atherosclerosis. Also, its complications lead to heart attacks and strokes. In a study conducted in Hong Kong only 58% of the people with diabetes had a HBP. HBP occurs in approximately 30% of the people with type 1 diabetes (Cheung & Li, 2012).

HBP leads to many diabetes complications and also worsens them. In addition, diabetes is a risk factor for HBP, CHDs, and circulatory diseases. Diabetes also damages the arteries by making them to harden as a result of atherosclerosis and this leads to HBP. If complications of diabetes remain untreated, they can lead to a stroke, heart and kidney failure, heart attack and damage to the blood vessels. Cardiovascular risk is graded and continuous among individuals with diabetes (Accord Study Group, 2010). HBP affects about 60% of individuals with diabetes. Lowering BP in individuals with diabetes reduce the rate of morbidity and mortality which occurs as a result of chronic diseases. Individuals with HBP and diabetes are having a double risk of having chronic diseases than those without HBP and diabetes (Rita et al, 2010). HBP and diabetes are interrelated diseases; they are risk factor for atherosclerotic heart diseases. Patients who have diabetes have double chances of having HBP than patients without diabetes. HBP cause retinopathy on diabetic patients (Venugopal & Mohammed, 2014).

### **(b) Obesity**

Obesity refers to over fatness of the body. It is a chronic disease which requires a long-term management. There are several methods used to asses for body fat, such as; under water weighing, dual energy x-ray absorptiometry, BMI, skinfolds and bioelectrical impendence. National instate for health have recommended the use of BMI in a clinical setting, to asses overweight and obesity. In classification of BMI; <18.5 kg.m<sup>2</sup> is referred to as underweight; 18.5-24.9 kg.m<sup>2</sup> is normal; 25-29.9 kg.m<sup>2</sup> overweight; 30-34.9 kg.m<sup>2</sup> obesity class I; 35-39.9 kg.m<sup>2</sup> obesity class II and ≥40 kg.m<sup>2</sup> obesity class III (Ehrma, Gordon, Virdish & Peteyan). Table 2.2 below present classification of BMI.

**Table 2.2 Classification of BMI**

Classification of overweight and obesity by BMI	
	BMI(kg.m <sup>2</sup> )
Underweight	<18.5
Normal	18.5-24.9
Overweight	25-29.9
Obesity class I	30-34.9
Obesity class II	35-39.9
Obesity class III	≥40

Obesity is a global health problem. It has been identified to be the most important risk factor for HBP. Obese patients have a higher risk of developing HBP and type II diabetes. An obese individual has more tissue and more blood circulation. Obesity makes the heart to work harder than normal; it is also associated with HBP. HBP in an obese individual occurs as a result of an increased force of contraction in the heart and atherosclerosis (Cheung et al, 2012). Obesity has been found to be an important problem in the developed countries and its increase is now becoming common in less developed countries. Obesity is associated with many chronic diseases such as diabetes, HBP and dyslipidaemia (Aliyu et al., 2015).

The prevalence of HBP is twice as high in an obese individual than in an individual with a normal weight. HBP and obesity are the major contributory factors for CVDs, which contribute to a high rate of morbidity and mortality. A high body mass and high waist circumference is risk factors for hyperlipidaemia, which is a risk factor for HBP (Kollar & Simonyi, 2013). HBP is linked with increased blood flow, cardiac output, HBP and vasodilation. It has been recognised that the relationship of obesity and HBP is as a results of the sympathetic activation. A lowering of the body weight is linked with lowering in BP (Re, 2009).

The link between obesity and HBP has been noted in the 20<sup>th</sup> century. NHNES reports indicate that individuals who had higher BMI had a higher risk of having HBP than those with lower BMI (Landsberg et al., 2013). A report of a study which was conducted to evaluate the relationship between obesity and blood pressure among adolescents in Limpopo Province, the study showed that an increase in body weight was linked with elevated BP (Mkhonto & Mabaso, 2012).

Hun et al, indicates that obesity and HBP are both independently linked with a high prevalence of diabetes. Obesity increase the risk of developing HBP more than those with normal weight or who are underweight (Sengwayo et al., 2013). In a study which was conducted among females teachers in Ghana, the results show that there is positive a relationship between HBP and all anthropometric measurements which include the waist to hip ratio (WHR), Hip circumference, waist circumference, body weight and body mass index (BMI). However there was the strongest prediction of HBP among teachers who had high WHR. The prevalence of HBP among obese teachers was 41.3%. However there was no HBP among those who were underweight (Pobee, Plahar & Owosu, 2013).

## **2.6 Health consequences of high blood pressure**

During early stage of HBP, it may show sign or no sign of a disease. Lack of treatment makes HBP to be poorly controlled and lead to complications such as stroke, kidney failure, premature death and disability (WHO, 2013). It had been further indicated that when HBP is poorly controlled or treated, it reduces arteries flexibility and leads to atherosclerosis, cerebral stroke, microvascular disease of retina and glomerulus, angina pectoris and cardiac insufficiency (Ziyyat, Ramdani, Bouanani, Vanderpas, Hassani, Boutayeb, Aziz, Mekhfi, Bnouham & Legssyer, 2014). HBP is a leading cause of maternal deaths in South Africa. HBP is associated with preclamsia during pregnancy. Preclamsia is the most common cause of perinatal mortality and morbidity (Seedat & Rayner, 2011).

HBP strains several organs in the body such as the eyes, kidneys and heart, and makes them to deteriorate in later years. About 75% of heart attacks and strokes occur as a result of HBP. HBP causes a thickening of the blood vessels leading to atherosclerosis. HBP makes the heart to work harder than the normal way, which causes heart failure and left ventricular hypertrophy. HBP contribute to sexual dysfunction mostly in men and it is more severe in smokers than in general population. HBP affects the blood vessels of the eye, leading to retinopathy (The New York times, 2016).

HBP contributes about 700 000 strokes in America. HBP triple the risk of having stroke. About 1.4 million CHD occurs as a result of HBP. HBP increase the risk of having heart failure especially in adults. HBP is a major contributory factor of renal disease (Landsberg et al, 2013). HBP is also associated with peripheral artery disease, impairment of vision and retinal bleeding (WHO, 2010).

HBP is a major cause of renal parenchymal damage among adults. HBP is also associated with sleep apnoea in adults especially at the age of 40-59 years. HBP among preadolescent is commonly as a result of renal parenchymal disease (Anthony, Viera & Neutze, 2010).

## **2.7 Challenges in management of HBP**

Prevention of HBP is the best option, since the problem with HBP is that it cannot be completely cured, and its management requires a lifelong medication and lifestyle modification (Desai et al, 2009). In many countries, public awareness of HBP is very low, and, if no action is taken many individuals become disabled and even die as a result of HBP. Intervention to prevent or control HBP should include awareness, treatment and control (Lloyd-Sherlock et al, 2014).

Several factors play a role in the poor control of HBP, for example clinicians, inadequate knowledge of national, HBP guidelines, insufficient physician patient communication, patient not adhering to medication and lifestyle modification. Presence of health care models and worksite programs that address these factors may improve in the control of HBP among employees (Davila et al., 2012). In South Africa economic factor contribute to inadequate manage of HBP. About 8.7% of gross domestic product is used for health care services. However more money is allocated to private health sector and very few in public health sectors (Public clinics and hospitals) which only allow the rich to have better access to health care services than the poor (Rayner, 2010).

## **2.8 Management of HBP**

Living a healthy lifestyle remains a cornerstone in the management of HBP with regardless to the levels of BP. The healthy life styles include exercise and healthy diet. However, medications also play a very important role in the management of HBP.

### **2.8.1 Exercise**

It has been observed that exercise lower both SBP and DBP. Regular exercise improve sodium elimination and also lowers visceral fat, lowers plasma renin and catecholamine activity and also lowers sympathetic tone and increased parasympathetic tone, which result in lowering BP. Engaging in regular exercise also assist in prevention of type 2 diabetes and dyslipidemia among the individuals who have HBP. Exercise is the primary recommendation lifestyle among individuals who are at prehypertension stage (Rahl, 2010). In a study which was conducted among employees who were working in a fertilizer company at Surat District

in India, study findings indicated that the employees who were engaged in yoga meditation and exercise had a lower risk of developing HBP than those who do not exercise (Divan, Chauhan, Panchal & Bangal, 2010).

People with HBP are likely to have less physical activity levels than those without HBP. There is strong evidence that regular exercise lowers BP, especially in hypertensive individuals. It is recommended that hypertensive individuals should aim to perform moderate intensity and aerobic exercise activity for at least 30 minutes on most days of the week, in addition to resistance exercises on 2-3 days/week. Professionals with expertise in exercise prescription may provide additional benefits to patients with high cardiovascular risk (Sharman, La Gerche & Coombes, 2013).

Physical activity has been recommended as a lifestyle modification that can be used to prevent the development of HBP. Men who had reported exercising five times a week experience a lower incidence of HBP in two to three decades later in life. PA is a potential protective factor for development of HBP (Diaz & Shimbo, 2014). Participating in PA reduces the incidence of HBP, and progression of pre-HBP, while reducing mortality and the risk of developing cardiovascular diseases (CVD). Engaging in PA also promotes a decrease in BP among the patients with resistance HBP. In a study conducted among Brazilian populations the results show that PA lowers BP (Bento, Albino, Dermoura & Santos, 2015).

### **2.8.2 Healthy diet**

It has been documented that a reduction of salt intake lowers BP. Depending on BP levels salt reduction can lower BP by about 4-8 mmHg. The reduction of salt intake with a combination of lifestyle modification leads to a high decrease in BP. Low intake of salt facilitates the lowering of BP and reduces cardiovascular morbidity and mortality (Friso et al., 2012). WHO (2013), further indicated that salt reduction has a vital effect on lowering BP level. It is vital for the health and food sectors to work together, in order to address problems related to hidden salt and fats that are found in processed foods. Government should implement policies that monitor for the food production industries in order to reduce salt and fats in their foods (Addo et al., 2012).

Potassium is an essential nutrient in the body; it is used to maintain total body fluid, volume acid, electrolytes and normal cell functioning. Food processing reduces the content of potassium in the food. In the past, agricultural diet contained a high content of potassium in food. In modern agricultural diet, potassium content has been reduced. Low intake of potassium has been associated with elevated BP. In a three systematic review with meta-

analysis, it has been indicated that a high potassium intake lowers BP among adults with or without HBP. In another systematic review, it was concluded that a high intake of potassium lowers BP in adults (Aburto, Hanson, Gutierrez, Hooper, Elliott & Cephalon, 2013).

Eating healthy food has been indicated to have an effect on controlling BP and reducing the risk of developing cardiovascular diseases. A Dietary approaches to stop hypertension (DASH) refers to a diet that contains vegetables, fruits, whole grain, dairy that contain low fat, low sodium and total fat. DASH diet has been designed to assist in decreasing BP among hypertensive individuals. DASH diet lowers BP on hypertensive individuals, and not in individuals who have a normal BP. DASH diet has been found to work independently in lowering BP. Increase in consuming of a diet which contain potassium reduces both SBP and DBP in adults by 1.96 to 3.49 mmHg (Saneei, Salehi-Abargouei, Esmail & Azadbakht, 2014).

Vegetarians have been linked with a low BP. Individuals who are vegetarians are markedly having a low BP. Vegetarians even experience a low BP even though their age is increasing. In Massachuset low BP among the vegetarians has been documented. A high dose of omega 3 poly saturated fatty acid commonly called fish oil can lower BP in a hypertensive individual. Dietary fibres have been found to lower BP in evidence from observational studies, and several clinical trials suggested the same thing (Appel, Brands, Daniels, Kranja, Elmer & Sacks, 2006).

### **2.8.3 Medication therapy**

Diuretics are often used in the treatment of HBP, especially in the first stage of treatment. Sometimes diuretics are used in combination with other drugs. Beta-blockers lowers the heart beat and makes it to pump with a lesser force, this result in the heart pumping a less amount of blood through the blood vessels, which contributes in the lowering of BP. Angiotensin converts enzyme inhibitors (ACE) blocking the process of angiotensin which increases BP. ACE brings the opposite results of angiotensin. Angiotensin II receptor blockers (ARBs) block the hormone from binding with the receptors in the blood vessels. When angiotensin II is blocked the blood vessels do not constrict and this in turn lowers the BP. Calcium channel blockers are also used in lowering BP (Medical Letter, 2012).

If lifestyle modification is not effective in controlling BP, hypertensive medications should be used. Older elderly individuals who are older than 80 years should be treated using drugs intervention only if their BP exceeds 150 mmHg SBP and 90 mmHg DBP. The target of that treatment should be to reach BP of less than 140mmHg SBP and 90 mmHg DBP.

Hypertensive individuals should be introduced to treatment immediately. The type of drug to be used for HBP treatment depends on several factors such as race, age, and clinical characteristics for example diabetes associated with HBP. In most cases of HBP using one drug for treatment is not effective. If many drugs should be taken in a day, they should be divided and taken during different times such as in the morning and evening. The choice of drugs depends on the availability of the drug or the cost of the drug (Weber, Schiffrin, White, Mann, Lindholm, Kenerson, Flack, Carter, Meterson, Venkata, Cohen, Cadet, Jean-Charles, Taler, Kountz, Townsend, Chalmers, Ramirez, Bakris, Wang, Schutte, Bisognano, Touyz, Sica & Harrap, 2014).

Among black populations who have HBP, the use of diuretics drugs for treatment is recommended. Beta-blockers should not be used in combination/simultaneously with diuretics as a first line therapy due to a predisposition to diabetes. Hypertensive individuals should use Beta-blockers if using one drug is intolerance. In severe hypertensive cases lifestyle modification, drugs and follow-ups are advised (Seedat et al, 2011). It has been indicated that the initial treatment of HBP using diuretics and bedtime chronotherapy in which one drug is taken at night has effect of lowering cardiovascular events. Adherent to therapy differs among individuals, and it is important in controlling HBP (Santiago, Pereira, Bota, Simoes, Carvalho, Pimenta & Neto, 2014).

## **2.9 Conclusion**

Chapter 2 discussed the prevalence of HBP. The literature indicates that HBP is included among the NCDs and is a global health problem. Prevalence of HBP is increasing in many countries especially in the workplace. Factors associated with HBP included socioeconomic status, age, gender, alcohol intake, smoking, physical inactivity, unhealthy diet especial high salt diet, obesity and diabetes. HBP awareness and control is still low in many countries.

## Chapter 3: Methodology

### 3.1 Introduction

Research methodology refers to the process of data collection, data analysis and interpretation of data (Cresswell, 2014). This chapter discusses the study design, study setting, population, sampling, exclusion criteria, instrumentation, pre-testing of instrument, validity and reliability of instrument, data collection, data analysis, ethical considerations, and dissemination.

### 3.2 Study design

Study design refers to the procedure and plans of a research that span the decisions from the broad assumptions to the details of the method of data collection and analysis (Cresswell, 2014). A Quantitative cross sectional survey design was used to determine the prevalence of HBP among UNIVEN academic staff. Quantitative approach is a research design which tests objective theory by evaluating if there is any association among variables (Cresswell, 2014). Quantitative is more reliable and objective, can use statistics to generalise findings and assumes that sample size can be used to represent population. The study objectives of the study was to determine the prevalence of HBP, awareness, management and control , and also to determine the risk factors associated with HBP, which can be best analysed using numbers.

### 3.3 Study setting

UNIVEN is an academic institution which was established in 1982. UNIVEN is situated in Thohoyandou, Vhembe District in Limpopo Province, about 188km from Polokwane. At UNIVEN academic staff includes males and females of different ages recruited nationally and internationally. UNIVEN has eight schools namely Agriculture, Education, Environmental Sciences, Health Sciences, Human and Social Sciences, Law, Management, and Mathematics and Natural Sciences. Table 3.1 summarises the number of Departments, Centres, Clinic and Institutions in each School. School of Mathematics and Natural Sciences has many departments (10) and centre, followed by Agriculture (9) and Education with the least (3).

**Table 3.1 Distribution of schools and departments**

Name of the School	Departments
Agriculture	9
Education	3
Environmental sciences	6, Centre and an institution
Health sciences	4 and centre
Human and social sciences	5, 2 Centres and an institution
Law	6 and a Clinic
Management Sciences	8 and an institution
Maths and Natural Sciences	10 and Centre

Table 3.2 below shows the distribution of academic staff according to the schools. There are 198 male academic staff, and 125 female academic staff (UNIVEN Human resource, 2016). The School of Management has many staff (60), followed by Human and Social Sciences (57) and Law with the least (21).

School	Males	Females	Total
Health sciences	12	35	47
Agriculture	25	10	35
Human and social Sciences	33	24	57
Law	15	6	21
Education	10	9	19
Environmental sciences	22	8	32
Management	41	14	55
Mathematics and Natural sciences	40	19	60
Total	198	126	324

**Table 3.2 Distribution of the academic staff according to Schools, UNIVEN 2016 (Source: Human Resources department, UNIVEN)**

### 3.4 Population

Population refers to any specific collection of objects or respondents of interest in a study (Shafer & Zang, 2012). The target population of this study comprised all full-time academic staff from all the eight schools.

### 3.5 Sampling

#### 3.5.1 Sample size

The Slovin Formula (Hitan, 2013) was used to calculate the sample size required sample to represent all academic staff. The slovin's formula makes it possible to quickly determine a reasonable and unbiased sample within a population. A total of 179 total of academic staff from all schools were selected to take part in the study. It is impossible to survey every member of a population due to time frame and funds allocated for the research. The calculation is shown below..

#### Slovin's Formula

$$n = N / (1 + N e^2)$$

whereas:

n = sample size

N = total population

e = margin of error (which is 0.05 or 5%).

Margin error is the error attributed to chance that is being made when selecting random samples to represent a given population under consideration. It is the expected chance difference, variation or deviation between a random sample and the population.

$$\begin{aligned}
 n &= N / (1 + Ne^2) \\
 &= \frac{324}{1 + (324 \times 0.05^2)} \\
 &= \frac{324}{1 + (324 \times 0.0025)} \\
 &= \frac{324}{1 + 0.81} \\
 &= \frac{324}{1.81}
 \end{aligned}$$

= 179

Sampling of each School was calculated by multiplying total sample of male or female by the total sample size, divided by the total population, referred from table 3.2 above.

$$\text{Sample} = \frac{\text{population size} \times n}{N}$$

Population size = refers to the total no of males or females per School

n= total sample size which was 179

N= Total population which was 324

<p><b>For example Health sciences (males)</b> <math>= \frac{12 \times 179}{324}</math></p> <p style="margin-left: 40px;"><math>= 6.6</math></p> <p style="margin-left: 40px;"><math>= 7</math></p>	<p><b>females</b> <math>= \frac{35 \times 179}{324}</math></p> <p style="margin-left: 40px;"><math>= 19</math></p>
--	--

Table 3.3 below present the sample size of 179, drawn from population of 324 using Slovin's formula. It shows the selected number of academic staff per school.

**Table 3.3 Sample**

School	Males	Females	Total
Health sciences	7	19	26
Agriculture	14	6	20
Human and social Sciences	17	14	31
Law	8	3	11
Education	6	5	11
Environmental sciences	12	4	16
Management	20	10	30
Mathematics and Natural sciences	20	13	33
<b>Total</b>	104	75	179

### **3.5.2 Sampling of participants**

Simple random sampling was used in this study to select a sample for the study. Random sampling refers to every individual having an equal chance to be selected to be part of the study (Babbie, 2013). Names of all academic staff from each schools were written in a small paper, folded and place in two containers, one for males the other one for females. An independent person was requested to select from the two containers according to the number calculated per school.

### **3.6 Exclusion criteria**

- The researcher excluded all part-time academic staff.
- All academic staff on contracts.

### **3.7 Instrumentation**

Four instruments were used in collecting data namely: Questionnaire and anthropometric instruments namely; lectronic BP monitor (Omron MX3), Seca weighing scale, and stadiometer scale.

#### **Questionnaire**

A questionnaire refers to a list of written questions which require the respondent to record the answers (Kumar, 2011). The modified WHO stepwise questionnaire for non-communicable diseases version 3.1 (WHO, 2014) was used (Appendix A). Open-ended questions were used. The questionnaire was used to obtain information on demographic characteristics, lifestyle, metabolic and social factors. The questionnaire comprises of four sections as follows: Section A covers demographic information, Section B covers lifestyle determinants, Section C covers socials determinants and Section D covers metabolic determinants. The questionnaire was administered in English since lecturers are professionals.

#### **3.7.2 Anthropometric instruments**

An electronic BP monitor, seca weighing scale and stadiometer scale, werethe antropometric instruments used. An electronic BP monitor was used to measure blood pressure levels in mmHg. Seca weighing scale was used to measure weight in kg. Weight was recorded to the nearest 100g. A stadiometer scale was used to measure height in cm.

Height was recorded to the nearest 0.5 cm. Space was provided on the questionnaire to write the results of BP, weight and height.

### **3.8 Pre-test of the instrument**

Pre-testing refers to a collection of techniques and activities which allow researchers to assess survey questions, the questionnaire and/or other survey procedures before the actual data collection process (Casper, Peytcheva & Cibelli, 2011). The researcher chose four of the full-time academic staff who did not form part of the study to pre-test the instruments.

The main aim was to evaluate if the questionnaire was well understood by the respondents and also for the researcher to familiarise herself with the instruments. After the study the pre-test respondents gave feedback on the questionnaire; for example, stating whether the questions were easy to understand or difficult. The findings pretesting indicated that some questions did not give option for respondents to choose, the research rectified those questions. BP was measured using electronic BP monitor after the respondent has rested for at least five minutes. First and second BP results had a difference of less than 5 mmHg; no adjustments were made as the results of BP was almost the same. The seca weighing scale was checked accuracy by measuring a 2kg rice packet and accurate measurement was obtained. Weight and height measurements showed same results, no adjustment was made on the equipment that was used.

### **3.9 Data collection**

The process included recruitment of the participants and the actual data collection process. Data collection include two methods namely; recruitment process and procedure of data collection.

#### **3.9.1 Recruitment process**

The researcher requested all the Deans from all 8 Schools to inform the academic staff about a study in order for them to be aware of the study. The researcher visited selected respondents offices to give them an information letter containing all relevant information regarding the study and also to determine those who are willing to participate in the study. None of the selected respondents refused to participate in the study.

The researcher also visited Department of Biokinetics at UNIVEN to ask for an intern to assist in data collection. One intern on internship at the UNIVEN Biokinetic clinic was recommended by Biokinetics coordinator. The researcher then approached the recommended intern and explained about the study and a role of a research assistant in the study, and the research assistant agreed to assist. The researcher trained the research assistant on how to approach the respondents during appointments in data collection explained the questionnaire privacy, confidentiality and handling of equipment's. the intern was remunerated for the services rendered.

### **3.9.2 Procedure of data collection**

Appointments were made with the respondents at least one week prior to data collection. The researcher met with the respondents at their offices in order to save time and ensure privacy. The researcher and research assistant gave the questionnaire to respondents to complete and then measure their BP, weight, and height on the same day. Data collection took approximately 20 minutes for each respondent and the process of data collection ran for 5 weeks.

#### **(a) Questionnaire**

The respondents were given a questionnaire to complete before BP measurement and return on the same day.

#### **(b) Blood pressure**

Joint National Committee 7 guidelines for measuring BP were used. The respondents were advised to sit still, not to talk during the measurement of BP, and to remove any clothes on their upper arm where the cuff was wrapped. BP measurement was assessed while the respondent was seated quietly for at least five minutes after resting in a chair with a back support with their feet on the floor and their arm supported at the heart level (Ramukumba, 2012). Cut-off points for BP were recorded according to the classification of BP, issued by Frese et al., (2011) indicated in the previous chapter in Table 2.1. Two measurements were taken three minutes apart. The mean average of the score was recorded as the results. Digital automatic BP cuff monitor was wrapped around the upper arm and power button pressed on. The results of BP were indicated by SBP (upper value) and DBP (bottom value). HBP in this study is when BP was equal or exceeds 140/90 mmHg or when the respondent

self-report to be on antihypertensive drugs. All new cases of HBP were referred to UNIVEN campus clinic for further assistance.

### **(c) Weight**

Seca weighing scale was used to measure weight. The researcher placed a seca weighing scale on the flat floor. The respondents were advised to wear minimal clothing and remove shoes. The respondent stood on the scale without support with feet distributed evenly on the scale. Weight was recorded to the nearest 100g while the subject was still standing on the scale (Ramukumba, 2012).

### **(d) Height**

Height was measured using a stadiometer scale. Respondents were advised to remove shoes during height measurement. Height was measured with the subject standing upright on a stadiometer scale, with arms hanging on the side, head on frank fort plane without touching the scale. The orbital was on the same horizontal line with the tragion. Heels, buttocks and upper body were touching the scale. The highest height was the vertex of the skull. The respondent was asked to take a deep breath and hold, and then height was recorded to the nearest 0.5 cm (Ramukumba, 2012).

## **3.10 Data analysis**

Statistical analysis was performed using the Statistical Package for Social Sciences Software, (SPSS) version 23.0 (International business machine, 2015). Chi-square test was used to determine the relationship between BP and its associated risk factors, such as BP and demographic, stress, lifestyle and metabolic factors. In case were frequency values were less than 5 fishers exact test was used instead of Chi-square test values. Level of significance was set at  $P \leq 0.05$ , any value equals to/or less than 0.05 was regarded as significant (association) and any value above 0.05 was regarded as no significant (no association). Charts and graphs were used to present the results of the study. The questionnaire was coded before captured into the computer. The researcher sought help from a statistician to assist with data analysis. The researcher worked together with the statistician to ensure that the required results are achieved.

### **3.11 Ethical considerations**

Research ethics refer to a moral distinction between right, and wrong, and what is unethical not necessarily illegal. Ethics in research differ in societies. The researcher ensured that all the necessary ethical issues were followed throughout the study.

#### **3.11.1 Permission**

The proposal was presented to the School of Health Sciences for quality and then submitted to the University of Venda Higher Degrees Committee for approval. The researcher then obtained an ethical clearance certificate from the UNIVEN Ethics Committee. The researcher then requested permission to collect the data from UNIVEN Director in human resources (Appendix D).

#### **3.11.2 Consent form**

Informed written consent form (Appendix C) was obtained after the respondents had been fully informed about what was expected of the respondent and the nature of the study. An information letter (Appendix B) was attached to the consent form to inform respondents about the aim of the study, objectives of the study, and benefits of participating in the study. The respondents who agreed and signed the consent form formed part of the study.

#### **3.11.3 Privacy**

Privacy refers to an individual's right to be free from intrusion or interference by others. It is a fundamental right in a free and democratic society. Individuals have privacy interests in relation to their bodies, personal information, expressed thoughts and opinions, personal communications with others, and spaces they occupy (Bhattacharje, 2012). In this study, the researcher ensured privacy by collecting data in the respondents' offices during the study.

#### **3.11.4 Confidentiality and anonymity**

The ethical duty of confidentiality refers to the obligation of an individual or organisation to safeguard entrusted information. Confidentiality includes obligations to protect information from unauthorised access, use, disclosure, modification, loss or theft. Fulfilling the ethical duty of confidentiality is essential to the trust relationship between the researcher and respondent, and for the integrity of the research project (Bhattacharjie, 2012).

The researcher ensured that any information obtained from the respondents during the study remained confidential by keeping the information in a locker where only the researcher was had access to it. Anonymity was done to ensure that there is no link between information and the respondent. The researcher used pseudo names, in order for the information obtained not to link with the respondent.

### **3.11.5 Rights of respondents**

#### **(a) Right to full disclosure**

The researcher fully informed the respondents regarding the study; for example nature, duration and purpose of the study. The respondents were also informed about the methods, processes and procedures for data collection, and how findings of the study will be used.

#### **(a) Voluntary participation**

The researcher ensured that respondents got information prior to the study, for example that the study is voluntary, and that they had a right to refuse to participate in the study, and that they had a right to withdraw at any time from the study without getting any penalties (Bhattacharje, 2012). An information letter and informed consent form was used to ensure that the respondents would not feel forced to participate in the study.

### **3.12 Validity and reliability of the study**

#### **Social desirability bias**

Social desirability refers to self-reports, in most cases respondents do not respond accurately in questionnaire, especially when there is a question which is sensitive, and present themselves in the best way (Fisher, 1993). In this study the researcher did not include sensitive questions, and the respondents questionnaires were all filled.

#### **Sampling of the participants**

In order to avoid bias the researcher used simple random sampling method in order for all the academic staff from all eight schools to have equal chance to be selected to be part of the study.

## **Validity of the instrument**

Validity of instrument refers to the relevance. It assesses to determine whether an instrument is able to measure what it is supposed to measure. Validity of instrument is an important aspect of development and assessment of the instrument (Shafer et al, 2012). Four academic staff members were used in pretesting of instruments. They all filled questionnaire, and their BP, weight and height were also measured.

## **Validity of the questionnaire**

Face validity refers to whether an instrument or test appears to measure what it is supposed to measure (Lane, 2013). In this study the questionnaire was assessed and analysed by the researcher to check if the content measure what it is supposed to measure. The researcher also sought help from supervisors to do face validity on the questionnaire in order to determine if the questionnaire appear the way it was able to give respondents understanding on how to respond and also if questionnaire was able to cover the objectives of the study.

Predictive validity test the score of an instrument is able to predict the relevance of the behaviour (Lane, 2013). In this study, predictive validity was used to evaluate the questionnaire. Questionnaires were given to two experts in research to rate them. Test scores indicated errors in spelling, interpretation of words (some of the words were not well understood) and some questionnaire did not provide an option to tick a relevant answer. The researcher corrected all the noted errors in the questionnaire.

## **Electronic BP monitor and seca weighing scale**

A validated electronic BP monitor was used to measure BP. Known mass was used to determine the validity of the seca weighing scale, for example putting a packet of 1 kg rice on the scale to find out if the results of the scale was 1 kg.

## **Reliability of instrument**

Reliability of the instrument refers to the consistence, accuracy, and precision of the measurement of the instrument taken. It is done to ensure that the instrument that is being used was able to obtain the same results each time the measurement is used (Lane, 2013). Test-retest method was used to determine the reliability of instrument. Rest-retest refers to taking same measurement more than once (Babbie, 2013). The researcher ensure that the

instruments that will be used for data collection were valid, namely; the questionnaire, electronic BP monitor and seca weighing scale.

### **Questionnaire**

To ensure reliability of the questionnaire the researcher had given the questionnaire to four full-time academic staff and after a week re-administer same questionnaire and check if there is consistency. The results of the questionnaire obtained were the same.

### **Electronic digital BP monitor, Seca weighing scale, and stadiometer scale**

The researcher, as a Biokineticist, is well trained and experienced in measuring BP, weight, and height. To ensure reliability of the electronic digital BP monitor the researcher measured blood pressure twice on four full-time academic staff three minutes apart to ensure the reliability of the electronic digital BP monitor. Two measurements of weight were taken on the respondents to ensure reliability of a seca weighing scale. The results obtained were checked for consistency.

### **3.13 Dissemination of the results**

A copy of this study would be submitted to the UNIVEN library. The study findings would be presented at conferences, seminars and published in accredited journals.

### **3.14 Conclusion**

This chapter discussed methodology on this study, which includes the study setting, sampling, instrument testing, data analysis, data collection and ethical considerations.

## Chapter 4: Results

### 4.1 Introduction

This chapter presents the results of the study obtained from data analysis. The results include demographic characteristics of the respondents, questionnaire response, measurements results (BP, weight, height and BMI) and also the results of the relationship between BP and associated risk factors (demographic characteristics, lifestyle characteristics and metabolic risk) and conclusion.

### 4.2 Demographic characteristics

One hundred and seventy nine questionnaires were distributed among selected UNIVEN academic staff and they were all completed. Table 4.1 presents demographic characteristics of the UNIVEN academic staff selected from all 8 different schools. Demographic characteristics include age, gender, race, marital status and family history of HBP. Their age was ranging from 22 to 68 and their mean age was  $43.9 \pm 10.1$ . Majority of the respondents age was in the 40-49(30.2%) range, followed 50-59 (29.1%); 30-39(26.3%); 20-29(8.9%), and the lowest was 60-69(5.6%). Regarding gender, there were 104 (58.1%) men and 75 (41.9%) women. Majority of the respondents were black 170(95%), followed by white 6(3.4%), Indian 2(1.2%) and least was coloured 1(0.6%). Regarding marital status, majority of the respondents were married 130(72.6%) followed by single 44(24.6%), divorced 3(1.7%) and widow/widower 2(1.1%). Almost half of the respondents had indicated that they have a family history of HBP 86(48%). About 66(37%) indicated that they do not have family history of HBP and almost quarter 27(15%) were not sure if they had a family history of HBP.

**Table 4.1 Demographic characteristics**

Variable	Frequency	Percent (%)
<b>Age</b>		
20-29	16	8.9
30-39	47	26.3
40-49	54	30.2
50-59	52	29.1
60-69	10	5.6
<b>Gender</b>		
Male	104	58.1
Female	75	41.9
<b>Race</b>		
Black	170	95
White	6	3.4
Indian	2	1.2
Coloured	1	0.6
<b>Marital status</b>		
Single	44	24.6
Married	130	72.6
Divorced	3	1.7
Widow/widower	2	1.1
<b>Family history</b>		
Yes	86	46
No	66	37
Not sure	27	15

#### **4.3 BP awareness, treatment and control**

The response of this study show that more than half of the respondents 118(66%) had their BP checked within the current 12 months, 25(15%) checked their BP more than a year ago, 6(3%) never had their BP checked and 29(16%) were not sure of when last they had checked their BP. Majority of the respondents 119(69%) indicated that they had a normal BP, 23(13%) had a HBP and 31(18%) were not sure about their previous BP measurement results.

The respondents who had been previously diagnosed and aware that they had HBP 20(10%) had indicated that there were using medication and diet to control their BP of which 20(95%) were using medication and 1(5%) was using diet to control their BP. Majority of the respondents 19(90%) indicated than they are still under treatment and 2(10%) are no longer under treatment. Only 3(13%) of HBP respondents had their BP under control.

#### 4.4 Risk factors associated with HBP

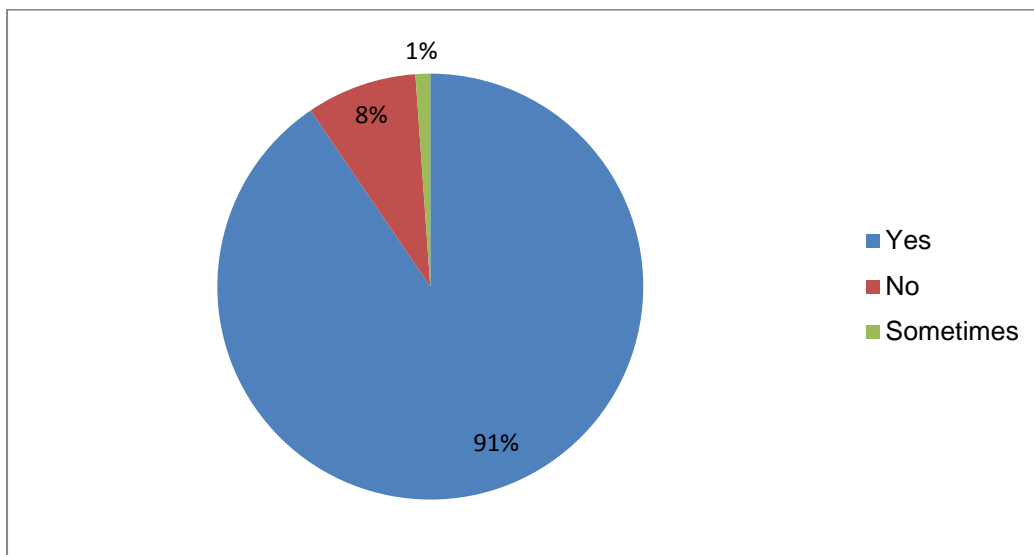
Risk factors assessed in this study include lifestyle, stress and metabolic risk.

##### 4.4.1 Lifestyle characteristics

The study assessed the lifestyle of the respondents regarding diet pattern (salt intake, cooking methods, vegetable and fruit intake), smoking, alcohol intake and exercise.

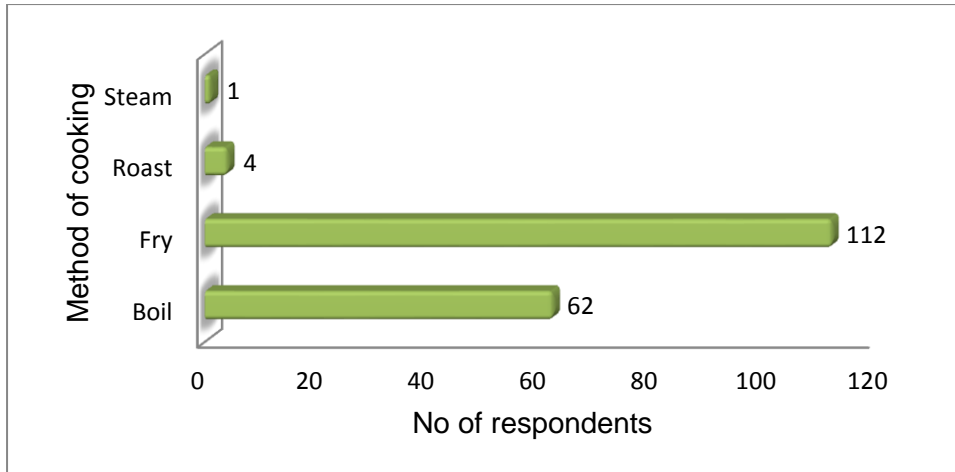
###### 4.4.1.1 Diet

Respondents were asked whether they add salt. Almost all respondents 162(91%) have indicated that they always add salt in their food, followed 15(8%) do not add salt into their food and 2(1%) add salt sometimes. Figure 4.1 below presents the results



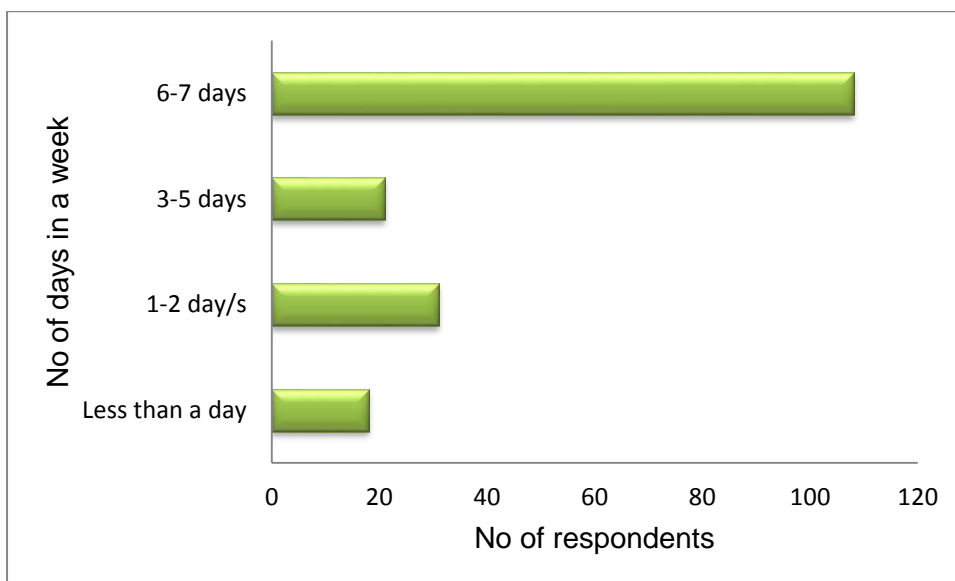
**Figure 4.1 Salt intake**

Respondents were asked their preferred method of cooking. Majority of the respondents showed that they prefer to fried food 112(63%), followed by boiling 62(35%), roasting 4(2%) and steaming 1(0%). Figure 4.2 represents the results.



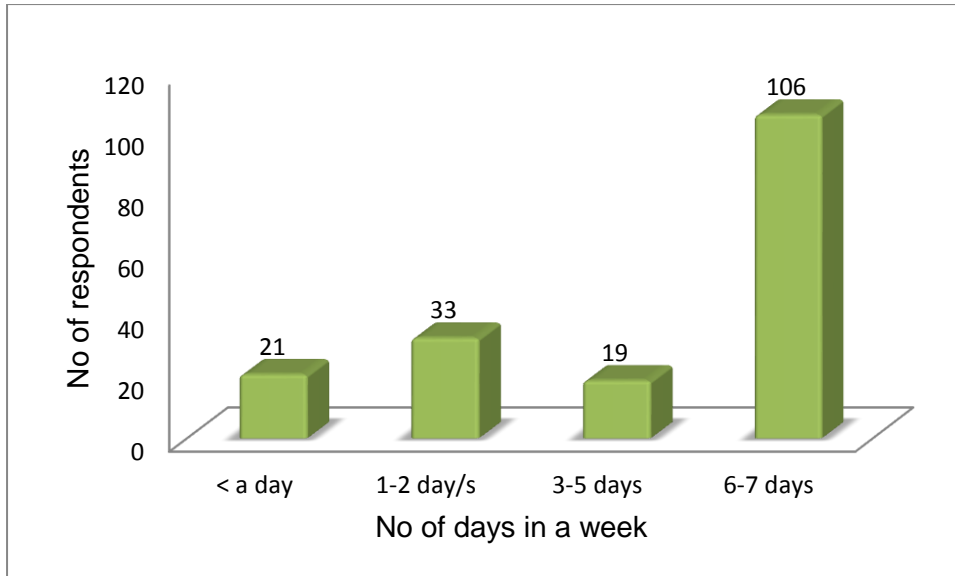
**Figure 4.2 Preferred method of cooking food**

Respondents were asked on the frequency of fast food intake in a week. The majority of the respondents 108(61%) indicated that they eat fast 6-7 days in a week, followed by 31(17%) who eat 1-2 day/s, 21(12%) eat 3-5 days and 18(10%) eat less than a day in a week. Results are presented in Figure 4.3 below.



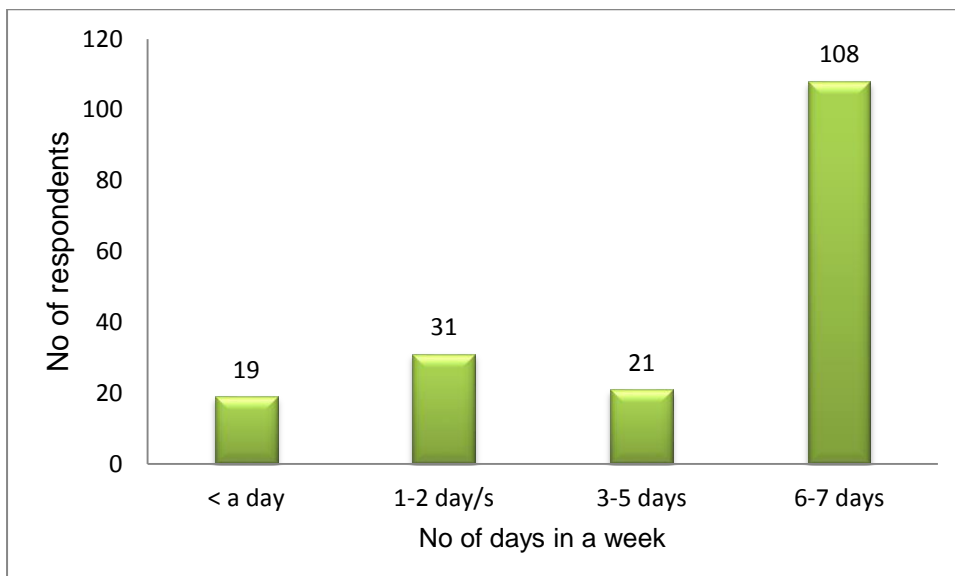
**Figure 4.3 frequency of fast food intake**

Respondents were asked on the frequency fruits intake in a week. The majority of the respondents 106(59%) 6-7 indicated that they eat fruits in most days a week, followed by 33(18%) who eat 1-2 day/s, followed by 21(12%) who eat less than a day, and 19(11%) 3-5 days a week. Figure 4.4 below shows the results.



**Figure 4.4 Frequency of fruit intake in a week**

Respondents were asked on the frequency of vegetables intake in a week. Many of the respondents 108(60%) indicated that they eat vegetables most days of the week 6-7 days a week, followed by 31(17%) who eat 1-2 day/s, followed by 21(12%) who eat 3-5 days a week, and 19(11%) who eat less than a day in a week. Figure 4.5 below present the results.

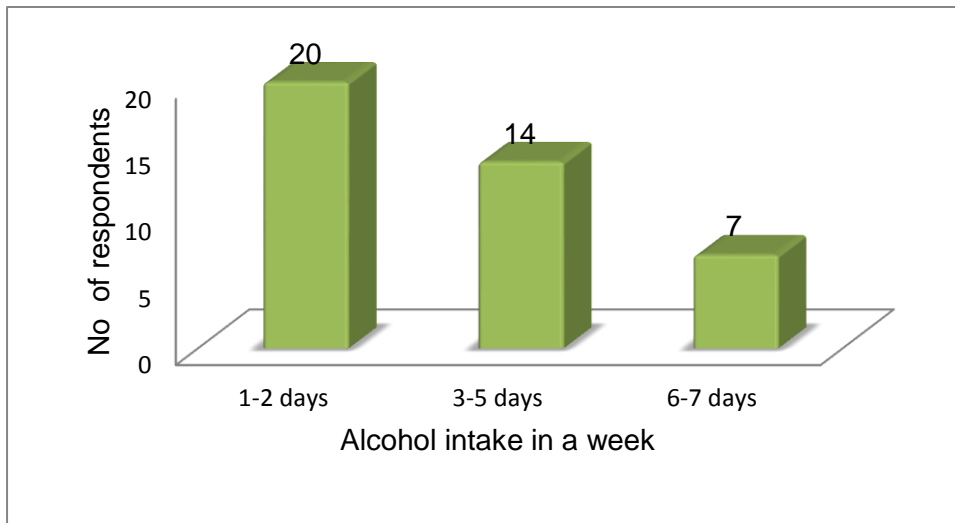


**Figure 4.5 Frequency of vegetables intake in a week**

#### 4.4.1.2 Alcohol intake

Respondents were asked if they drink alcohol and frequency of alcohol intake in a week among those who drink. Majority of the respondents indicated that they do not drink alcohol 138(77%). Among those who drink alcohol almost half 20(49%) of the respondents who

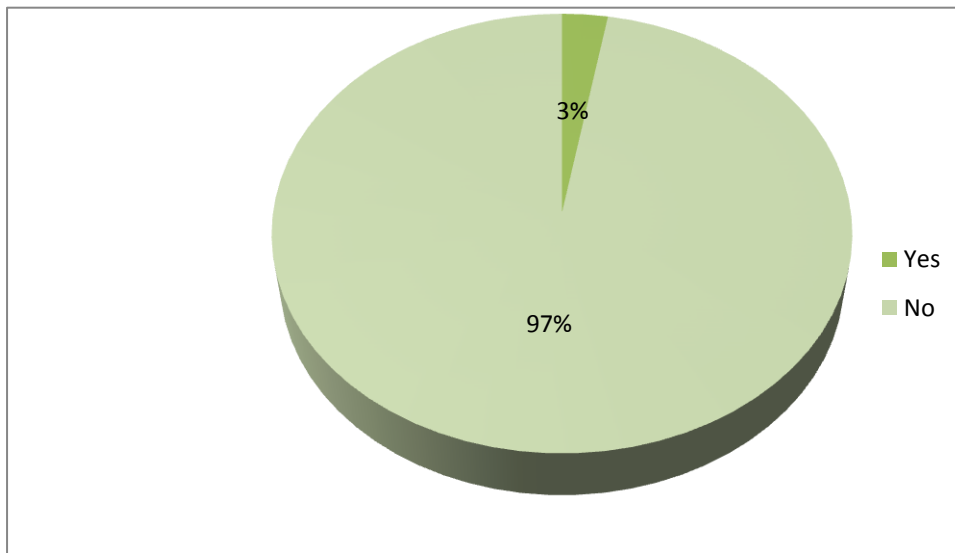
drink indicated that they drink 1-2 days in a week, followed by 14(34%) who drink 3-5 days a week and 7(17%) who drink 6-7 days a week. Figure 4.6 below indicate the results.



**Figure 4.6 Frequency of alcohol intake in a week**

#### 4.4.1.3 Cigarette smoking

Respondents were asked if they smoke. Almost all respondents 97% indicated that they do not smoke cigarette. Figure 4.7 shows the results.

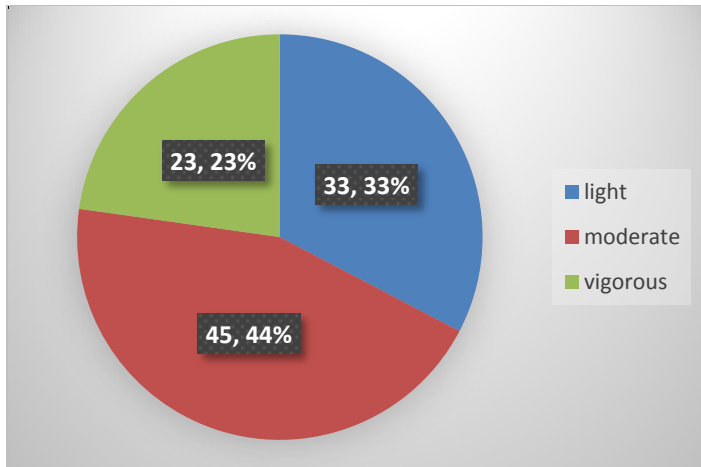


**Figure 4.7 Cigarette smoking**

#### 4.4.1.4 Exercise

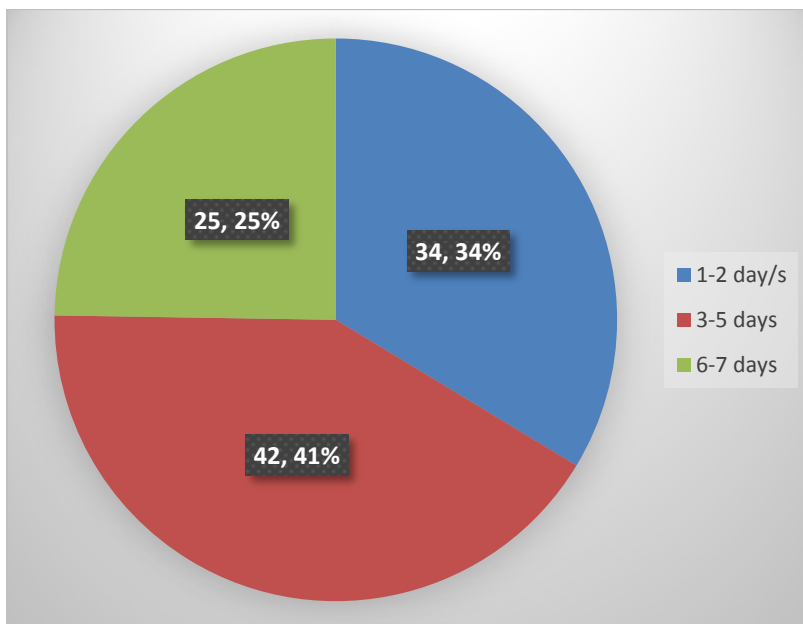
Respondents were asked if they engage in exercise. Almost half of the respondents 101(56.4%) indicated that they engage in regular exercise and 78(43.6%) indicated that they do not exercise. Among those who exercise 45(44%) indicated that they engage in moderate

exercise, followed by those who engage in light exercise 33(33%) and those who engage in vigorous exercise 23(23%). Figure 4.8 below shows the results.



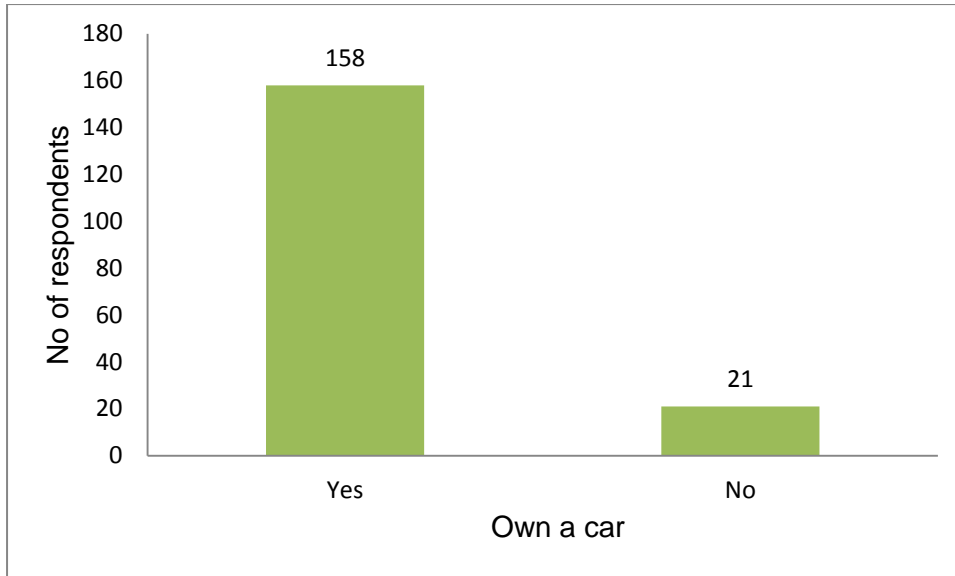
**Figure 4.8 Intensity of exercise**

Respondents were asked on the frequency of exercise in a week. Most of the respondents 42(41%) indicated that they exercise 3-5 day/s in a week, followed by 34(34%) who exercise 1-2 days a week and 25(25%) who exercise 6-7 days a week. Results are shown in Figure 4.9 below.



**Figure 4.9 Frequency of exercise**

Respondents were asked if they own a car. Majority 158(88%) indicated that they have a car. Figure 4.10 below indicate the results.



#### 4.10 The number of respondents owning/not owning a car

#### 4.4.2 Stress

Respondents were asked if they experience stress. The majority of the respondents indicated that they experience stress 100(57%) and 75(43%) indicated that they do not experience stress. Of the respondents that had experienced stress, 60 indicated that they are always stressed and about 42 experience stress sometimes. When asked about the type of stress experienced, work was reported as the highest at 89 followed by family at 8 and finance at 5. Figure 4.11 below shows the results.

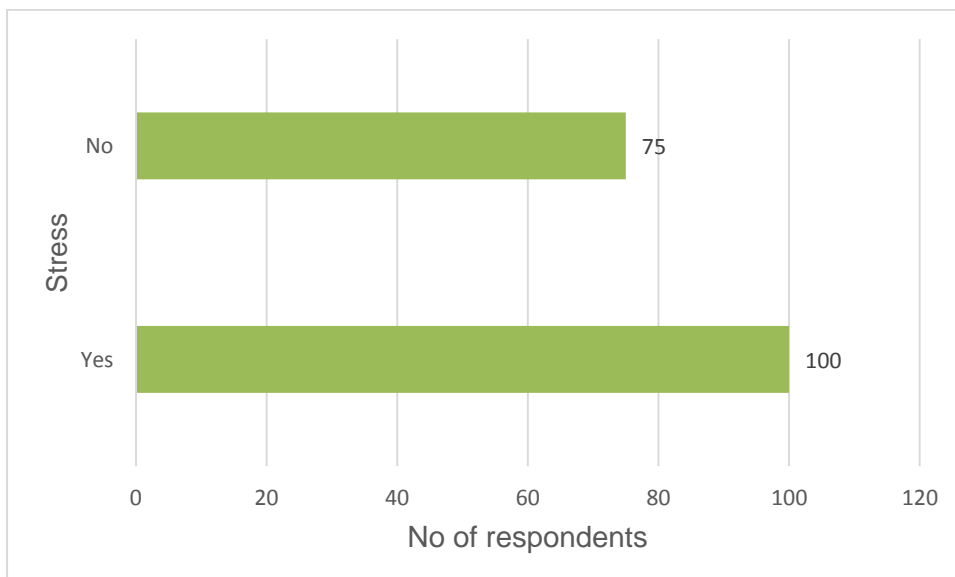
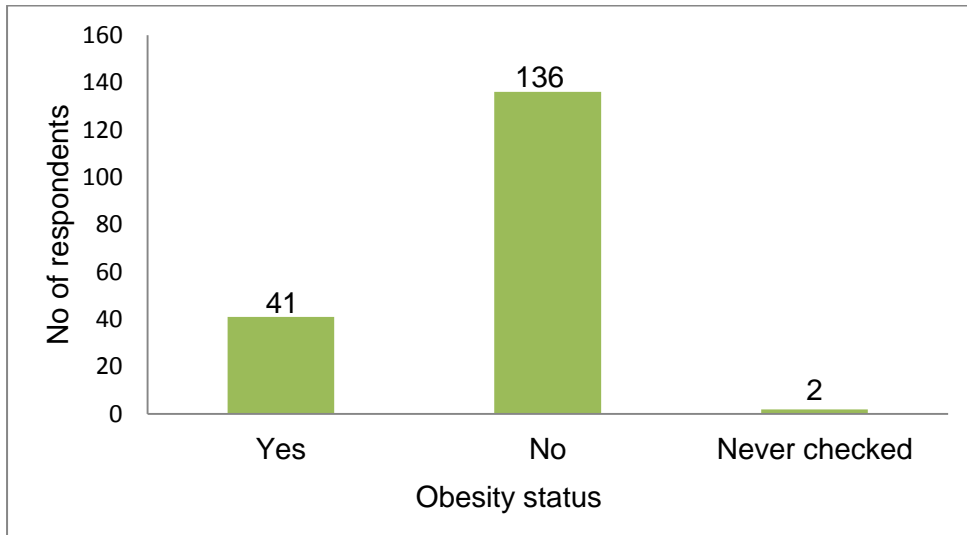


Figure 4.11 Stress

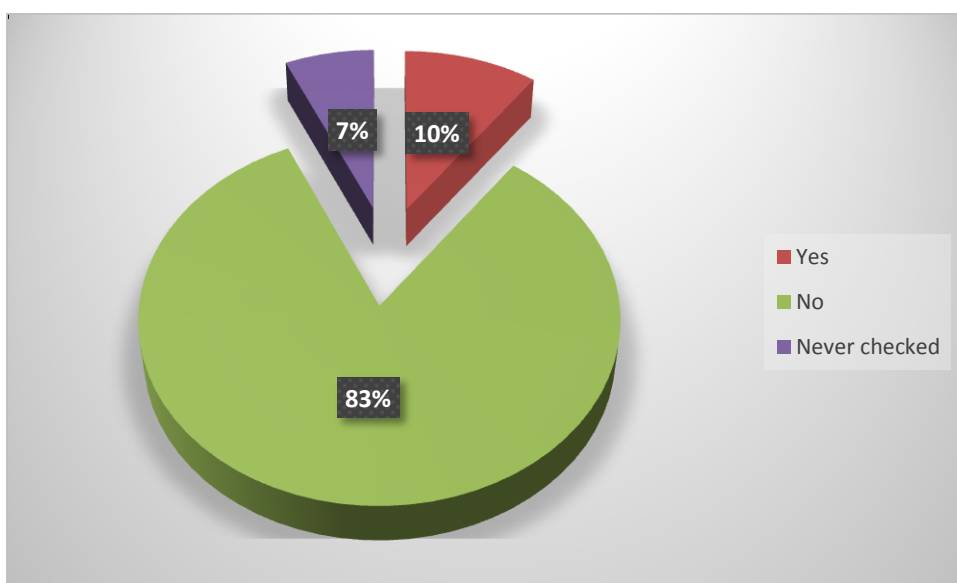
#### (4.4.3) Metabolic risk

Respondents were asked if they were ever told by health professional that they are obese. Many respondents 136(76%) indicated that they were never told by any health worker that they are obese, 41(23%) have been told that they are obese and 2(1%) never checked. Figure 4.12 shows the results.



**Figure 4.12 History of obesity**

Respondents were asked if they were ever told by any health profession that they have diabetes. The majority of the respondent reported that they were not diabetic 149(83%), 18(10%) reported that they were diabetic and 12(7%) indicated that they never checked for diabetes. Figure 4.13 below presents the results.



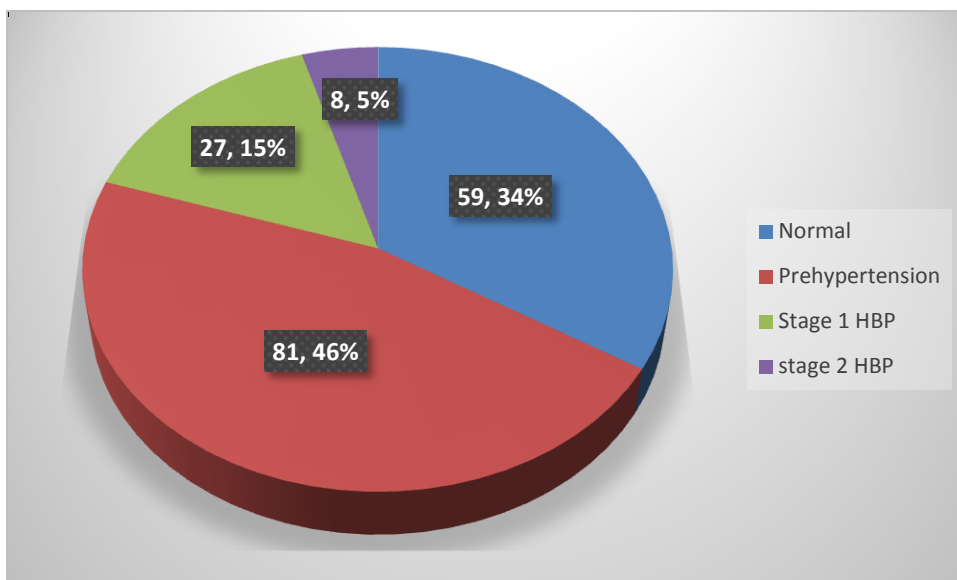
**Figure 4.13 Diabetes status**

#### 4.5 Measurements results: BP and BMI

About 175 respondents were assessed for BP, weight and height. However, four of the respondents refused and reason was that they were not comfortable with the measurements. Measurements were taken on weight, height and two measurements were taken on BP

##### 4.5.1 BP results

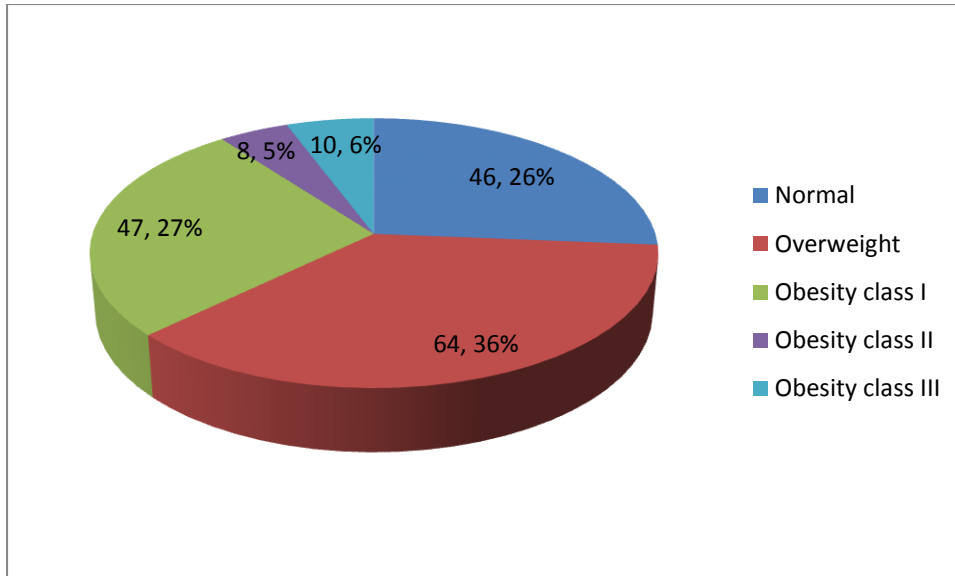
The majority were on prehypertension stage 81(46%), about 27(15%) were on stage 1 HBP and about 8(5%) were of stage 2 HBP and only 59(34%) had a normal BP. The mean SBP was  $127.0971 \pm 15.67950$  and the mean DBP was  $1.91 \pm 0.818$ . Figure 4.14 below indicate the results.



**Figure 4.14 Classification of BP among the UNIVEN academic staff**

##### 4.5.2 BMI results

Weight and height was measured to determine BMI. The BMI is calculated by dividing weight (kg) by height (m) squared ( $BMI = \text{weight}/\text{height}^2$ ) and it is used to determine if an individual is overweight or has obesity (Table 2.2). The majority of the respondents 64(36%) were overweight, 47(27%) were on class I obesity, 8(5%) were on obesity class II and 10(6%) were on obesity class III and only 46(26%) had a normal BMI. The weight mean was  $82.9 \pm 16.8$  and the height mean was  $2.1 \pm 5.1$ . Results are shown in Figure 4.15 below.



**Figure 4.15 Classification of BMI**

#### **4.6 The association between HBP and associated factors**

Cross tabulation and chi-square test were conducted to determine the association between BP and demographic, lifestyles, stress and metabolic variables.

##### **4.6.1 HBP and demographic variables (Age, gender, race, marital status and family history of HBP)**

The results between BP and demographic variables showed no significant between BP and Age, gender, race, marital status and family history of HBP. However, there was a very high significance association between BP and gender ( $P=0.000$ ) and family history of HBP ( $P=0.011$ ). Table 4.2 below summarise of the results of the association between HBP and demographic variables (Age, gender, race, marital status and family history of HBP).

**Table 4.2 BP and demographic variables**

Variable		Classification of BP				TOTAL	P-value (P≤0.05)
		Normal	Prehypertension	Stage 1 HBP	Stage 2 HBP		
Age	20-29 years	5	9	2	0	16	FET=18.417
	30-39 years	25	17	4	0	46	
	40-49 years	12	27	11	3	53	
	50-59 years	16	22	8	4	50	
	60-69 Years	1	6	2	1	10	
Total		59	81	27	8	175	P=0.063
Race	Black	56	76	26	8	166	FET=7.697
	Coloured	0	0	1	0	1	
	White	2	4	0	0	6	
	Indian	1	1	0	0	2	
Total		59	81	27	8	175	P=674
Gender	Male	22	55	18	6	101	FET=15.053
	Female	37	26	9	2	74	
Total		59	81	27	8	175	<b>P=0.000</b>
Marital status	Single	15	18	8	1	42	FET=6.475
	Married	43	61	17	7	128	
	Divorced	1	1	1	0	3	
	Widow/Widower	0	1	1	0	2	
Total		59	81	27	8	175	P=0.691
Family history of HBP	Yes	27	34	19	3	83	FET=15.875
	No	28	31	4	2	65	
	Don't Know	4	16	4	3	27	
Total		59	81	27	8	175	<b>P=0.011</b>

#### 4.6.2 HBP and lifestyle characteristics (Diet, smoking, alcohol intake, and exercise).

The significance value shows that there is no significance association between HBP and most of the lifestyle variables. Including; salt intake, method of cooking, fast food, fruit intake, cigarette smoking, alcohol intake and exercise. However, there was significant association between BP and vegetables intake ( $P=0.034$ ). Table below shows the results.

**Table 4.3 Association between HBP and lifestyle variables**

Variable		Classification of BP				Total	P-Value ( $P \leq 0.05$ )
		Normal	Prehypertension	Stage 1 HBP	Stage 2 HBP		
Salt intake	Yes	54	75	24	7	160	FET=4.522
	No	5	5	3	1	14	
	Sometimes	0	1	0	0	1	
Total		59	81	27	8	175	P=0.697
Cooking method	Boiled	23	26	10	2	61	FET=6.866
	Fried	33	54	16	6	109	
	Roasted	2	1	1	0	4	
	Steamed	1	0	0	0	1	
Total		59	81	27	8	175	P=0.703
Fast foods intake in a week	Less than a day	41	53	18	6	118	FET=11.361
	1-2 day/s	18	21	6	1	46	
	3-5 days	0	6	3	1	10	
	6-7 days	0	1	0	0	1	
Total		59	81	27	8	75	P=0.223
Fruits intake in a week	< a day	6	10	5	0	19	FET=9.340
	1-2 days	11	14	7	1	33	
	3-5 days	7	7	3	2	19	
	6-7 days	35	50	12	5	102	
Total		59	81	27	8	175	P=0.686
Vegetables intake in a week	< A day	9	4	6	0	18	FET=19.568
	1-2 days	10	15	4	1	30	
	3-5 days	3	10	7	1	21	
	6-7 days	37	52	10	6	105	
Total		59	81	27	8	175	<b>P=0.034</b>

<b>Smoking</b>	Yes	3	2	0	0	5	FET=1.569
	No	56	79	27	8	170	
Total		59	81	27	8	175	P=0.617
<b>Alcohol intake</b>	Yes	10	20	8	3	41	FET=3.221
	No	49	61	19	5	134	
Total		59	81	27	8	175	P=0.331
<b>Exercise</b>	Yes	31	45	20	5	101	FET=4.303
	no	28	36	7	3	77	
Total		59	81	27	8	175	P=0.206
<b>Intensity of exercise</b>	Light	11	13	8	2	33	FET=4.303
	Moderate	10	22	10	1	43	
	Vigorous	10	10	2	2	24	
Total		30	45	20	5	101	P=0.206
<b>Frequency of exercise</b>	1-2 days	12	15	8	0	36	FET=4.303
	3-5 days	9	20	10	3	42	
	6-7 days	11	10	2	2	25	
Total		31	45	20	5	101	P=0.206
<b>Own a car</b>	Yes	53	73	24	6	156	FET=2.103
	No	6	8	3	2	19	
Total		59	81	27	8	175	P=0.549

#### 4.6.3 HBP and stress

The results show no significant association between HBP and stress, frequency of stress and cause of stress. Results are presented on Table 4.4 below.

**Table 4.4 BP and stress**

Variable	Classification of BP				Total	P-Value (P≤0.05)	
	Normal	Prehypertension	Stage 1 HBP	Stage 2 HBP			
Stress	Yes	34	50	13	3	100	FET=2.871
	No	25	31	14	5	75	
<b>Total</b>		59	81	27	8	175	P=0.417
Stress frequency	Sometimes	19	28	10	2	59	FET=4.007
	Always	15	22	3	1	40	
<b>Total</b>		34	50	13	3	175	P=0.691
Cause of stress	Work	30	45	10	3	88	FET=6.522
	Family	3	4	1	0	8	
	Finance	1	1	2	0	4	
<b>Total</b>		34	50	13	3	100	P=0.680

#### 4.6.4 HBP and metabolic risk factors

The results indicated that there was no significant association between HBP and BMI. However, there was strong significant between HBP and diabetes (P=0.006). Table 4.5 below shows the results.

**Table 4.5 Association between BP and metabolic risk**

Variable		Classification of BP				Total	P-value (P≤0.05)
		Normal	Prehypertension	Stage 1 HBP	Stage 2 HBP		
<b>BMI classification</b>	Normal	21	18	7	1	47	FET=6.453
	Overweight	18	32	10	4	64	
	Class I Obesity	15	22	7	2	46	
	Class II Obesity	2	5	1	0	8	
	Class III Obesity	3	4	2	1	10	
Total		59	81	27	8	175	P=0.880
<b>Diabetes</b>	Yes	0	11	6	1	18	FET=16.650
	No	53	65	21	7	146	
	Never Checked	6	5	0	0	11	
Total		59	81	27	8	175	P=0.006

#### 4.7 Conclusion

The prevalence of HBP among UNIVEN academic staff was associated with gender, family history of HBP, vegetables intake and diabetes. Males had higher prevalence of HBP than women. Those with family history of HBP had a higher prevalence of HBP than those without. Those who eat vegetables most days of the week had a lower BP compared to those who eat vegetables less days of the week. Among those with diabetes there was no one who had a normal BP.

## Chapter 5 Discussion, conclusion and recommendations

### 5.1 Introduction

This chapter discusses the findings of the study and also compares the findings with those of other studies, conclusion, recommendations and limitations of the study. The aim of this study was to determine the prevalence of HBP among UNIVEN academic staff. HBP is a single leading cause of morbidity and mortality globally. It is a growing public health problem especially in sub-Saharan Africa. Several studies have been conducted widely in order to determine the prevalence of HBP.

### 5.2 Prevalence, awareness and control of HBP

This current study indicates that the prevalence of HBP among UNIVEN academic staff was at 20% with 15% on stage 1 HBP and 5% on stage 2 HBP. The results further indicated a higher number of UNIVEN academic staff who are at the prehypertension category at 46% which raise a concern as it shows a possible higher risk of HBP. Only 34% of the respondents had a normal BP. The results concur with the results from a study which was conducted among university academic staff in Malaysia, which indicated a higher prevalence of HBP of 34% and 33.9% prehypertension (Rampal et al., 2011).

A study conducted among the academic staff in the University of Zambia, the results showed the higher prevalence of 40% (Mulenga et al., 2013). The prevalence of HBP among teachers in Basra was at 21.3%, while 20.3% were on prehypertension stage (Ali et al., 2009). Adedoyin et al., (2016), also indicated a higher prevalence of 20.1% among University teaching staff in Nigeria. A study which was conducted in Ethiopia further indicated a prevalence of 21.8% among teachers (Fikadu & Lemma, 2016).

The higher prevalence of HBP was also observed in other professionals where the overall prevalence of HBP among nurses, teachers, peri-urban and rural population was 25%. The prevalence of HBP was 25.9% among nurses, followed by 23.3% among teachers (Guwatudde, Nankya-Mutyoba, Kalyesubula, Laurence, Adebamowo, Ajayi, Ajunirwe, Njelekela, Chiwanga, Reid, Volmik, Adami, Holmes & Dala, 2015). Lakshman, Manikath, Rahim and Anilikumari (2014) also reported a higher prevalence of HBP among bus drivers (179) aged between 20-60 years in North Kerala, India. The prevalence of HBO was higher at 41.3% and 41.9% were on prehypertension stage.

On contrary, in a study conducted among 20 UNIVEN academic staff, the findings showed that 65% had a normal BP and 35 were on prehypertension stage. This may have been due to a smaller sample size (Ravele, 2011).

Kumar et al., (2013) also reported a very low prevalence of HBP (4%) among school teachers in wangaral. Although the prevalence is very low there is a concern about 4% who have HBP, as HBP is a chronic condition which requires long-term management. A lower BP was also indicated in other professionals. In a study which was conducted among University non-teaching staff in Nigeria, showed the lower prevalence of HBP at 14.8% (Adedoyin et al., 2016). A study conducted in Libya also indicated a lower prevalence of HBP at 15.1% (Griew, Gad, Mandil, Wagdi & Elneihoum, 2010). Fikadu et al., (2016) also reported a lower prevalence among bankers at 19.8%, in Ethiopia.

The prevalence of HBP is still lower as compared to the general population, in a National population-based cross-sectional study conducted among 3840 adults aged 50 years and above, a study showed a highest prevalence of HBP at 77%, this may be due to age (Peltzer et al., 2013). Ntuli et al., (2015) also reported a highest prevalence of 41% among adults in Limpopo.

Concerning awareness of BP status, this study reveals that 66% of UNIVEN academic staff was aware of their current BP status, whereas 34% were not aware (within the current 12 months). Although the level of aware is higher it is not satisfactory as 34% were not aware which can make them to be prone to the complications of HBP. Awareness of BP helps HBP patients to be able to control it. Among 66% who were aware of their BP status, about 23(13%) were previously diagnosed with HBP.

Several studies indicated that there is still low. A study which was conducted among teachers in Ethiopia indicated that 43% of those who had HBP were aware of their status (Fikadu et al., 2016). Chor, Ribeiro, Carvalho, Duncan, Lofuto, Nobre, Aquino, Schmidt, Griep, Molina, Barreto, Passos, Judith, Bensenor, Matos & Mill (2015). Indicated a very high level of Bp awareness among Brazil civil servants (80.2%). A higher level of HBP awareness was observed among USA workers, while about 70% of 6928 USA adult workers were aware of their BP status (Davilla et al., 2012).

In a comparative study between USA, Canada, and England the level of awareness was very high in Canada at 83%, followed by the USA at 81% and 65% in England (Jofresss, Falaschetti, Gillespie, Robitalle, Loustalot, Poulter, McAlister, Johansen, Baclic & Campbell, 2013). Although Canada have indicated the highest level of BP awareness at 83%, there is still concern about 17% who are not aware of their BP status as they may develop

complications related to untreated HBP. In a community based study conducted among adults from age 35 years and above at Gondar city in Ethiopia, about 28.3% of the respondents who were having HBP were not aware of their BP status (Awoke, Awoke, Alamu & Megabiaw, 2012).

In a study of conducted among Southern China population, about 67.43% of the respondents who had HBP were aware of their condition whereas 32.57% of them who had HBP were not aware of it (Yang, Yan, Tang, Xu, Yu & Wu, 2016).studies which was conducted among twenty three countries of Africa, indicated that BP awareness was lower in rural population than in urban population (Kayima, Wanyenze, Katamba, Leontsini, & Nuwaha, 2013). In a study conducted among adults in Benin about 77.5% were not aware that they had HBP (Houinato, Gbary, Houehanou, Ammousou, Segnon-Agueh, Kpozehouen & Salamon, 2012). Chinyere, Mwuese, & Ara (2014) also reported a very low level of awareness among university students and staff at Benue State University, Nigeria. Only 21.6% of the respondents who had HBP were aware of their status and 78.4% were not aware of their BP status.

HBP is poorly controlled in many countries as it requires lifestyle modification (such as losing weight stress management and eating recommended diet) and adherence to drug therapy. About 90% of UNIVEN academic staff who were aware that they had HP were on treatment and 10% were no longer on treatment of HBP. Some studies support the findings of this study. Davila et al., (2012) indicated that about 91% of USA workers with HBP were on antihypertensive medication. About 81.6% of Benin adults who had HBP were not currently stopped using their hypertensive medication (Houinato et al., 2012). However, different results were observed among Chinese population. About 55.76% (above half) of the Chinese population who had HBP were on treatment (Yang et al. 2016). In a comparative, BP control was lowest in England (27%) followed by USA (53%), where almost half had their BP control, and it was highest in Canada (66%) (Joffres et al., 2013)

HBP is poorly controlled in many countries as it requires life modification (such as losing weight, stress management and eating recommended diet) and adherent to drug therapy. In this current study the results indicated that only 13% had controlled HBP, which raises a concern that HBP might lead to complications such as stroke and even deaths, if poorly controlled. Several studies also showed that there is low level of BP control. A study conducted among Benin adults shows that only 1.9% had their BP under control (Houinato et al., 2012). Among Chinese population who were on treatment about 30.97% had their BP control (Yang et al. 2016). However BP control was very high among USA workers. In a study conducted among USA workers about 65% of those who were on treatment had their

BP under control, although it is still low as 355 are still at a risk of having complications associated with uncontrolled HBP (Davila et al., 2012).

### **5.3 HBP and its associated risk factors**

HBP and its associated risk factors are discussed under the following subheadings, demographic characteristics, lifestyle, stress and metabolic factors.

#### **Demographic characteristics**

Majority of the respondents are above 40 years which is a risk of having HBP. However the results of this study indicated that there was no significant association between HBP and age ( $P=0.63$ ). Rockwood and Howlett (2011), Reported similar results to the current study, as there was no significant association between HBP and age among the Canadians.

Mulenga et al., 2013; Kulundaivelan & Yamini 2015, both reported significant association between HBP and age among academic staff. Fidow, Huda & Salminah (2016), indicated significant association between age and HBP. Fikadu et al., (2013), also reported significant association between HBP and age among bankers and teachers. A study which was conducted among adults in Maiduguri, Nigeria, also showed significant association between HBP and age. Desai et al., (2009), further indicated that the prevalence of HBP among white collar job employees increased with age.

The findings of the current study reveals that there is very high significance relationship between HBP and gender, men 24(69%) had a higher prevalence rate of HBP than women 11(31%) ( $P=0.000$ ). Fikado & Lemma (2016) study also results showed significance relationship between HBP and gender among bankers and teachers in Addis Ababa, Ethiopian ( $P=0.003$ ). Desai et al (2009) also indicated that the prevalence of HBP among white collar job employees was higher among male employees (32.5%) as compared with female employees (23.1%).

In contrary, some studies reported different findings from the current study. For example, Tshitenge and Mabuza (2015) indicated that there was no significance association between HBP and gender among 161 (Male were 60 and female were 101) adults at Kang in Botswana ( $P=0.59$ ). Chinyere et al., (2014), reported no significance relationship between HBP and gender among students and staff at Benue States University, the sample size was 471 (Male were 315 and women were 156. Sengwayo et al., (2013), Further reported no significance association between HBP and gender among adults from age of 18 to 65 years adults from Ga-Mothapo village, Limpopo ( $P>0.05$ ). Male were 96 and female were 286, may be lack of association might be due to a very low number of male (25.1%).

In a meta-analysis of nine studies among Ethiopians adults in Ethiopia. The prevalence of HBP was the same in both male and female, there was no significance relationship between gender and HBP (Kibret and Mesifin, 2015).

Concerning race, the results of this study showed that blacks had a higher prevalence of HBP, but there was no significance relationship between BP and race among UNIVEN academic staff ( $P=0.674$ ). There reason might be as results of higher number of blacks since 95% of the respondents are blacks. In a four cross-sectional study conducted in Nigeria, rural and Peri-urban residents in Uganda, school teachers in South Africa and Tanzania, and nurses, race was noted as a single predictive factor that cause HBP among then Hispanics (Holmes, Hossain, Ward & Opara, 2013).

A study conducted among black and white population in central Cuba indicated that there is no significance association between HBP and race (Ordeunez, Kaufum, Benet, Morejon, Silva, Shoham & Cooper, 2013). Hicken, Lee, Morenoff, House and Williams (2014), further indicated no significance relationship between HBP and race among whites and Hispanic population in Chicago.

Concerning marital status, majority of the respondents indicated that they were married. However, the results of this study showed that there was no significant association HBP and marital status among UNIVEN academic staff ( $P=0.691$ ). However several studies indicated that there is significance association between HBP and marital status. Dangroo, Hamid, Rafiq and Asfaq (2013), reported a higher significance between HBP and marital status. Prevalence of HBP was higher among widow and widower, and those who were married had a lower BP among Kashmiri population. Chinyere et al., (2014), found significance association between BP and marital status. Respondents who were married had a higher prevalence of HBP.

There was significance association between HBP and marital status among adults in a rural Limpopo community, South Africa (Ntuli et al., 2015). Ofili, Ncama and Sartorius (2015), further reported that there was significance association between HBP and married among adults in Delta state, Nigeria. Those who were married had a higher prevalence of HBP.

Concerning family history, the findings of this study shows that there is significance association between HBP and family history of HBP ( $P=0.011$ ). The risk of having HBP was higher among respondents who had family history of HBP than those without. Other studies also support the findings of this study. Several studies indicated that there was significant association between HBP and family history of HBP (Sikandar, 2015; Greiw, 2010;

Kulundaivelan et al., 2013; Kumar et al., 2013; Ranasinghe, Cooray, Jayawardena & Kulunda, 2015 & Liu, He, Jiang, Wang, Wu, Zhang, Zeng & Yao, 2015).

Majority of the respondents indicated that they add salt in the food and high salt intake is associated with the HBP. However, the results of this current study showed no significance association between HBP and salt intake ( $P=0.697$ ). In a thirty four trial with 3230 participants, the results showed a significant association between low salt intake and BP among HBP patients ( $P=0.001$ ), those who were adding low salt in their food had a lower BP (He, Li & MacGregor, 2013). Wei, Sun, Huang, Zhou, Ding, Tao, He, Liu & Niu (2015) also noted a significant association among adult population in China ( $P<0.001$ ). Those who were adding low salt or no salt had a lower prevalence of HBP.

Fischer, Cruickshanks, Pinto, Schubert, Klein, Klein, Nieto, Pankow, Snyder and Keating (2012), found no significant association between HBP and intensity of salt intake. Kein, Nieto, Pankow, Snyder & Keating (2012), indicated no significance between salt intake intensity and HBP. Wei, Sun, Huang, Zhou, Ding, Tao, He, Liu & Niu (2015), further reported no significant association between HBP and salt intake.

Majority of the respondents indicated that they eat vegetables several days in a week. The results of the study indicated that there was significant association between HBP and vegetable intake among UNIVEN academic staff ( $P=0.034$ ). Those who were eating vegetables most days of the week had a lower BP than those who were eating vegetable less days in a week. Wang, Manson Gaziano, Buring and Sesso (2012), also indicated there was significance association between HBP and vegetables intake among 28 082 middle aged women and older women in US. A study conducted among adults aged 25 to 65 years in Zanzibar, the results showed that there was no significant association between BP and vegetables intake ( $P>0.05$ ) (Keller, Kourten & Draebel, 2012).

Majority of the respondents indicated that they eat fruits most days of the week. However, the results of this study revealed that there was no significance association between HBP and fruits intake among UNIVEN academic staff ( $P=0.686$ ). Though there was no significant association between HBP and fruits intake, there is a need for respondents to be encouraged to eat fruits most days of the week as some studies indicate that eating fruits most days of the week lowers BP. Some of the studies showed that there is no significance between BP and fruits intake Wang et al., 2012; Ntuli et al., (2015). However, Borgi, Muraki, Satija, Willett, Rimm and Forman (2016) indicated that eating fruits for a long-term reduce the risk of having HBP, in other words consuming fruits act as a protective factor of having HBP.

Majority of the respondents indicated that they eat fast food most days of the week. However, there was no significance relationship between HBP and fast foods intake ( $P=0.223$ ). Most of the fast foods contain high salt and high cholesterol which increases the risk of having HBP, therefore eating fast foods most of the days should be discouraged. Fifth Korean National Health and Nutrition Examination Survey also indicated that there was significant association between eating fried food and HBP in women (Kang & Kim, 2016). A study conducted among academic staff indicated that there was no significant association between HBP and fast foods intake (Ali, 2009). Awosan et al., (2014) also reported no significant association between HBP and fast foods intake among market traders in Nigeria.

Almost half of the respondents indicated that they do not exercise. The results of this study reveals that there was no significance association between HBP and exercise ( $P=0.206$ ). Engaging in exercise should be encouraged as some studies indicated that regular exercise is vital in prevention and management of HBP. Ali et al., (2009), also reported no significant association between HBP and exercise among Basra female teachers.

Desai et al., (2012), indicated that association between HBP and exercise exist, exercising most of the days in a week was associated with a decrease in BP in both individuals with HBP and normal BP ( $P=0.03$ ). Another study showed that there was significant association between aerobic exercise and HBP. Those who were engaging in regular aerobic exercise

About 26% of the respondents indicated that they drink alcohol, which is a problem as alcohol is associated with HBP. However in this study there was no significant association between HBP and alcohol intake ( $P=0.617$ ). Other studies showed different findings from this study, they showed that there was significance association between HBP and alcohol intake, especially among those who drink frequent and those who drink heavy. A study which was conducted among University academic staff indicated that there was significant association between HBP and alcohol intake. Omorogiuwa et al., (2009), indicated that there was significant association between HBP and alcohol intake among staff members of Southern University, in Nigeria.

Pajak, Szafraniec, Kubinova, Malyutina, Peasey, Pikhart, Nikitin, Marmot and Bobak (2013), revealed that there was significance relationship between alcohol consumption and HBP in those who drink frequently. A study conducted among Indian adults further indicated that there was significance association between HBP and alcohol intake (Shankarishan, Borah, Mohapatra, Ahmed & Mahanta, 2012).

Briasoulis et al., (2012), indicated that there was significance association between HBP and heavy alcohol drinking among male, however there was no significant association in HBP

among those who drink mild and moderate alcohol. In women the association between HBP and alcohol intake was J-shape, among US, and Japan men and women. In a questionnaire based study conducted among four villages at Mandya and Tumkur District, Karnataka there was direct relationship between HBP and alcohol intake (Venkataraman et al., 2013). However, Tshitenge et al., (2015), indicated that there was no significance relationship between HBP and alcohol intake among Botswana adults.

Majority of the respondents have indicated that they experience stress, especially work related stress. However the results of this study indicated no significance relationship between HBP and stress ( $P=0.417$ ). Although there was no significant association between HBP and stress, stress management strategies are important as some studies indicated that that stress is linked with HBP. Mulenga (2013) reported no significant association between HBP and stress among academic staff in Zambia.

A cross-sectional rural study among Maharashtra adults above 40 years, the study findings indicated no significant relationship between HBP and mental stress in male, but such association was not there in women (Jadhav et al. 2014). A study conducted among health workers of mission hospital in Nigeria, indicated that there was significant association between work-related stress and HBP, further more male who experience stress had higher rate of HBP compared to women (Owolabi et al., 2012).

Only 26% of the respondents had a normal BMI which is a concern as a higher BMI is associated with HBP. However, though majority had a higher BMI, there was no significant association between BMI and HBP ( $P=0.880$ ). Kulundaiveilan et al., (2015), indicated a significant association between HBP and BMI among academic staff. Ali et al., (2009), indicated that there was significant association between HBP and BMI among female teachers in Basra. Giurgiu, et al., (2013), found significant association between HBP and BMI among Romanian academic emergency country hospital staff members.

A study was conducted among Malaysia University academic staff age 30 years and above. The results showed that there was significance association between HBP and overweight/obesity among the aboriginal Nicobarese tribe (Manimunda, Sugunan, Benegal, Balakrishna, Rao & Pesal, 2010). This was also confirmed among 514 Bahraini adults from aged 30 to 79 years ( $P<0.05$ ) (Musaiger et al, 2013). Mungreiphy, Kapoor and Sinha (2011) reported that there was significance association between HBP and BMI among 257 males of Tangkul Naga tribal. Majority of the males with normal BMI had normal BP. Arul (2015) indicated that there was significant association between HBP and BMI.

About 10% of the academic staff indicated that they had diabetes and none of them had a normal BP, which shows that there is a need of diabetes prevention to prevent HBP. There was significant association between HBP and diabetes among UNIVEN academic staff ( $P=0.006$ ). Some studies also supported the findings of this current study. Ziyyat et al. (2014) also reported that there was very high significance association between BP and diabetes among Eastern Morocco adults age 40 and above ( $P=0.001$ ).

A cross sectional study conducted among 250 respondents who had type 2 diabetes indicated a high prevalence of HBP, only 22% had a normal BP, 52.4% were on prehypertension stage, 18% were on stage 1 HBP and 7.6% were on stage 2 HBP. These results show a higher significance between HBP and diabetes (Venugopal et al, 2014). However some studies obtained different findings from this current study. Wei et al. (2015) noted no significance association between BP and diabetes among Chinese adult of a sample of 3778 ( $P>0.05$ ). Tshitenge et al, (2015) also reported that there was no significance relationship between HBP and diabetes among Botswana adults. The risk of having HBP was the same between individuals who had diabetes and those without diabetes.

#### **5.4 Conclusion**

Conclusion of this study was categorised based on the study objectives.

The prevalence of HBP among the UNIVEN academic staff was at 20% (about 15% were on stage 1 HBP and 5% on stage 2 HBP), about 46% were at prehypertension stage and 34% had normal BP. There is high prevalence of HBP and majority of the academic staff are at a risk of having HBP if care is not taken. The study indicate that there is low level of participating in exercise, high level of stress especially work related stress, poor diet, family history of HBP and higher age. There prevalence of HBP was associated with gender, family history of HBP, low vegetables intake and diabetes.

#### **5.5 Study limitations**

Four of the respondents refused to be assessed BP resulting in reduced BP assessments. Only questionnaire had been used to determine the diabetes status, which was not enough since there are others who never had their blood glucose tested for diabetes. The study was only conducted at UNIVEN; therefore the findings of the study cannot be generalise to all academic staff or even to all UNIVEN staff.

## 5.6 Recommendations

Recommendations of this study are based on the objectives and findings of the study.

- Prevalence of HBP to be associated with diabetes as a results management of prevention diabetes strategies should be implemented as a way of managing BP.
- There is a need for UNIVEN management to appoint wellness coordinator who will implement programmes that will focus on BP prevention, awareness and management/control. About 34% did not know their current 12 months BP, which shows low level of awareness. Wellness campaigns should be conducted regularly to increasing awareness and assist in management to those who are diagnosed to have HBP.
- A team of different health practitioners are needed to work under a supervision of a wellness co-ordinator to assist for example a dietician to assist in diet education, biokineticist to assist in exercise education, prescription and supervision, a psychologist to assist in mental health programmes, such as stress management programmes as majority of the staff indicated that they experience stress and nurse or a doctor to assist in medication therapy and education.
- The results of the study show that almost half of the academic staff did not exercise. Department of sport should implement different sports activities for academic staff and department of biokinetics should expand UNIVEN biokinetic clinic to encourage UNIVEN academic staff to be physically active as a way of prevention and management of HBP.
- UNIVEN cafeteria should be provided with training in order for them to be able to prepare food that contain low fat and salt to help in prevention HBP and to management of HBP.

## 6. REFERENCES

- Abdullahi, A.A. & Amzat, K. (2011). Knowledge of hypertension among the University of Ibadan. *Journal of Public Health and Epidemiology*, 3(55): 204-209
- Aburto, N.J., Hanson, S., Gutierrez, H., Hooper, L., Elliott, P. & Cephalon, F.P.C. (2013). Effect of increased potassium intake on cardiovascular risk factors and disease: systematic review and meta-analyses. *British Medical Journal*, 346, 1-19
- Accord Study Group. (2010). Effects of Intensive Blood-Pressure Control in Type 2 Diabetes Mellitus. *The New England Journal of Medicine*, 362: 1575-1585.
- Addo, J., Agyemang, C., Smeeth, L., De-Graft Aikins, A., Edusei, A.K. & Ogedegbee, O. (2012). A review of population-based studies on hypertension in Ghana. *Ghana Medical Journal*, 46(2): 4-11. PMC3645150
- Adeloye, D. & Basquill, C. (2014). Estimating the prevalence and awareness rates of hypertension in Africa: a systematic analysis. *Medical, Nursing, Dental, Veterinary, Health Care, and Preclinical Sciences Journal*, 9 (8): 1-17. PM no C4121276
- Ali, H.A. & Al-Asadi, J.N. (2009). Prevalence and lifestyle determinants of hypertension among secondary school female teachers in Basra. *The Medical Journal of Basra University*. 27(2): 90-94
- Aliyu, S.U., Chiroma, A.S., Jajere, A.M. & Gujba, K.F. (2015). Prevalence of Physical Inactivity, Hypertension, Obesity and Tobacco Smoking: A Case of NCDs Prevention among Adults in Maiduguri. *Nigeria. American Journal of Medical Sciences and Medicine*, 3(4): 39-47
- Aljadhey, H. (2012). Physical Inactivity as a Predictor of High Prevalence of Hypertension and Health Expenditures in the United States: A Cross-Sectional Study. *Tropical Journal of Pharmaceutical Research*, 11(6): 983-990
- Anthony, J., Viera M. D. & Neutze, D.M (2010). Diagnosis of secondary hypertension: an Age-based approach. *American Academy of Family Physicians*, 82(12): 1471-1478

Appel, L.J., Brands M.W., Daniels, S.R., Kranja, N., Elmer, P.J. & Sacks, F.M. (2006). Dietary approach to prevent and treat hypertension: a scientific statement from the American heart association. *American Heart Association Science Statement*, 47: 296-308

Awoke, A., Awoke, T., Alemu, S. & Meabiaw, B. (2012). Prevalence and associated factors of hypertension among adults at Gondar, Northwest Ethiopia: A community based cross-sectional study. *Biomedical Central Cardiovascular Disorders*, 12: 113

Awosan, K.J., Ibrahim, M.T.O., Sabir, A.A. & Ejimodu, P. (2013). Awareness and prevalence of risk factors of coronary heart disease among teachers and bankers in Sokoto, Nigeria. *Journal of Medicine and Medical Science*, 4(9), 335-342

Babbie, E. (2013). The practice of Social Research. Thirteen edition. *Wadsworth, Cengage Learning*, 135, 189, China

Bains, A. & Rashid, M.A. (2013). Junk food and heart disease: the missing tooth. *Journal of the Royal Society of Medicine*, 106(12): 472–473

Bell, K., Twiggs, J. & Olin, B.R. (2015). Hypertension: The silent killer: updated JNC-8 guideline recommendations. *Alabama Pharmacy Association*, 1-8

Bento, V.F.R., Albino, F.B., Dermoura, K.F. & Santos, M.C, (2015). Impact of physical activity intervention on blood pressure levels in Brazilian populations. *Journal of the Brazilian Society of Cardiology*, 105(3): 301-308

Bhattacharje, A. (2012). *Social science research principles, methods, and practices* (2<sup>nd</sup> edition). *Non-commercial–shareAlike*, 65,137-138

Borgi, L., Muraki, I., Satija, A., Willett, W.C., Rimm, B.E. & Forman, J.P. (2016). Fruit and Vegetable Consumption and the Incidence of Hypertension in three prospective cohort studies. *American Heart Association*, 67: 288-293

Bosu, W. K. (2015). The prevalence, awareness, and control of hypertension among workers in West Africa: a systematic review. *Global Health Action*, 8: 1-23

Booth, F.W., Roberts, K.C. & Laye, M.J. (2012). Lack of exercise is a major cause of chronic diseases. *Comprehensive Physiology*, 2(2): 1143–1211

- Bowman, T.S., Gaziano, J.M. & Sesso, H.D. (2007). A prospective study of cigarette smoking and risk of incident hypertension in women. *Journal of the American College of Cardiology*, 50(21): 2085-2092
- Briasoulis, A., Agarwal, V. & Messerli, F.H. (2012). Alcohol consumption and the risk of hypertension in men and women: a systematic review and meta-analysis. *The Journal of Clinical Hypertension*, 14(11): 792-798
- Bromfield, S. & Muntner, P. (2013). High blood pressure: the leading global burden of disease risk factor and the need for worldwide prevention programs. *Current hypertension report*, 15(3): 134–136
- Casper, R., Peytcheva, E. & Cibelli, K. (2011). *Cross-cultural survey guidelines*
- Chestnow, O. (2014). Non-communicable diseases. World Health Organisation (WHO)
- Cheung, B.M.Y. & Li, C. (2012). Diabetes and hypertension, Is there a common metabolic pathway? *Current Atherosclerosis Report*, 14:160-166
- Chi, G., Kriva, A.T., Arnett, K.A., Myers, R.H, Pankow, J.S., Hunt, S.C. & Rao, B. (2008). Genetic effect on blood pressure is modulated by age. *American Heart Association*, 53(1): 35-41
- Chinyere, I.O., Mwuese, U.P. & Ara, B.I. (2014). Prevalence and awareness of hypertension amongst staff and students of a tertiary institution in Nigeria. *Global Advanced Research Journal of Medicine and Medical Science*, 4(1): 61-66
- Chor, D.,Ribeiro, A.L.P., Carvalho,M.S., Duncan, B.B., Lotufo, P.A., Nobre, A.R., Aquino, E.M.L.L., Schmidt, M.I., Griep, R.H., Molina, M.C.B., Barreto, S.M., Passos, V.M.D., Judith, I., Bensernor, M., Matos, S.M.A. & Mill, J.G. (2015). Prevalence, awareness, treatment and influence of socioeconomic variables on control of high blood pressure: results of the ELSA-Basil study. *Plos one*, 10(6): 1-14
- Cornellisen, V.A. & Smart, N.A. (2013). Exercise training for blood pressure: a systematic review and meta-analysis. *Journal of American Heart Association*, 1-68
- Cresswell, J.W. (2014). Research design qualitative, quantitative and mixed methods approaches, third edition. *SAGE publication*, 3, 4, & 15, USA

- Dangroo, S., Hamid, S., Rafiq, M., Ashfaq. D. (2013). The role of gender and their marital status in the prevalence of hypertension in Kashmiri Ppopulation. *Scholars Journal of Applied Medical Sciences*, 1(6):975-980
- Davila, E.P., Kuklina, E.V., Valderrama, A.L, Yoon, P.W., Rolle, L. & Nsubuga, P. (2012). Prevalence, management, and control of hypertension among United States workers: Does occupation matter? *Journal of Occupational and Environmental Medicine*, 54(9): 1150-1156.
- Desai, M.H. V. & Kavishwar, A. (2009). A study on effect of life style risk factors on prevalence of hypertension among white collar job people of Surat. *The Internet Journal of Occupational Health*, 1(1): 1-10
- Diaz, K.M. & Shimbo, D. (2014). unmarked hypertension Unmasking masked hypertension: prevalence, clinical implications, diagnosis, correlates and future directions. *Journal of Human Hypertension*, 28: 521–528.
- Divan, V., Chauhan, V., Panchal, S. & Bangal, R.K, (2010). Prevalence of hypertension among workers of a fertilizer company in Surat District. *National Journal of Community Medicine*, 1(2): 153-155.
- Djousse, L. & Mukamal, K.J. (2009). Alcohol Consumption and Risk of Hypertension: Does the Type of Beverage or Drinking Pattern Matter? *Spanish Society of Cardiology*. 62(6): 603-605
- Egan, B.M., Zhao, Y. & Axon R.N. (2010). US trends in prevalence, awareness, and control of hypertension 1988-2008. *The Journal of the American Medical Association*, 303(20): 2043-50.
- Erkoc, S.B., Isikli, B., Mentintas, S. & Kalyoncu, C. (2012). Hypertension knowledge-level scale (HK-LS): A study on development, validity and reliability, *International Journal of Enviromental Research Public Health*. 9: 1018-1029
- Fiidow, O.M., Huda, B.Z & Saminah, M.S. (2016). Socio-demographic factors of hypertension among non-academic staff in University Putra Malaysia. *International Journal of Public Health and Clinical Services*, 3(4): 2289-7577
- Fikado, G. & Lemma, S. (2016). Socioeconomic Status and Hypertension among Teachers and Bankers in Addis Ababa Ethiopia. *International Journal of Hypertension*, 1-7

Fischer, M.E., Cruickshanks, K.J., Pinto, A., Schubert, C.A., & Klein, B.E.K., Klein, R., Nieto, F.J., Pankow, J.S., Snyder, D.J. & Keating, B.J. (2012). Intensity of Salt Taste and Prevalence of Hypertension Are Not Related in the Beaver Dam Offspring Study. *Chemosensory Perception*, 5:139–145

Fisher, R.J. (1993). Social responsibility bias and the validity of indirect questioning. *Journal of Consumer Research*, 20: 303-315

Frese, E.M., Fick, A. & Sadowsky, H.S. (2011). Blood pressure measurement guidelines for Physical Therapists. *Cardiopulmonary Physical Therapy Journal*, 22(2): 5-12.

Friso, T.M., Schmieder, R.E., Grodzicki, T. & Messerli, F.H. (2012). Salt and hypertension: is salt dietary reduction worth the effort? *American Journal of Medicine*, 125(5): 443-449.

Ghadieh, A.S. & Saab, B. (2015). Evidence of exercise training and management of hypertension in adults. *Canadian family for physician*. 61: 233-239

Giles, T.D., Materson, B.J., Cohn, J.N. & Kostis, J.B (2009). Definition and classification of hypertension: *An upadate. Journal of hypertension*, 11(11): 611-614.

Giurgiu, D. I., Bardac, D. I. & Raulea, C.I. (2013). Study on hypertension prevalence in medical staff from a Romanian academic emergency country Hospital. *Acta Medica Transilvanica*, 2(3): 282-288

Greiw, A.H., Gad, Z., Mandil, A., Wagdi, M. & Elneihoum, A. (2010). Risk Factors for Cardiovascular Diseases among School Teachers in Benghazi, Libya. *Ibnosina Journal of Medicine and Biomedical Sciences*, 2(4):168-177

Guwatudde, D., Nankya-Mutyoba, J., Kalyesubula, R. Laurence, C., Adebamowo, C., Ajayi, I., Bajunirwe, F., Njelekela, M., Chiwanga, F. S., Reid, T., Volmink, J., Adami, H., Holmes, M. D. & Dalal, S. (2015). The burden of hypertension in sub-Saharan Africa: a four-country cross sectional study. *Biomedical Central Public Health*.15: 1211

Gumus, A., Kayhan, S. Cinarka, H. & Sahin, U. (2013). The Effect of Cigarette Smoking on Blood Pressure and Hypertension. *Advances in Bioscience & Clinical Medicine*, 8-15,

Hasumi, T. & Jacobsen, K.H. (2012). Hypertension in South African adults: results of a nationwide survey. *Journal of Hypertension*, 30(11): 2098-2104

He, F.J., Li, F. & Macgregor, G. (2013). Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomised trials. *British Medical Journal*, 346: 1-15

Hicken, M.T., Lee, H., Morenoff, J., House, J.S. & Williams, D.R. (2014). Racial/ethnic disparities in hypertension prevalence: Reconsidering the role of chronic stress. *American Journal of Public Health*. 104(1): 117-123

Hitang, T. (2013). Slovin formular. [www.researchgate.net](http://www.researchgate.net) accessed on 10/06/2016

Holmes, L., Hossain, J., Ward, D. & F. Opara, F (2013). Racial/Ethnic Variability in Hypertension Prevalence and Risk Factors in National Health Interview Survey. *International Scholarly Research Notices*. 1-8

Houinato, D.S., Gbary, A.R., Houehanou, Y.C., Dijoro, F., Ammoussou, M., Segnon-Agueh, J., Kpozehouen, A. & Salamon, R. (2012). Prevalence of hypertension and associated risk factors in Benin. *Pubmed*, 60(2): 95-102

Hu, W., Zhang. T., Shi, J., Qin, W., Tong L. & Shen, Y. (2014). Association between cigarette smoking and hypertension in men: a dose response relationship analysis. *PUPMED*, 42(9): 773-777

Jaddou, H.Y., Batieha, A.M., Khader, Y.S., Kanaan, A.H., El-Khateeb M.S. & Ajlouni, K.M. (2011). Hypertension prevalence, awareness, treatment and control, and associated factors: results from a national survey, Jordan. *International Journal of Hypertension*, 1-8

Jadhav, S.B., Jatti, G.M., Jadhav, A.S., Rajderkar, S.S., Naik, J.D. & Nandimath, V.A (2014). Stressing 'Mental Stress' in Hypertension: A Rural Background Study. *Journal of Clinical and Diagnostic Research*, 8(6): 4-7

Joffres, M., Falaschetti, E., Gillespie, C., Robitaille, C., Loustalot, F., Poulter, N., McAlister, A. F., Johansen, H., Baclic, O. & Campbell, N. (2013). Hypertension prevalence, awareness, treatment and control in National surveys from England, the USA and Canada, and correlation with stroke and ischaemic heart disease mortality: A cross-sectional study. *British Medical Journal*, 3: 1-0

Jorgeason, R.S. & Maisto, A. (2008). Alcohol consumption and prehypertension: an investigation of university youth. *Behavioural Medicine*, 34 (1): 21-26

Kang, Y. & Kim, J. (2016). Association between fried food consumption and hypertension in Korean adults. *British Journal of Nutrition*, 115(1): 87-94

Kayima, J., Wanyenze, R., Katamba, A., Leontsini, E. & Nuwaha, F. (2013). Hypertension, awareness, treatment and control in Africa: A systematic review. *Biomedical Central Cardiovascular disorders*, 13: 54

Keller, M., Kourten, M. & Draebel, T.A. (2012). Fruit and vegetable consumption and prevalence of diet-related chronic non-communicable diseases in Zanzibar, Tanzania: a mixed methods study. *Online Publication*, 16

Kibret, K.T. & Mesifin, Y.M. (2015). Prevalence of hypertension in Ethiopia: a systematic meta-analysis. *Public Health Reviews*, 36:14

Kishore, J., Gupta, N., Kohli, C. & Kumar, N. (2016). Prevalence of hypertension and determination of its risk factors in rural Delhi. *International Journal of Hypertension*, 1-6

Knight, J. A. (2012). Physical inactivity: Associate diseases and disorders. *Annals of Clinical and Laboratory Science*, 2(3): 320-337

Kollar, R. & Simonyi, G. (2013). Obesity and hypertension, *Orvosi Hetilap*, 54(44): 1736-1742

Kulundaivelan, S. & Yamini (2015). Prevalence and determinants of hypertension among University employees. *Journal of Exercise and Physiotherapy*, 11(1): 1-10

Kumar, R. (2011). *Research methodology a step-by-step guide for beginners* (3<sup>rd</sup> edition) SAGE publication, 94 & 138

Kumar, S.V., Laxmi, A.N.R., Pasula, S., Adepu, S. & Ali, M. (2013). Prevalence, awareness, and control of hypertension in school Teachers in Warangal, Andri Pradesh, India. *International Journal of Biological and Medical Research*, 4(2): 3247-32492

Lago, R.M., Singh, P.P. & Nesto, R.W. (2007). Diabetes and hypertension. *Nature Publishing Group*, 667

Lakshman, A., Manikath, N., Rahim, A. & Anilakumari V. P. (2014). Prevalence and Risk Factors of Hypertension among Male Occupational Bus Drivers in North Kerala, South India: A Cross-Sectional Study. *International Scholarly Research Notices*, 1-9

Landsberg, L., Aronne, L.J., Beilin, L.J., Burke, V., Igel, L.A., Lloyd-Jones, D. & Sowers, J. (2013). Obesity-related hypertension: pathogenesis, cardiovascular risk, and treatment. *The Journal of Clinical Hypertension*, 15(1): 14-33

Lane, D.M. (2013). *Introduction to statistics: an alternative*. Online edition, *Rice University*, 15, 225, 228-9

Leone, A. (2011). Does smoking act as a friend or enemy of blood pressure? Let Release Panda's. *Cardiology Research and Practice*

Liu, M., He, Y., Jiang, B., Wang, J., Wu, L., Wang, Y., Zhang, D., Zeng, J., Yao, Y. (2015). Association between family history and hypertension among Chinese elderly. *Medical Journal*, 94(48): 1-6

Lloyd-Sherlock, P., Beard, J., Minicuci, N., Ebrahim, S. & Chatterji, S. (2014). Hypertension among older adults in low-and middle-income countries: prevalence, awareness and control. *International journal Epidemiology*, 43(1): 116-128

Lucini, D., Riva, S., Pizzinelli, P. & Pagani M. (2006). Stress management at worksite. *Online Publication*, 49: 291-297

Mabuza, L.H., Omole, O.B., Govender, I., Ndimande, J.V. & Schoeman, H.S. (2015). Inpatients' awareness of admission reasons and management of their clinical conditions at a tertiary hospital in South Africa. *Biomedical Central Health Services Research*, 15(89): 1-9

Madhumitha, M., Naraintran, S. & Manohar, C. (2014). Influence of stress and socio demographic factors on hypertension among urban adults in North Karnataka. *Asian Journal of Biomedical and Pharmaceutical Sciences*, 4(38): 23-26

Maepe, L.M. & Outhoff, K. (2012). Hypertension in gold miners. *South Africa Medical Journal*, 102(1): 30-33

Manimunda, S.P., Sugunan, A.P., Benegal, V., Balakrishna, N., Rao, M.V. & Pesal, K.S. (2010). Association of hypertension with risk factors & hypertension related behaviour among the aboriginal Nicobarese tribe living in Car Nicobar Island, India. *Indian Journal of Medical Research*. 133: 287-293

Mateos-caceres, P.J., Zamorano-Leon, J.J., Rodriguez-sierra, P., Macaya, C. & Lopez-Farre, J.A. (2012). Plasma desmoplakin: Biomarker of vascular recurrent after ischemic stroke. *Journal of Neurochemistry*, 121(2): 314-325

Medical dictionary. (2007). Saunders comprehensive veterinary dictionary, third edition, Elsevier

Medical letter. (2012). Treatment guidelines from medical letter. *Medical letter*, 10(113): 1-13

Mkhonto, S.S. & Mabaso, M.L.H. (2012). Relationship between obesity and blood pressure in school-going adolescents in the Limpopo province South Africa. *Human Sciences Research Council*.

Mulenga, D. & Siziya, S. (2013). Prevalence and correlates for hypertension among full-time Anza academic staff. *Medical Journal of Zambia*, 40(4): 146-149

Mungreiphy, N.K., Kapoor, S. & Sinha, R. (2011). Association between body mass index, blood pressure and age among Tangkhul Naga tribal males of Northeast, India. *Journal of Anthropology*.1-7

Musaiger, M., Al-Mannai, K. & Bahrain, M. (2013). Social and lifestyle factors associated with hypertension in Bahraini community. *Nutrition & Food Science*, 43(3): 213-217

Ntuli, S.T., Maimela, E., Alberts, M., Choma, S. & Dikotope, S. (2015). Prevalence and associated risk factors of hypertension amongst adults in a rural community of Limpopo Province, South Africa. *African Journal of Primary Health Care and Family Medicine*, 7(1): 1-5

Odika, V.O., Joffa, P.P.K. & Apiyanteide, F.A (2011). Hypertension knowledge among non-academic employees of Niger Delta University, Bayesa state, Nigeria. *International Journal of Tropical Medicine*, 6(20): 113-120

OECD. (2001). *Education and training statistics. Eurostat*, 45

Ofili, M.I., Ncama, B.P. & Sartorius, B. (2015). Hypertension in rural communities in Delta State, Nigeria: Prevalence, risk factors and barriers to health care. *African Journal Pharmaceutical Health Care Family Medicine*, 7(1): 1-7

Olack, B., Wabwire-Mangen, F., Smeeth, L., Montgomery, J.M., Kiwanuka, N. & Breiman, R.F. (2015). Risk factors of hypertension among adults aged 35–64 years living in an urban slum Nairobi, Kenya. *Biomedical Central*, 15(1251): 1-9

Omorouiwa, A., Ezenwanne, E.B., Osifo, C., Ozor, M.O. & Ekhtator, C.N. (2015). Comparative study on risk factors for hypertension among adults aged 35-64 years living in urban slum Nairobi, Kenya. *Biomedical Central*, 15(2): 103-107

Onwuke, S.C. & Omole, O.M. (2012). Drug therapy, lifestyle modification and blood pressure control in a primary care facility, South of Johannesburg, South Africa: an audit of hypertension management. *South African Family Practice*, 54(2): 156-161

Ordeunez, P., Kaufum, J.S., Benet, M., Morejon, A., Silva, L., Shoham, D.A. & Cooper, R. S. (2013). Black and whites in Cuba have equal prevalence of hypertension: confirmation from a new population survey. *Biomedical Central Public Health*, 13:169

Oto, M.A, Ergene, O., Tokgozoglu, L., Ongen, Z., Kozan, O., Sahin, M., Erol, M.K., Jezel, T. & Ozkan, M. (2011). Impact of mass media campaign to increase public awareness of hypertension. *Turkish Society of Cardiology*, 39(5): 355-364

Owabi, A.O., Owolaabi, M.O., Olaolorun, A.D. & Olofin, A. (2012). Work-related stress perception and hypertension amongst health workers of a mission hospital in Oyo State, south-western Nigeria. *African Journal of Pharmaceutical Health Care Family Medicine*, 4(1): 1-7

Padayhag, M. J. L. (2013). Teachers prone to hypertension in public elementary and high school teachers in Cebu city undergo medical screening, *Cebu daily news*. Retrieved from [m.enquire.net/newsinfo/507273](http://m.enquire.net/newsinfo/507273) (date accessed 15/10/2015)

Pajak, A., Szafraniec, K., Kubinova, R., Malyutina, S., Peasey, A., Pikhart, H., Nikitin, Y., Marmot, M. & Bobak, M. (2013). Binge drinking and blood pressure: Cross-sectional results of the hapiee Study. *PLoS ONE* 8(6): 1-9

Pankova, A., Kralikova, E., Fraser, K., Lajka, J., Svacina, S. & Matoulek, M. (2015). No difference in hypertension prevalence in smokers, former smokers and non-smokers after adjusting for body mass index and age: a cross-sectional study from the Czech Republic, 2010. *Biomedical Central*, 13:24, 1-7

Peltzer, K. & Phaswana-Mafuya, N. (2013). Hypertension and associated factors in older adults in South Africa. *Cardiology Journal of Africa*, 24(3): 66-72

Pobee, R.A., Plahar, W.A., & Owosu, W.B. (2013). Association between Anthropometry and blood pressure among female teachers of child-bearing age in Ghana. *Journal of Biology, Agriculture and Healthcare*, 3(2): 2224-3208.

Rahl, R.L. (2010). Physical activity and health guidelines. *Human Kinetics*, 168, United States of America.

Ramaano, N.S. (2013). Factors contributing to high blood pressure among adults at Folovhodwe village in Mutale Municipality Vhembe district in Limpopo Province, South Africa. *University of Venda*.

Rampal, L., Somayeh, A.B., Salmiah, M.S., Faisal, I. & Zainiyah. (2011). Prevalence of hypertension and its associated factors among university staff. *Malaysia Journal of Medicine and Health Sciences*, 7(2): 61-71

Ramukumba, T.S. (2012). A community-specific intervention to reduce obesity and related health risks. *Tshwane University of Technology*.

Ranasinghe, P., Cooray, D.N., Jayawardena, R. & Katulanda, P (2015). The influence of family history of Hypertension on disease prevalence and associated metabolic risk factors among Sri Lankan adults. *Biomedical Central Public Health*, 15: 576

Ravele, F.L. (2011). Physical activity status of UNIVEN lecturers. *University of Venda library*. Unpublished journal

Rayner, B (2010). Hypertension: Detection and management in South Africa. *Nephron Clinical Practice*, 116: 269-273

Re, N.R. (2009). Obesity-Related Hypertension. *The Ochsner Journal*, 9:133–136

Reinberg, S. (2016). Alcohol and hypertension may not mix. *CBS news*.

Rita, E. & Carey, M.S (2010). Hypertension and diabetes-intensive treatment may be risky for some patients. *Today's Dietician The magazine for Nutrition Professionals*, 12(7):12

Rockwood, M.R.H & Howlett, S.E (2011). Blood pressure in relation to age and Frailty. *Canadian Geriatrics Journal*, 14(1): 2–7.

Rosenthal, T. & Alter, A. (2012). Occupational stress and hypertension. *Journal of American Society of hypertension*, 6(1): 2-22

Saneei, P., Salehi-Abargouei, A., Esmaili, A. & Azadbakht, L. (2014), Influence of dietary approaches to stop hypertension (DASH) diet on blood pressure: A systematic review and meta-analysis on randomized controlled trials. *Medical, Nursing, Dental, Veterinary, Health care, and Preclinical Sciences journal*, 24(12): 1253-1256

Santiago, L.M., Pereira, C., Bota, P., Simões, A.R., Carvalho, R., Pimenta, G. & Neto, G. (2014). Hypertensive patients in a general practice setting: Comparative analysis between controlled and uncontrolled high blood pressure. *Portuguese Journal of Cardiology*, 33 (7-8): 419-424

Santos, L.C., Chaves, B.C., Andrade, A.I. & Duarte, J.C. (2013). The Influence of Stress on the Quality of Life of Hypertensive Patients. *The European Journal of Counselling Psychology*, 4(2): 2195-7614

Sawicka, K., Szczyrek, M., Jastrzebska, I., Prasal, M., Zwolak, A. & Daniluk, J. (2011). Hypertension – the silent killer. *Journal of Pre-clinical and Clinical Research*, 5(2): 43-46

Seedat, Y.K. & Rayner, B.L. (2011). South African hypertension guidelines. *South African Medical Journal*, 102(1): 57-84

Sengwayo, D.G., Moraba, M.M. & Motaung, S.C.K.M. (2013). Prevalence of raised body mass indices and the association with high blood pressure and hyperglycaemia in the rural

black population of Ga-Mothapo village, Capricorn District of Limpopo province. *South African Family Practice*, 55(6): 538-544

Shafer, D.S. & Zhang, Z. (2012). *Beginning statistics. Phylis-Barnidge publisher*, 304, ISBN: 978-1-4533-4487-3, New York

Shankarishan, P., Borah, B.K., Mohapatra, P.K., Ahmed, G. & Mahanta, J. (2012). Population attributable risk estimates for risk factors associated with hypertension in an Indian population. *European Journal of Preventive Cardiology*, 20(6) 963–971

Sharman, J.E., Gerche, L.A. & Coombes, J.S. (2013). Exercise and cardiovascular risk in patients with hypertension. *American Journal of Hypertension*, 28(2): 147-158

Sikandar, N. (2015). Risk base stratification of hypertension in teachers of University Peshawar, *Journal of Rehman Medical Institute*, 1(2): 1

Shukla, A., Kumar, K. & Singh, A. (2014). Association between Obesity and Selected Morbidities: A Study of BRICS Countries. *International Journal of Hypertension*, World Health Organisation, 9(4): 1-9

Sparrenberger, F Cichelero, F.T., Ascoli, A.M., Fonseca, F.P., Weiss, G., Berwanger, O., Fuchs, S.C., Moreira, L.B. & Fuchs, F.D. (2009). Does psychosocial stress cause hypertension? A systematic review of observational studies. *Journal of Human Hypertension*, 23: 12–19

Spruil, T.M. (2010). Chronic psychological stress and hypertension. *Current hypertension reports*, 12(1): 10-16

Statistics South Africa. (2011). Use of health facilities and levels of selected health conditions in South Africa: Findings from the General household survey. Report no. 03-00-05

The New York times (2016). Hypertension complications. Reviewed by Simo, H., Zieve, D., Black, B. & ADAM editorial team in 2013. Accessed on 11/06/2016 [www.nytimes.com/health/guides/disease/hypertension/complications.htm](http://www.nytimes.com/health/guides/disease/hypertension/complications.htm)

Tshitenge, S. & Mabuza, L.H. (2015). Factors associated with high blood pressure in the adult population of Kang (Kgaladi North), Botswana. *South Africa Family Practice*

Venkataraman, R., Satish Kumar, S., Kumaraswamy, M., Singh, R., Pandey, M., Tripathi, P., Sharath, V, George, J.V., Dahal, P. & vaibhav, P. (2013). Smoking, alcohol and hypertension. *International Journal of Pharmacy and Pharmaceutical Sciences*, 5(4): 28-32

Venugopal, K. & Mohammed, M.Z. (2014). Prevalence of hypertension in type-2 diabetes mellitus. *CHRISMED Journal of Health and Research*, 1(4): 223-227

Virdis, A., Gianarelli, C., Neves, M.F., Ghiadoni, L. & Taddei, S. (2010). Cigarette smoking and hypertension. *Current pharmacological design*, 16(23): 2518-2525

Wamala, J.F., Karyabakabo, Z., Ndukutse, D. & Guwatudde, D. (2009). Prevalence factors associated with hypertension in Rukungiri District, Uganda - a community-based study. *African Health Sciences*, 9(3): 153-160

Wang, L., Manson, J.E, Gaziano, J.M, Buring, J.E & Sesso, H.D. (2012). Fruit and vegetable intake and the risk of hypertension in middle-aged and older women. *PUBMED*, 25(2):180-189

Weber, M.A., Schiffrin, E.L., White, W. B., Mann, S., Lindholm, H.L., Kenerson, J.G., Flack, J.M., Carter, B.L., Meterson, B.J., Venkata, C., Cohen, D.L., Cadet, J., Jean-Charles, R.R., Taler, S., Kountz, D., Townsend, R. R., Chalmers, J., Ramirez, A. J., Bakris, G. L., Wang, J., Schutte, E.A., Bisognano, J.D., Touyz, R.M., Sica, D. & Harrap, S.B. (2014). Clinical practice guidelines for the management of hypertension in the community: A statement by the American society of Hypertension and the international society of hypertension. *Journal of Clinical Hypertension*, 16(1): 14-26.

Wei, Q., Sun, J., Huang, J., Zhou, H.Y., Ding, Y. M., Tao, Y.J., He, S.M., Liu, Y.L. & Niu, J.Q. (2015). Prevalence of hypertension and associated risk factors in Dehui City of Jilin Province in China. *Journal of Human Hypertension*, 29: 64–68

World health Organisation (2010). Global status report on non-communicable diseases. *World Health Organisation*, 18

World Health Organisation (2013). A global review of hypertension silent killer global public health crisis, world health day, WHO/DCO/WHD/2013.2

World Health Organisation (2014). The WHO STEPwise approach to noncommunicable disease risk factor surveillance (STEPS). [www.who.int/chp/steps](http://www.who.int/chp/steps)

Yang, L., Yan, Tang, X., Xu, X., Yu, W. & Wu, H. (2016). Prevalence, awareness, treatment, control and risk factors associated with hypertension among adults in Southern China. *Plos One*, 11(1): 1-14

Zukifili, I.Z., Ramdani, N., baharuddin & Arul. (2015). Hypertension and anthropometric measurement on academic staff at public University in Malaysia. *Online Publication*, 1691 (1)

Ziyyat, A., Ramdani, N., Bouanani, N.E., Vanderpas, J., Hassani, B., Boutayeb, A., Aziz, M., Mekhfi, H., Bnouham, M. & Legssyer, A.A. (2014). Epidemiology of hypertension and its relationship with type 2 diabetes and obesity in Eastern Morocco. *Springerplus*, 3:644

## Appendix A

### Questionnaire: The prevalence of high blood pressure among the University of Venda academic staff, South Africa.

Instructions:

- Please answer all the questions
- Please tick or fill in gaps

Date of data collection: \_\_\_\_ (day) \_\_\_\_ (month) \_\_\_\_ (year)

Blood pressure (measurement during study)

1. First	2. Second trial (after 3 minutes)

Weight: \_\_\_\_\_ kg

Height: \_\_\_\_\_ cm

#### Section A: Demographic information

1. What is your date of birth?

1. Date	2. Month	3. Year

2. What is your gender?

1. Male	2. Female

3. What is your race?

1. African	2. Coloured	3. White	4. Indian	5. Other, specify

4. What is your marital status?

1. Single	2. Married	3. Divorced	4. Widow/widower

5. When last did you have your blood pressure checked? **If never had it checked or not sure go to question 12**

1. Within past the year (anytime less than 12 months)	2. More than 12 months	3. Never had it checked	4. Don't know/ not sure

6. If checked, what was its status?

1. Normal	2. High

7. If high, were you ever told of any method that you can use to lower or control your blood pressure? **If no go to question to question 10**

1. Yes	2. No

8. If yes, which method to lower or control your blood pressure are you on?

1. Medication	2. Diet	3. Exercise	4. Other, specify

9. Are you still under treatment?

1. Yes	2. No

10. In your family is there anyone who has high blood pressure (parents or siblings)?

1. Yes	2. No	3. Don't know/ not sue

## Section B. Lifestyle

### (a) Diet

11. Do you add salt in your food?

1. yes	2. No	3. Sometimes

12. What is your preferred method of cooking food?

1. Boil	2. Fry	3. Roast	4. Steam

13. How many days in a week do you eat fast food?

1. Less than a day	2. 1-2 day/s	3. 3-5 days	4. 6-7 days

14. How many days in a week do you eat vegetable?

1. Less than a day	2. 1-2 day/s	3. 3-5 days	4. 6-7 days

15. How many days in a week do you eat fruits?

1. Less than a day	2. 1-2 day/s	3. 3-5 days	4. 6-7 days

### (b) Alcohol intake

16. Do you drink alcohol? **If no go to question 18**

1. Yes	2. No

17. In a week how many days do you drink alcohol?

1. 1-2 day/s	2. 3-5 days	3. 6-7 days

**(c) Cigarette smoking**

18. Do you smoke cigarettes?

1. Yes	2. No

**(d) Exercise**

19. Do you currently engage in any exercise (in the last 6 months)? **If no, go to question 23.**

1. Yes	2. No

20. How would you describe your training sessions?

1. Light	2. Moderate	3. Vigorous

21. How many days per week do you exercise?

1. 1-2 days	2. 3-5 days	3. 6-7 days

22. Do you own a car?

1. Yes	2. No

**Section C: Social determinants**

23. Do you experience stress? **If no go to question 26**

1. Yes	2. No
--------	-------

--	--

24. How often are you stressed?

1. Never	2. Sometimes	3. Always

25. What causes your stress?

1. Work	2. Family	3. Finance	4. If other, specify

**Section D: Metabolic risk factors**

26. Have you ever been told that you are obese by any health worker?

1. Yes	2. No	3. Never checked

27. Have you ever been diagnosed as diabetic by any health worker?

1. Yes	2. No	3. Never checked

## Appendix B

### **Prevalence of high blood pressure among the University of Venda academic staff, South Africa.**

#### **Information letter**

I am a student in Public Health, School of Health Sciences at the University of Venda. I am doing a study on “**The prevalence of high blood pressure among the University of Venda academic staff, South Africa**”. The main aim of my study is to investigate the prevalence of high blood pressure among University of Venda academic staff. A questionnaire, electronic BP monitor, seca weighing scale and stadiometer scale were used as tools to investigate the prevalence of high blood pressure. Participation in this study is voluntary and there is no reward or payment attached. You are allowed to withdraw at any time of the study without getting any penalties. If you participate in the study, it will help UNIVEN management to know the prevalence of high blood pressure among academic staff and may create programmes which will help academic staff to check their blood pressure regularly, and provide treatment to those who have high blood pressure. The information you will provide was treated confidentially and your privacy was respected. You will not be expected to write your names when filling the questionnaire. If you are found to have high blood pressure during the study you will referred to the UNIVEN campus clinic or to your family doctors for further assistance.

For any enquiries contact me at 0835157022

Signature :.....( Researcher)      Date: .....

(Madzaga Thizwilondi)



## Appendix C

### **Prevalence of high blood pressure among the University of Venda academic staff, South Africa.**

#### **Informed consent form**

I..... (Respondent) agree to participate in this study freely and I have read and understood all the information regarding the study. I am aware of my responsibilities as a respondent in the study.

Signature: ..... Date.....

Witness signature: ..... Date: .....



## Appendix D Ethical clearance



## Appendix E

### **Prevalence of high blood pressure among the University of Venda academic staff, South Africa.**

Ms T Madzaga  
P. O Box 11015  
Thohoyandou  
0950

Director  
Human Resource  
University of Venda  
Private Bag X5050  
Thohoyandou  
0950

Dear Sir/ Madam

#### **Request for a permission to conduct a study at University of Venda**

I, Thizwilondi Madzaga (student number 11531072) request your permission to collect data among academic staff at UNIVEN. I am currently a master's student in Public Health. My research title is "the prevalence of high blood pressure among University of Venda academic staff, South Africa". The main purpose of the study is to determine the prevalence high blood pressure among University of Venda academic staff. The research will help the management of UNIVEN to be aware of the total number of academic staff who are hypertensive and be able to take steps to prevent, control, and manage high blood pressure among academic staff. Data was collected using a questionnaire, electronic BP monitor (to measure Blood Pressure), seca weighing scale (to measure weight), and stadiometer scale (to measure height). The collection of data will take a month. Attached is the ethical clearance obtained from UNIVEN Ethical Committee

I look forward to your positive response

Yours faithfully,  
Madzaga T (Ms)



## Appendix F Permission letter from HR