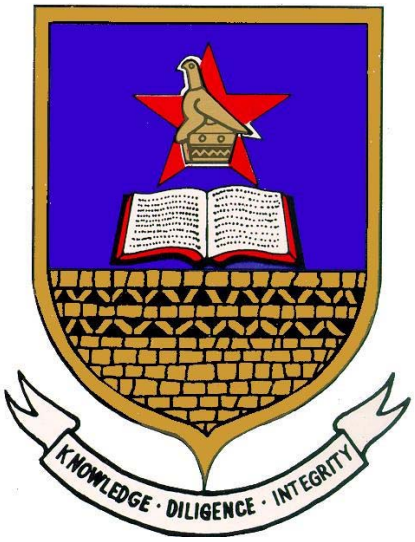
# Prevalence and Risk Factors for Hypertension among Bulawayo City Council Employees, 2010

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Dissertation Submitted in Partial Fulfillment of the

Masters in Public Health Degree

University of Zimbabwe

Master of Public Health Programme

College of Health Sciences

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## Declaration

This dissertation is the original work of **Amon Marwiro**. It has been prepared in accordance with the guidelines for MPH dissertations for the University of Zimbabwe. It has not been submitted elsewhere for another degree at this or any other university

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## Abstract

**Prevalence and risk factors for hypertension among Bulawayo City Council employees**

**Introduction:** An increase in the number of employees with raised blood pressure during routine medical examinations from less than two in every ten to four in every ten during the third quarter compared to the first and second quarters of 2009 prompted an investigation on the prevalence of hypertension and risk factors among Bulawayo City Council employees.

**Methods and Materials:** Analytical cross-sectional study was carried out. Three hundred and two participants were selected by systematic random sampling from employee registers. Questionnaire adapted from World Health Organization STEPwise approach to Surveillance non communicable disease instrument was used to collect data on risk factors. Blood pressure and anthropometric measurements were taken as per World Health Organization STEP guidelines. Hypertension was defined as systolic blood pressure of ≥140mmHg and/or diastolic blood pressure of ≥90mmHg.

**Results:** Mean systolic BP was 134.1±18.6mmHg and mean diastolic BP was 83.3±19mmHg. Prevalence of hypertension was 38.4% (116). The prevalence of hypertension was higher in females than males. Prevalence of undiagnosed hypertension was 14.2% (43). Seventy three (80%) of hypertensive participants were on treatment but only 21 (39%) of them had well controlled BP. Independent risk factors for hypertension were being aged 40 years or older (AOR 5.95, 95% CI 3.29; 10.77), being obese (AOR 3.66, 95% CI 1.89; 7.06), current tobacco smoking (AOR 3.26, 95% CI 1.05; 10.10), family history of hypertension (AOR 2.87, 95% CI 1.56; 5.28) and being married (AOR 1.95, 95% CI 1.03; 3.67).

**Conclusion**: There was a high prevalence of both diagnosed and undiagnosed hypertension. Despite high percentage of treatment among hypertensive participants, majority were at risk of

developing complications because of poor control. Health education on hypertension and setting up of a surveillance system for hypertension and its risk factors are necessary to reduce the burden of hypertension and related illnesses. Further studies on factors associated with obesity and poor control of blood pressure among hypertensive people on treatment are needed.

**Key words:** Prevalence, hypertension, risk factors, Bulawayo City employees, Zimbabwe

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## Acknowledgements

I would like to express my sincere gratitude to Mr. N T Gombe, my academic supervisor, for the patience, guidance and support he gave me throughout the study. I am also indebted to Prof Rusakaniko for his assistance and support during the development of the proposal for this project. The project also benefited immeasurably from the input I got from my field supervisors, Dr G. Marape and Dr Z Hwalima, they provided me with the support I needed for my day to day activities during the study. I also acknowledge the support I got from Heads of Departments and all the staff at Bulawayo City Council. To N. Ndlovu and S. Sibanda, thank you very much for the translation of the questionnaire and consent form to Ndebele. Special thanks go to the Centre for Disease Control and Prevention (CDC-Atlanta) for funding the MPH Programme.

I would also like to express my gratitude to my family. Thank you for the being patient and understanding when I was busy working on the project. Lastly, but not least, to Bulawayo City employees, the study participants, and all those who gave their support but are not mentioned here, I say thanks to you all!

## List of abbreviations

| | |
|---|---|
| AHA | American Heart Association |
| ACE | Angiotensin Converting Enzyme |
| AOR | Adjusted Odds Ratio |
| BCC | Bulawayo City Council |
| BMI | Body Mass Index |
| BP | Blood Pressure |
| CDC | Centers for Disease Control and Prevention |
| C.I | Confidence Interval |
| CHD | Coronary Heart Disease |
| CVA | Cerebrovascular Accident |
| CVD | Cardiovascular Disease |
| cm | Centimeter |
| DBP | Diastolic Blood Pressure |
| HCT | Hydrochlorothiazide |
| HIV | Human Immuno-deficiency Virus |
| HR | Heart Rate |
| JNC | Joint National Committee |
| Kg | Kilogram |
| MET | Metabolic Equivalents |
| mmHg | millimeter of mercury |
| MPH | Master's of Public Health |
| MRCZ | Medical Research Council of Zimbabwe |

| | |
|---|---|
| MRFIT | Multiple Risk Factor Intervention Trial |
| NHANES | National Health and Nutritional Examination Survey |
| O.R | Odds Ration |
| PHO | Public Health Officer |
| SBP | Systolic Blood Pressure |
| SD | Standard Deviation |
| S.E | Standard Error |
| STEP | STEPwise Approach to surveillance |
| US | United States of America |
| TB | Tuberculosis |
| W.H.O | World Health Organization |

# CHAPTER 1: INTRODUCTION

Hypertension means high pressure in the arteries.[1] It is commonly known as high blood pressure. Blood pressure is described by two values, pressure during systole (top value) and pressure during diastole (bottom value). Normal blood pressure is between 90/60 mmHg and 120/80 mmHg blood pressure between 120/80 mmHg and 139/89 mmHg is called pre-hypertension, and a blood pressure of 140/90 mmHg or above is considered high. [1-4]

An elevation of the systolic and/or diastolic blood pressure increases the risk of developing heart disease, kidney disease, hardening of the arteries, eye damage, and stroke.[1,5] These complications of hypertension are often referred to as end-organ damage because damage to these organs is the end result of chronic high blood pressure.

Most of the time hypertensive people show no symptoms in the early stages, symptoms only manifest after end-organ damage. That is why hypertension is described by some clinicians as a 'silent killer'.[2] Symptoms that may occur include chest pain, confusion, ear buzzing, irregular heartbeat, nosebleed, tiredness, headache and vision changes.[2] These symptoms are usually a result of end-organ damage and the presentation depends on the organ that is affected.

For this reason, the routine screening of symptomatic individuals is critical in early diagnosis, treatment and control of high blood pressure. Early diagnosis, treatment and optimum control of hypertension are keys to reducing morbidity and mortality of hypertension related illnesses.

Although the list of causes of hypertension is endless, in more than 90 % of people with hypertension, the causes are not known and is defined as 'essential hypertension' (which means the cause of hypertension cannot be identified).[1,2,5]

In the United States, essential hypertension has been associated with Family history of hypertension, advanced age, African-American race, obesity, inactivity, cigarette smoking, excessive salt intake and excessive alcohol intake.[5] Hypertension is defined as 'secondary hypertension' if the cause has been identified. The causes of secondary hypertension include hormonal abnormalities, renal diseases, pregnancy, sleep disturbances and medications.[1]

Diagnosis of hypertension is made by the observation of persistently high blood pressure.[1,2] This needs accurate measurement of blood pressure on at least two different occasions, in each time the individual is given enough time to relax. In very high blood pressure levels (SBP≥160 mmHg and/or DBP ≥100 mmHg) with evidence of target-organ damage only one reading is necessary to start on treatment.[2]

Bulawayo City Council is divided into 6 functional departments namely Health Services, Engineering Services, Housing and Community Services, Financial Services, Town Clerk and Chamber Secretary. In total, the Council has close to 4 000 workers. Pre-employment medical examination is mandatory to all prospective Bulawayo City Council employees. The examination is carried out, on behalf of the Director of Health Services, by the City Medical Officer. The examination, among other conditions, screens for hypertension. If any abnormality is found during examination, the individual is advised to go for evaluation and/or treatment at the local clinic or other centers.

Bulawayo City Council has an optional medical aid scheme where the Council and the employee contribute.

For medical services, employees who are on the medical aid scheme have an option of going to Bulawayo City Council clinics, the two Government hospitals in the city or private medical practitioners and the medical aid pays for the services. Employees who do not have a medical aid pay cash at for medical services at the point of care.

**Public health importance of hypertension**

It is estimated that nearly one billion people are affected by hypertension worldwide, and this figure is predicted to increase to 1.5 billion by the year 2025.[1,6] Centers for Disease Control and Prevention (CDC) estimates that 43 million people in the United States have hypertension or are taking antihypertensive medication, which is almost 24% of the adult population.[1]

According to the World Health Organization, non-communicable diseases constituted by cardiovascular diseases (including hypertension), diabetes, cancers and chronic respiratory diseases are increasing to epidemic levels but are not noticed or little attention is paid to them especially in the middle and low income countries.[7]

Hypertension is the major risk factor for cardiovascular diseases (CVD) which are the major cause of death in the developed countries. Multiple Risk Factor Intervention Trial (MRFIT) in the United States data showed that the relative risk for coronary heart disease mortality varied from 2.3-6.9 times higher for persons with mild-to-severe hypertension compared to persons with normal blood pressure and the relative risk for stroke ranged from 3.6-19.2. The population-attributable risk percentage for coronary artery disease varied from 2.3-25.6%, whereas the population-attributable risk for stroke ranged from 6.8-40%.[8]

With urbanization, the problem of hypertension and other non communicable diseases is growing rapidly to epidemic levels in the developing countries. This invisible epidemic is an under-appreciated cause of poverty and hinders the economic development of many countries.[7]

Despite impacting the poorest people in low-income parts of the world and imposing a heavy burden on socioeconomic development, non communicable diseases (NCD) prevention is currently absent from the Millennium Development Goals. However, in all low and middle-income countries and by any measure, non communicable diseases account for a large enough share of the disease burden of the poor to merit a serious policy response.[7] Contrary to common perception, non communicable diseases affect developing countries more than developed countries, World Health Organization estimates that about 80% of chronic disease deaths occur in low and middle income countries.[7]

After an assessment of the evidence concerning hypertension in Sub-Saharan Africa in a systematic review of literature, Juliet Addo et al concluded that hypertension was of public health importance in sub-Saharan Africa, particularly in urban areas and there was evidence of considerable under-diagnosis, treatment, and control. [9]

In Zimbabwe, like other developing countries, there is increasing burden of non communicable diseases such as hypertension, diabetes and cancers but little effort and resources has been put to address the underlying factors that are associated with the growing epidemic.[10] According to the Zimbabwe National Health Strategy the prevalence of hypertension in Zimbabwe is 27% and this is because mainly high prevalence of risk behaviours such as physical inactivity, tobacco smoking, high salt diet and excessive alcohol consumption.[10]

Hypertension is also a public health problem in Bulawayo City, with an annual number of consultations of 16522 in 2006, 14912 in 2007 and 13475 in 2008. Hypertension was among the top five reasons of City clinics outpatient consultations in adults, among the top three reasons of consultation in the age group 45-64 years and number one reason of consultation in the above 65 year age group in the years 2006-2008.[11]

Despite the limitation to accurate diagnosis of complications of hypertension (resulting in underestimation of the actual cases), hypertension and its complications was number one cause of deaths in people above the age of 65years in Bulawayo City claiming 18.5% of deaths of the above 65 age group.[11]

Prevention strategies such as promotion of physical activity, low salt diet (including regulation of salt content in processed food), cessation of smoking, moderation of alcohol consumption and monitoring and control of hypertension can be done at primary health centre at reasonable cost compared to the inpatient management of stroke, myocardial infarction, dialysis in case of renal failure or other complications of hypertension.[1] This stresses the common phrase 'treatment is better than cure/treatment'.

Early diagnosis, treatment and strict control blood pressure in hypertensive individual is not only cost-effective but also has potential for great impact on the hypertension related morbidity and mortality [1]. For instance, it has been estimated that a 5 mmHg reduction of mean systolic blood pressure (SBP) in the population would result in a 14 percent overall reduction in mortality due to stroke, a 9 percent reduction in mortality due to coronary heart diseases (CHD), and a seven percent decrease in all-cause mortality yet about half of strokes occurred in patients who do not know that they have hypertension in Uzumba, Maramba and Marondera.[4,12]

Hypertension share risk factors (unhealthy diet, physical inactivity, tobacco use and harmful alcohol consumption) with other non communicable diseases and these can be monitored together and act as early warning signs for most non communicable disease epidemic. Up to 80% of heart diseases and strokes can be prevented by eliminating the shared risk factors.[7]

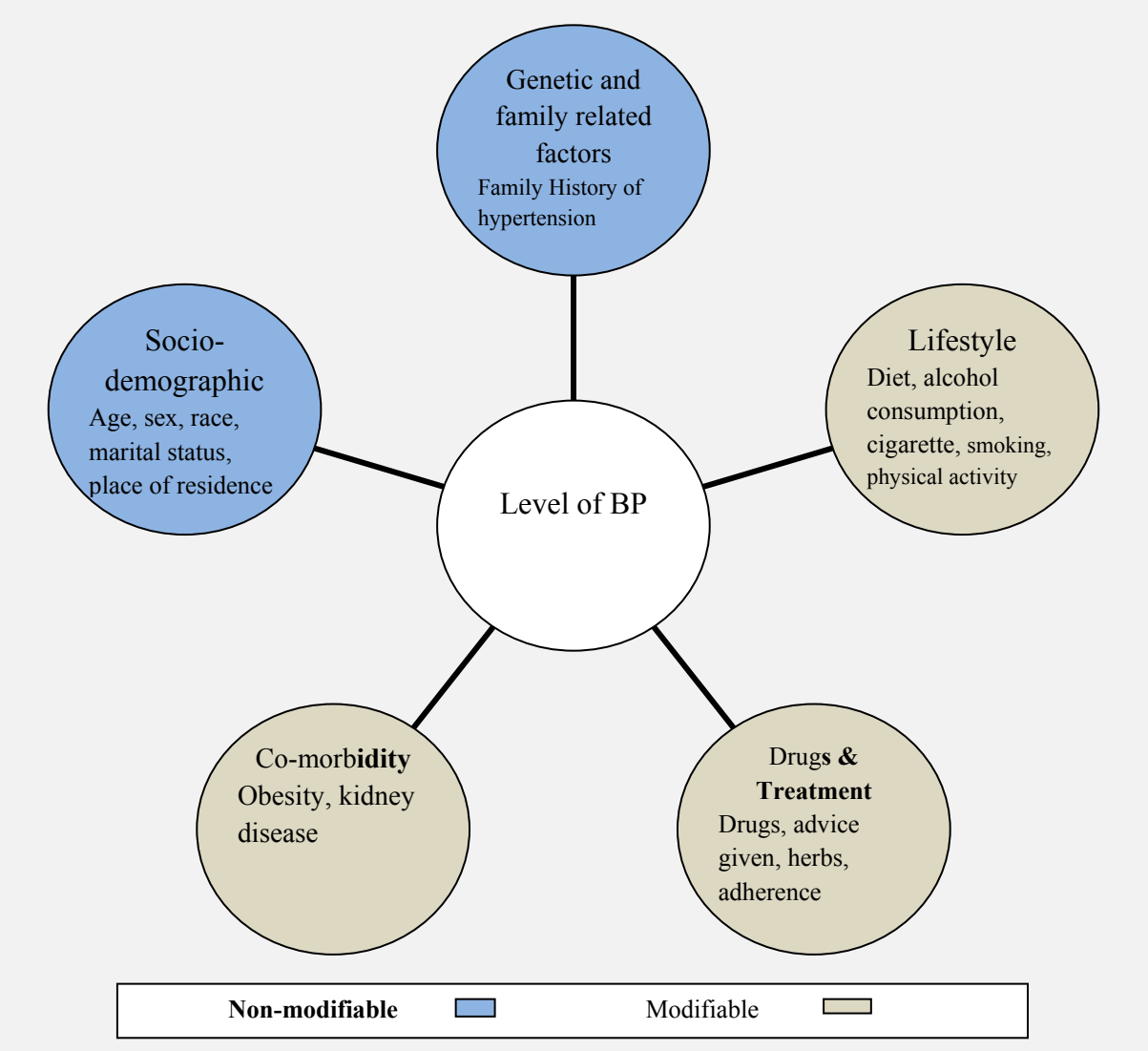
**Statement of the problem**

An increase in the number of people with raised blood pressure, about 4 in every 10 from less than two in every 10 people in the third quarter compared to the first and second quarter of 2009 was noted among Bulawayo City employees and prospective employees who came for pre-employment and periodic medical examination at Khami Road Clinic. On average 30 people were examined per week. There was no register where this information was recorded to verify the figures but all health workers involved medical examinations shared the same sentiments. There was no immediate care or information about hypertension given to those who came for medical examinations, they were only advised to go and get medical care at their local clinic or medical doctor. It was not known whether these people were going for medical evaluation and subsequent treatment. There was no information about the awareness and prevalence of hypertension, let alone information on the risk factors, treatment and control of hypertension for Bulawayo City Council employees. In a systematic review of literature on hypertension in sub-Saharan Africa, Addo J et al noted in one study that one year after diagnosing participants and referring them to a health facility for treatment, almost 27% claimed to be unaware of having hypertension.[9]

**Conceptual Framework**

According to the American Heart Association (AHA) the level of blood pressure is determined by genetic and familial factors, socio-demographic factors, lifestyle factors, co-morbidity, drug and treatment related factors as shown on Figure 1 below.

**Figure 1: Modifiable and non-modifiable determinants of the level of blood pressure**




*Source: Adapted from the American Heart association*[13]

**Genetic and family related factors**

Presence of a family member who had a history of raised blood pressure or its complications[13]

**Socio-demographic factors**

Blood pressure also varies with age, race, sex and place of residence.[13]

**Co-morbidity**

Presence of other medical disease or conditions such as diabetes mellitus, kidney disease and obesity[13]

**Drug and Treatment related**

Drugs taken for hypertension or for other conditions or recreational purposes may also affect blood pressure e.g. oral contraceptive pills, salbutamol and steroids (for asthma). Non-pharmacological advice given to hypertensive people may also affect the level of blood pressure.[13]

**Lifestyle factors**

Habits and behaviors that increase the risk of hypertension such as excessive alcohol consumption, cigarette smoking, sedentary life style, intake of high fat food, high salt diet, low intake of fruits and vegetables.[13]

**Research Question**

What is the prevalence of hypertension and its associated factors among Bulawayo City employees?

**Study Justification**

The cost effectiveness of early hypertension diagnosis and strict control compared to management of its complications and the losses incurred by the City Council in form of off-sick

therefore it is important to assess the risk posed by hypertension through determination of the awareness, prevalence and risk factors for hypertension and its complications to Bulawayo City Council employees.

The study aimed to give guidance in prioritizing evidence based intervention in the prevention and control of hypertension. There was no information on the prevalence of hypertension, its risk factors and complications in the Bulawayo City Council. The contribution of the refined foods imported from neighboring countries, high in fat and salt, which had became the only source of food for the past eighteen to twenty four months had not been evaluated. The prevalence of high risk behaviors may assist in estimating the burden of hypertension and other non-communicable diseases for the next 5 – 15 years.

**Broad objective**

To determine prevalence of hypertension and risk factors among Bulawayo City Employees

**Specific objectives**

- To determine prevalence of hypertension among Bulawayo City Council employees
- To assess treatment of hypertension among Bulawayo City Council employees
- To determine factors associated with hypertension among Bulawayo City Council employees
- To determine the prevalence of risk factors for hypertension among Bulawayo City Council employees

## CHAPTER 2: LITERATURE REVIEW

The global prevalence of hypertension is estimated to be 30% of adult population, varying between economically developed and developing countries and between rural and urban areas of the same population. According to a systemic review of global burden of hypertension, the lowest prevalence of hypertension was 3.4% in rural India and the highest was 72.5% in Polish women. Developed countries had prevalence ranging between 20% and 50% while developing countries had significantly lower rates, except for Zimbabwe (urban) which had rates comparable to the developed countries.[14]

A series of studies and surveys conducted by National Health and Nutrition Examination Survey (NHANES) between 1976 and 2004 to assess the trends in hypertension prevalence, blood pressure distributions and mean levels, and hypertension awareness, treatment, and control among US adults, aged more than 18 years, showed that there was an increasing pattern of awareness, control and treatment of hypertension, and that prevalence of hypertension was increasing reaching 28.9% as of 2004, with the largest increases among non-Hispanic women.[15]

The prevalence, awareness, treatment and control of hypertension in the Jackson Heart Study in the United States were 62.9%, 87.3%, 83.2% and 66.4% respectively.[8] The results suggested that public health interventions were relatively effective in increasing awareness and treatment among the study population, the African Americans.

In a general population study in Turkey, 44% were found to be to be hypertensive with higher rates in women (46.1%) than men (41.6%).

More than half of the hypertensive participants (54.5%) were being treated for hypertension but only 24.3% of these had adequate control of the blood pressure.[16] This means that more than 85% of hypertensive participants were still at high risk of developing hypertensive related morbidity and mortality.

The prevalence of hypertension was found to be strongly linked to age, with 16.9% and 84.4% of the age groups 20- 29years and 60-69 years respectively being hypertensive.[16] Similar pattern was seen in Egypt in which the youngest age group (25 to 34 years) hypertension was present in 7.8% of the population, whereas the prevalence rate was 59.4% in the 65-74 age group.[17] However the overall prevalence of 26.3% was much lower than that in Turkey (44%).[16,17]

In Egypt, awareness, treatment and control of hypertension were at 37.5%, 23.9% and 8.0% respectively.[17] These figures are too low to have an impact on the morbidity and mortality of hypertension related illness which is increasing in the developing countries. Hence public health interventions are needed to increase awareness, treatment and control of hypertension.

In a study of the sex difference in the awareness and treatment of hypertension in France, women were found to have a better awareness of hypertension than do men (69.8% and 51.8%) and their hypertension was treated and controlled better (51.2% and 25.3% compared to 30.0% and 9.2% for treatment and control in females and males respectively).[18]

In Mozambique, prevalence, awareness, treatment and control of hypertension were found to be 33.1%, 14.8%, 51.9%, 39.9% respectively.[19] Prevalence was higher in men than women but awareness, treatment and control was higher in women. Unlike Mozambique, Cameroon had considerably lower prevalence rates of 16.4% in men and 12.1% in women in urban area and 5.4% and 5.9% in rural men and women respectively.[19,20]

Age, male gender, obesity (measured by BMI), low education level, non smoking, family history of hypertension, medical conditions, occupation and parity (in women) were found to be significant risk factors for hypertension in Turkey.[16]

Optimum control of hypertension is the goal of pharmacological and non pharmacological interventions. In the United States, factors that were associated with good control of hypertension were being married, having a health insurance, visiting the same health facility, being seen by the same health care provider, having blood pressure checked in the preceding six months and preceding 6-11 months and reported using lifestyle modifications.[21]

In the inter-ASIA study in China, participants who were former smokers, overweight/obese, had higher income or their blood pressure measured in the previous five years preceding the study were likely to be aware of their hypertension. Current smokers, those who consumed alcohol or the less active participants were less likely to be aware of their hypertension.[22]

In the same study, hypertension treatment was positively associated with being older, female gender, obesity and having blood pressure checked in the preceding 12 months but negatively associated with current smoking, alcohol consumption and being physically active. Blood pressure control was associated with being female, being a former smoker, being obese and having blood pressure measured within the previous one year.[22]

In a study on the correlates of blood pressure, Mufunda J et al reported that there was a very high prevalence of hypertension among urban Zimbabweans, particularly among women and the prevalence of hypertension had a steep association with age.

No tobacco use in women and greater Na/K ratio in spot urines in men were significantly associated with an increased systolic blood pressure. In both men and women the levels of hypertension was strongly positively associated with BMI.[23]

In a study on the management of hypertension, Matenga JA et al reported that awareness is low and treatment and control of hypertension are inadequate in Zimbabwean population and hence there was an urgent need to set up a national policy for the prevention and control of hypertension in Zimbabwe. The main focus would be on prevention, as this may be more cost-effective for a developing country with limited resources.[24]

Despite many knowledge gaps in the awareness, prevalence, risk factors, treatment and control of hypertension and its complications in Sub-Saharan Africa this area has received little attention in terms of both basic and operational research.[9] The paucity of critical information on hypertension prevalence and risk factors may contribute to its low rank priority as a public health problem in developing countries as compared to communicable diseases such as HIV, TB and malaria. These diseases have been given too much attention which has resulted in the neglect of non communicable diseases such as hypertension. The interventions to target hypertension such as awareness campaigns on weight reduction, dietary modification, increasing physical activity and cutting down on alcohol consumption are cheaper and have potential for greater impact compared to HIV preventive measures such as male circumcision yet funding of programs to target non-communicable diseases is almost always unavailable.

## CHAPTER 3: METHODS AND MATERIALS

### Study design

An analytical cross-sectional study was carried out among Bulawayo City Council employees in June and July of 2010.

### Sample size calculation

Using the Dobson formula $n = z^2pq/\Delta^2$

Where n = sample size

z = standard z score

p = prevalence of hypertension (proportion of people with hypertension)

q = 1-p (proportion of people without hypertension)

$\Delta$ = absolute precision

Assuming 95% confidence interval (z=1.96), prevalence of hypertension (p) of 26.3% [17] an absolute precision of 5% and 20% non response/refusal rate a total number of 358 participants was calculated.

### Sampling procedure:

Using employment registers from the five departments as sampling frame, systematic sampling was employed to select study participants. The total number of employees (N=3957) was calculated by adding the number of employees in each department register. The total number was divided by 358 (the sample size (n)) to get the interval of selection of 11. The first participant was selected from the first 11 by the lottery method. The subsequent participants were selected by adding the interval 11 to the selected participant. This was done until all 358 participants are selected.

**Inclusion criteria**

Bulawayo City Council employees who were on the employee register and had worked for council for more than six months were eligible for enrolment into the study.

**Exclusion criteria**

Contract workers and employees who had worked for less than six months and those who declined to participate were excluded from the study.

**Data collection**

Interviewer administered questionnaire was adapted from the World Health Organization STEPwise approach to surveillance (STEPS) instrument (adapted to suit Bulawayo City employees). The questionnaire was translated to Ndebele.

STEPSwise approach to surveillance (STEPS) is a sequential process for collecting data on Chronic diseases and their risk factors. It starts with gathering key information on risk factors with a questionnaire, then moves to simple physical measurements and then to more complex collection of blood samples for biochemical analysis.[25] In this study only interviews and physical measurements were done. Measurement and recording of weight, height, waist and hip circumference and blood pressure done as described below.

**Table 1**: Study Variables

| Concept | Variables |
|---|---|
| **Outcome variables** | |
| Blood pressure | Systolic (SBP) and diastolic blood pressure (DBP) |
| **Dependent variables** | |
| Socio-demographic | Age, sex, marital status, level of education, family income, occupation |
| Family-related | Family history of hypertension, family history of hypertension complications |
| Lifestyle related factors | Salt intake, fat intake, fruit and vegetable consumption, alcohol consumption, tobacco smoking, physical activities at work, traveling and home/recreation |
| Co-morbidity | Obesity, diabetes, kidney diseases |
| Drugs and treatment | Hypertensive and non-hypertensive drugs, non-pharmacological treatment, adherence to treatment |
| Anthropometric measurements | Weight, height, waist and hip circumference |

**Definition of Variables**

**Hypertension**

Hypertension was defined as average systolic blood pressure (SBP) of 140 mmHg or higher and/or average diastolic blood pressure (DBP) of 90mmHg or higher

Or a participant taking anti-hypertension medication within the preceding two weeks [7]

**Awareness of hypertension**

Knowing or remembering that the individual was previously diagnosed of hypertension or was told that his/her blood pressure was raised by a health care worker (even without remembering the actual values of systolic and diastolic blood pressure).[8]

**Undiagnosed hypertension**

Undiagnosed was defined as someone who fitted into the definition of hypertension but was not aware that s/he was hypertensive.

**Treatment of hypertension**

Treatment of hypertension was defined as having taken antihypertensive drugs within the past two weeks[8]

**Blood pressure control**

Good blood pressure control was defined as an average SBP of less than 140mmHg and an average DBP of less than 90mmHg in a participant taking anti-hypertension medication.
Poor blood pressure control was defined as an average SBP which was more or equal to 140mmHg and/or an average DBP which was more or equal to 90mmHg in a patient being treated for hypertension.[8]

**Measurement of Variables**

**Blood pressure**

After the interview, the study participant was allowed to rest (relax) for 15 minutes then two blood pressure measurements were taken three minutes apart in a sitting position. The blood pressure was measured on the left upper arm. The participant was positioned in such a way that the left upper arm was at the same level with the heart. To minimize measurement and inter-

observer variability, digital BP machine was used throughout the study and all blood pressure measurements were done by one qualified person.

**Weight, height, hip and waist circumference**

Body weight was measured to the nearest 0.1 kg using a digital scale and height to the nearest 0.1 cm in the standing position with no shoes using a portable height board. Waist circumference was measured to the nearest 0.1 cm, using a constant tension tape, directly over the skin or over light clothing, at the level of the midpoint between the inferior margin of the last rib and the iliac crest in the mid-axillary line. Hip circumference was measured, to the nearest 0.1cm, on the widest part of the hips over light clothing. A constant tension tape was used.

All measurements were done by one qualified person to reduce inter-observer variability.

**Pretest**

Questionnaire was pre-tested on 20 patients at Northern Suburb Clinic and necessary adjustments were made.

**Data processing and analysis**

Averages of two systolic and diastolic blood pressure measurements were calculated and were used as variables in the analysis. The classification on Table 2 was used to classify average systolic and diastolic blood pressure.

**Table 2**: Classification of blood pressure

| Classification | Systolic value (mmHg) | Diastolic value (mmHg) |
|---|---|---|
| Hypotension (low blood pressure) | <90 | <60 |
| Normal blood pressure | 90-119 | 60-79 |
| Pre-hypertension | 120-139 | 80-89 |
| Hypertension stage 1 | 140-159 | 90-99 |
| Hypertension stage 2 | ≥160 | ≥100 |

*Source: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure.*[4]

Body mass index (BMI) was used as a measure of obesity. BMI was calculated by dividing the weight of an individual (in kg) by the square of the height in metres ($m^2$).

The classification on Table 3 below was used

**Table 3**: Classification of obesity using BMI

| **Class** | **BMI** $Kg/m^2$ |
|---|---|
| Under weight | <18.5 |
| Normal weight | 18.5-24.9 |
| Overweight | 25-29.9 |
| Obesity class I | 30.0-34.9 |
| Obesity class II | 35.0-39.9 |
| Obesity class III (extreme obesity) | >40 |

*Source: The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure*[4,25]

Waist/hip ratio was calculated by dividing waist circumference (cm) by hip circumference. The ration was used to classify obesity into abdominal and non abdominal obesity. Abdominal obesity was defined as waist/hip ratio of ≥ 0.80 in females and ≥0.85 in males.

Intensity of physical activity was measured in Metabolic Equivalents (MET) that is the ratio of a person's working metabolic rate relative to the resting metabolic rate. Table 4 below shows the MET values that were used for the various activities that participants were involved in.[23]

**Table 4**: Metabolic Equivalents of intensity of physical activities used in grading level of physical activity of Bulawayo City Council employees, 2010

| Domain | Intensity of activity | MET value |
|---|---|---|
| Work activities | Moderate | 4 |
| | Vigorous | 8 |
| Transport | Cycling/walking | 4 |
| Recreation/home activities | Moderate | 4 |
| | Vigorous | 8 |

*Source: STEPwise approach to Surveillance of Chronic Diseases and Risk Factors Instrument. World Health Organization*[25]

The number days per week on which the activity was done was multiplied by the number of minutes taken doing the activity per day and then multiplied by the MET value for each activity to get the number of MET-minutes/week. The number of MET-minutes/week for each activity were then added to get the total number of MET-minute/week which was then used to classify physical activity into high, moderate and low as per WHO STEP guidelines.[25] Low physical activity was used as physically inactivity in this study as per WHO guidelines.[25]

**Table 5**: Criteria used to classify physical activity of study participants

| Level of activity | Criteria |
|---|---|
| **High physical activity** | A person reaching any of the following criteria is classified in this category:<br>- Vigorous-intensity activity on at least 3 days achieving a minimum of at least 1,500 MET-minutes/weeks<br>OR<br>- 7 or more days of any combination of walking, moderate- or vigorous intensity activities achieving a minimum of at least 3,000 MET-minutes per week. |
| **Moderate physical activity** | A person not meeting the criteria for the "high" category, but meeting any of the following criteria is classified in this category:<br>- 3 or more days of vigorous-intensity activity of at least 20 minutes per day OR<br>- 5 or more days of moderate-intensity activity or walking of at least 30 minutes per day OR<br>- 5 or more days of any combination of walking, moderate- or vigorous intensity activities achieving a minimum of at least 600 MET-minutes per week. |
| **Low physical activity** | A person not meeting any of the above mentioned criteria falls in this category |

*Source: STEPwise approach to Surveillance of Chronic Diseases and Risk Factors Instrument. World Health Organization*[25]

Epi-info version 3.01 was used to analyze generate frequencies, prevalence, tables and graphs. The same package was used to calculate measures of association and their confidence intervals. Stratified analysis was carried out to check and control for confounders and assess for effect modification. Multivariate analysis using stepwise logistic regression was used to identify independent risk factors for hypertension.

**Permission to proceed**

Permission was obtained from Health Studies Office, Director of Health Services Bulawayo City Council and Head of Departments.

**Ethical consideration**

Clearance was obtained from Medical Research Council of Zimbabwe. Informed written consent was obtained from the study participants. Confidentiality was assured and maintained throughout the study. Names of participants were not captured on questionnaires. All participants were given health education on hypertension after the interview. Previously undiagnosed hypertensive participants who had raised Blood Pressure were referred to Bulawayo City clinics for full medical evaluation and subsequent treatment.

# CHAPTER 4: RESULTS

## Sample size & attrition

Eleven (3%) participants refused to participate in the study. Seventeen participants were on normal leave, 6 on sick leave, 13 on study leave, 4 were stationed at Ncema Water Works (outside Bulawayo City), 5 questionnaires were not complete so a total of 302 (84.4%) were analyzed giving an attrition rate of 15.6%.

## Socio-demographic characteristics

Table 6 and Table 7 show that 164 (54.3%) participants were females. Only eight (2.65%) were below the age of 25 years and forty six (15.2%) were 55 years and older. The median ages of study participants were 39 years ($Q_1$=31, $Q_3$=49) and 43 years ($Q_1$=34.5; $Q_3$=50) for males and females respectively, with an overall median age of 41 years $Q_1$=33; $Q_3$=49). One hundred and eight nine (62.6%) participants were married and the majority (33.4%) of these being males. More than 90% of study participants went to school beyond primary level. Health workers constituted 27.5% of study participants and most (92%) of health workers were females. Health work, accounts and administration staff constituted the majority (71.3%) of female participants whereas the majority (53.6%) of male participants was general hands. About 43.7% (132) of respondents' families earned less than US$ 500.00 per month, 23.2% (70) of the families earned between US$500 andUS$999, 30.1% (91) earned US$1000 and above and 3.0% (9) were not willing to disclose their family income. The socio-demographic characteristics of study participants are shown on Table 6 and 7 below.

**Table 6**: Frequency distribution of socio-demographic characteristics of Bulawayo City Council employees by sex, 2010

| Variable | Frequency (%) | | |
|---|---|---|---|
| | **Males n=138** | **Females n=164** | **Overall n=302** |
| **Age** (years) | | | |
| <25 | 5 (1.7) | 3 (1.0) | 8 (2.7) |
| 25-34 | 44 (14.7) | 38 (12.6) | 82 (27.2) |
| 35-44 | 35 (11.6) | 51 (16.9) | 86 (28.5) |
| 45-54 | 31 (10.3) | 49 (16.2) | 80 (26.5) |
| 55+ | 23 (7.6) | 23 (7.6) | 46 (15.2) |
| **Marital status** | | | |
| Married | 101(33.4) | 88 (29.1) | 189 (62.6) |
| Not married | 37 (12.3) | 76 (25.2) | 113 (37.4) |
| **Level of education** | | | |
| Primary | 16 (5.3) | 9 (3) | 25 (8.3) |
| Secondary | 79 (26.2) | 83 (27.5) | 162 (53.6) |
| Tertiary | 43 (14.2) | 72 (23.8) | 115 (38.1) |

**Table 7**: Frequency distribution of socio-demographic characteristics of Bulawayo City Council employees by sex, 2010

| **Variable** | **Frequency (%)** | | |
|---|---|---|---|
| | **Males n=138** | **Females n=164** | **Overall n=302** |
| **Occupation** | | | |
| Accounts &Administration | 24 (7.9) | 41 (13.6) | 65 (21.5) |
| Health workers | 6 (2.0) | 76 (25.2) | 82 (27.2) |
| General hand | 74 (24.5) | 29 (9.6) | 103 (34.1) |
| Artisans | 21 (7.0) | 7 (2.3) | 28 (9.3) |
| Other | 13 (4.3) | 11 (3.6) | 24 (8.0) |
| **Family Income** (US$)* | | | |
| <500 | 80 (26.5) | 52 (17.2) | 132 (43.7) |
| 500 – 999 | 32 (10.6) | 38 (12.6) | 70 (23.2) |
| >1000 | 24 (7.9) | 67 (22.2) | 91 (30.1) |
| **Have medical insurance** | 78 (25.8) | 123 (40.7) | 201 (66.6) |
| **Religion** | | | |
| Protestants | 51 (16.9) | 83 (27.5) | 134 (44.4) |
| Pentecostal | 27 (8.9) | 50 (16.60 | 77 (23.5) |
| Apostolic | 10 (3.3) | 12 (4.0) | 22 (7.3) |
| Others | 50 (16.6) | 19 (6.3) | 69 (22.9) |

**9 participants were not willing to disclose their family income*

**Distribution of Blood pressure**

The overall mean systolic blood pressure was (mean ± SD) 134.1 ± 18.6mmHg, with mean systolic of 135.9±17.7mmHg and 132±19.0mmHg among males and females respectively. The overall mean diastolic blood pressure was 83.3±11.5 mmHg, with mean diastolic blood pressures of 84.2±10.4mmHg and 83.3±12.3mmHg among males and females respectively. About 19.2% of the participants had normal blood pressure, 42.4% had pre-hypertension, 22.8% had hypertension stage 1 and 15.5% had hypertension stage 2. Both mean systolic and mean diastolic blood pressures rose steadily with age as shown on Table 8.

**Table 8**: Distribution of mean systolic and diastolic blood pressure by age group among Bulawayo City Council employees, 2010

| **Age Group (years)** | **Mean systolic BP ± SD (mmHg)** | **Mean diastolic BP ±SD (mmHg)** |
|---|---|---|
| <25 | 122.6 ± 12.0 | 73.1 ± 9.6 |
| 25 – 34 | 126.0 ± 11.7 | 79.3 ± 8.1 |
| 35 – 44 | 131.1 ± 16.0 | 82.4 ± 16.2 |
| 45 – 54 | 140.3 ± 20.5 | 87.2 ± 13.0 |
| 55+ | 145.3 ± 21.4 | 89.1 ± 11.0 |

**Prevalence of hypertension**

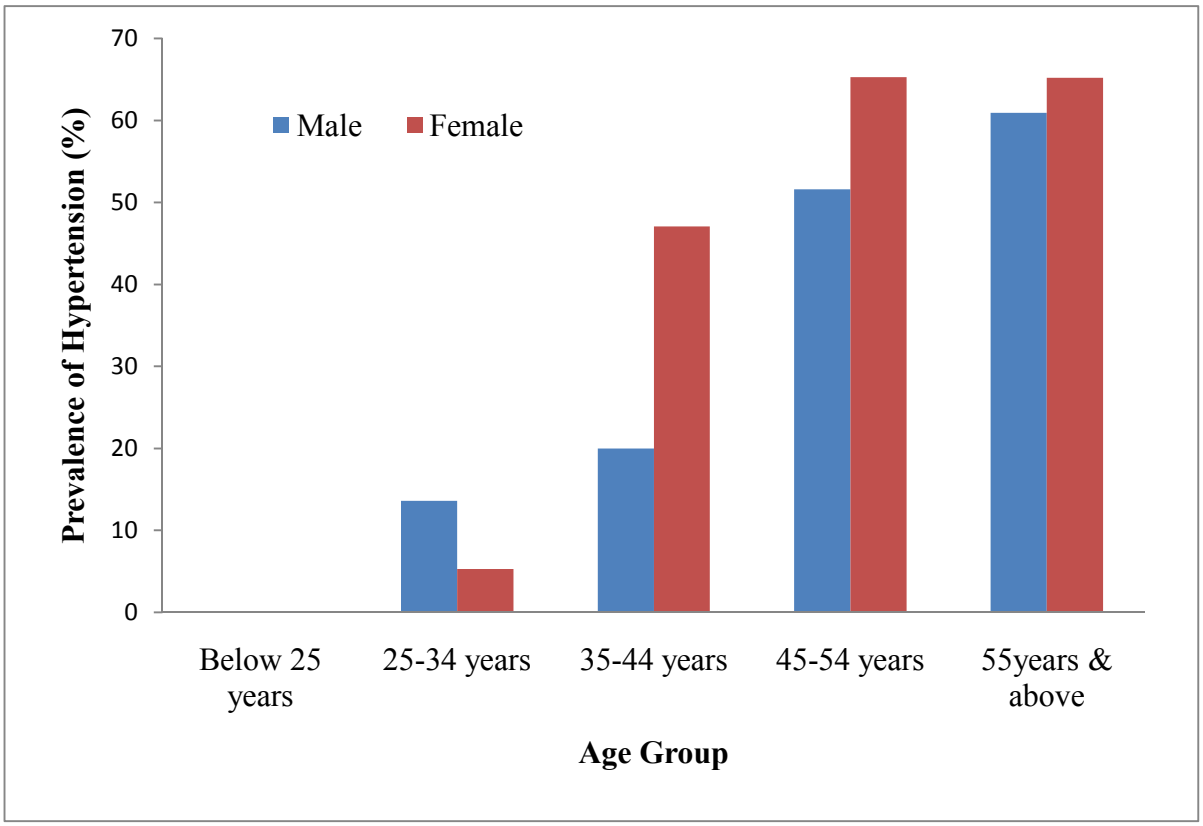
Table 9 shows that the overall prevalence of hypertension was 38.4% (95% CI 32.9%; 44.2%). The prevalence of hypertension was higher among females 44.4% (95% CI 36.8%; 52.5%) than males 31.2% (95% CI 23.6%; 39.6%). The overall prevalence of undiagnosed hypertension was 14.2%, with 12.2% among females and 16.7% among males.

**Table 9**: The prevalence of hypertension by sex among Bulawayo City Council employees, 2010

| | Frequency | | |
|---|---|---|---|
| **Variable** | **Male** | **Female** | **Overall** |
| | **n=138 (%)** | **n=164 (%)** | **n=302 (%)** |
| Diagnosed hypertension | 20 (14.5) | 53 (32.3) | 73 (24.2) |
| Undiagnosed hypertension | 23 (16.7) | 20 (12.2) | 43 (14.2) |
| Hypertension (all) | 43 (31.2) | 73 (44.5) | 116 (38.4) |

The prevalence of hypertension was higher in the older age groups as shown on Figure 2. Below the age of 25 years, the prevalence of hypertension was 0.0%. it rose to 9.8%, 36.0%, 60% and 63% for the age groups 24-34 years, 35-44years, 45-54years and 55 years and above respectively. Below the age of 35 years, the prevalence of hypertension was higher in males but after 35 years, it was higher in females as shown on Figure 2.

**Figure 2:** Age and sex distribution of the prevalence of hypertension among Bulawayo City Council employees, 2010



**Treatment of hypertension**

Table 10 shows that among participants who were previously diagnosed of hypertension (aware of hypertension status), 59 (80.8%) were on treatment of which 13 (65.0%) were males and 46 (86.8%) were females. Among participants on treatment for hypertension, only (2) 15.4% of males, (21) 45.6% of females and overall (23) 39.0% had well controlled blood pressure. Treatment and control of hypertension was higher in female than in male hypertensive participants.

**Table 10**: Treatment and control of blood pressure among previously diagnosed hypertensive Bulawayo City Council employees, 2010

| | Frequency | | |
|---|---|---|---|
| **Variable** | **Males** | **Females** | **Overall** |
| | **n=20** | **n=53** | **n=73** |
| On treatment | 13/20 | 46/53 | 59/73 |
| BP well-controlled | 2/13 | 21/46 | 23/59 |

Fifteen ( 20.5%) participant who had ever taken antihypertensive drugs had now stopped and reason cited for stopping treatment were adverse effects (4/15), feeling better (3/15), completed treatment (3/15) and blood pressure was normal (3/15). Two (2/15) participants did not have reasons for stopping treatment.

Of the 59 participants who were on treatment, 23 were on at least two hypertensive drugs. Table 8 below shows that the most frequently taken drug was hydrochlorothiazide. The frequency of drugs used by hypertensive participants are shown on the Table 11 below.

**Table 11**: Frequency of anti-hypertensive drugs used by hypertensive Bulawayo City Council employee, 2010

| **Drug** | **Frequency (%)** **n=59** |
|---|---|
| Hydrochlorothiazide | 42 (71.1) |
| Nifedipine | 11 (18.6) |
| Angiotensin Converting Enzyme inhibitors (ACE- inhibitors) | 10 (16.9) |
| β-blockers | 9 (15.3) |
| Methyl-dopa | 8 (13.6) |
| α-blocker | 3 (5.1) |
| Others antihypertensive drugs | 4 (6.8) |

**Table 12**: Non pharmacological advice given to hypertensive Bulawayo City Council employees on treatment, 2010

| **Advice** | **Frequency** | |
|---|---|---|
| | **n=72** | **%** |
| Reduce salt in the diet | 36 | 50.0 |
| Start exercise | 29 | 40.3 |
| Reduce weight | 27 | 37.5 |
| Reduce/stop alcohol | 6 | 8.3 |
| Stop smoking | 3 | 4.1 |

Table 12 shows that 36 (50%) hypertensive participants on treatment for hypertension were advised to reduce salt intake, 29 (40.3%) were advised to start exercise, 27 (37.5%) were advised to reduce weight while 6 (8.3%) and 3 (4.1%) were advised to stop/reduce alcohol and stop smoking respectively. Although hypertensive patients were given non pharmacological advice, very few took the advice with only 26 (36.1%) reporting having reduced salt in their diet, 14 (19.4%) had lost weight, 17 (23%) had started exercising and no one had reduced alcohol consumption or stopped smoking.

**Table 13**: Prevalence and sex distribution of assessed factors among Bulawayo City Council employees, 2010

| Factor | Males n=138 | Females n=164 | Overall n=302 |
|---|---|---|---|
| Family History of hypertension | 48 (34.8) | 107 (65.2) | 155 (51.3) |
| Obesity | | | |
| Overweight | 56 (40.6) | 64 (39.0) | 120 (39.7) |
| Obesity class 1 | 14 (10.1) | 34 (20.7) | 48 (15.9) |
| Obesity class 2 | 3 (2.2) | 16 (9.8) | 19 (6.3) |
| Obesity class 3 | 0 (0.0) | 5 (3.0) | 5 (1.7) |
| Total with abnormal BMI | 73 (52.9) | 119 (72.6) | 192 (63.6) |
| Alcohol consumption | 50 (36.2) | 12 (7.3) | 62 (20.5) |
| Cigarette smoking | | | |
| Direct smoking | 24 (17.4) | 0 (0.0) | 24 (8.0) |
| Passive (secondhand) smoking | 4 (2.9) | 9 (5.6) | 13 (4.3) |
| Total smokers | 28 (20.3) | 9 (5.6) | 37 (12.3) |
| High Salt diet | 71 (51.4) | 60 (36.6) | 131 (43.4) |
| Diabetes mellitus | 8 (5.8) | 29 (17.7) | 37 (12.3) |
| Physical inactivity | 49 (35.5) | 111 (67.7) | 160 (53.0) |

**Family history of hypertension**

One hundred and fifty five (51.3%) participants had an immediate family member with a history of hypertension and 107 (69.0%) were females. Sixty four (40%) of the family members with a history of hypertension were mothers of participants. Fifty six (36%) of the family members with a history of hypertension had developed complications of hypertension such as heart failure (35/36), stroke (16/36) and kidney failure (9/36). Four people having more than one complication.

**Obesity**

The mean body mass index (BMI ± SD) was 28.3 ± 5.4 kg/$m^2$ in females, 25.4 ± 3.9 kg/$m^2$ in males and an overall mean BMI of 27.0 ± 5.0 kg/$m^2$. One hundred and ninety two (63.6%) of the participants had weight above the recommended for their height, 120 (39.7%) were overweight, 48 (15.9%) were obese class I, 19 (6.3%) were obese class II and 5 (1.7%) were obese class III. The overall prevalence of obesity was 23.9%. Overweight/obesity was more prevalent among females (72.6%) compared to males (52.9%). Of the 72 participants who were obese, 51 (70.8%) participants had abdominal (or central) obesity i.e. Waist/Hip ratio of ≥0.8 in females and ≥0.85 in males. Forty one (80.4%) participants with abdominal obesity were females.

**Oral contraception**

Eighteen (6.0%) participants reported taking combined oral contraceptive pills for family planning. All participants who were on the combined oral contraceptive pill were not hypertensive and were aged below 35 years.

**Smoking**

Prevalence of smoking was 7.9%. All current smokers were males, giving a sex specific smoking prevalence of 17.4% and 0.0% for males and females respectively. For current smokers, the median duration of smoking was 13 years ($Q_1$= 6; $Q_3$=18) and the median number of cigarettes smoked per day was 8.5 ($Q_1$=4; $Q_3$=10). Prevalence of passive (secondhand) smoking was 4.3%, 5.4% among females and 2.8% among males. About 46.5% of passive smoking occurred in the work place.

**Alcohol consumption**

The overall prevalence of alcohol consumption was 20.5% (62), with (50) 36.2% among males and 7.3% (12) among females. The median number of standard alcoholic drinks consumed per drinking occasion was 4 ($Q_1$=3; $Q_3$=5). The number of people who had at least one heavy drinking episodes/month (≥5 standard drinks/day in males or ≥4 in females) was 37 (60.9%) and median number of heavy drinking episodes per month was 2.5 ($Q_1$=0; $Q_3$=4.5). The frequency of drinking alcohol was generally low, with two (3.2%) participants reported drinking alcohol daily, two (3.2%) between 5-6 days/week, 36 (58.1%) between 1-4 days/week while 22 (35.5%) between 1-3 days/month.

**Diet**

One hundred and seventy one (56.6%) participants reported adding salt to their food on the table and seventy four (43.3%) participants did so on 5 days or more per week. The majority (44) of these were males. Fifty five (18.2%) ate at least 5 servings of fruits per week and 173 (57.3%) ate at least 5 servings of vegetables per week. The majority of participants who ate at least 5 servings of fruits and vegetables were females.

The commonly used oil was vegetable oil. Although only 25 (8.3%) participants reported occasionally using animal fat for cooking, only 16 (5.3%) participants reported consistently removing visible fat on meat before cooking. One hundred and seven (34.8%) used cooking methods such as frying that leaves food with a lot of fat on at least 5 days per week.

**Physical inactivity**

The overall prevalence of physical inactivity was 53.0%, with 67.7% in females and 35.5% in males. Of the 142 who were physically active 93 (65.5%) were general hand workers and the activity was experienced mainly at work. Only 18 (6.0%) participants do significant activity (more than 30 minutes of moderate or vigorous activity/day) at home or during leisure time and 5 (1.7%) while traveling to and from places.

**Risk factors for Hypertension**

**Socio-demographic factors**

Participants who were 40 years and above were 7 times more likely to be hypertensive than those who were below the age of 40 years. Other risk socio-demographic factors were education level of primary and below (OR=2.18, 95%; CI: 0.96 – 4 .99), being married (OR=1.90; 95%CI: 1.15 – 3.13), being female (OR 1.77; 95% CI: 1.10 – 2.73), being a health worker (OR=1.68; 95%CI: 1.00 – 2.82), and family income of more than US$ 500 (OR=1.65; 95%CI: 1.00 – 2.73). Socio-demographic factors associated with hypertension are shown on Table 14.

**Table 14**: Socio-demographic factors associated with hypertension among Bulawayo City Council employees, 2010

| **Factors** | | **Hypertensive** | **Non-Hypertensive** | **OR** | **95%CI** |
|---|---|---|---|---|---|
| Age | ≥ 40 years | 94 | 70 | **7.08** | **4.08 – 12.30** |
| | < 40 years | 22 | 116 | | |
| Education level | Primary | 14 | 11 | 2.18 | 0.96 – 4.99 |
| | Secondary/+ | 102 | 175 | | |
| Marital status | Married | 83 | 106 | **1.90** | **1.15 – 3.12** |
| | Single | 33 | 80 | | |
| Sex | Female | 73 | 91 | **1.77** | **1.10 – 2.85** |
| | Male | 43 | 95 | | |
| Occupation | Health worker | 39 | 43 | **1.68** | **1.00 – 2.82** |
| | Non- Health worker | 77 | 143 | | |
| Income | ≥US$ 500 | 74 | 96 | **1.65** | **1.00 – 2.73** |
| | <US$ 500 | 42 | 90 | | |

**Lifestyle related factors**

Table 15 shows that participants who added salt to their food on the table were1.93 times more likely to be hypertensive than those who did not. Participants who were currently smoking tobacco were 1.67 times more likely to be hypertensive than those who were not smoking but however this was not statistically significant. Participants who were physically inactive were 1.53 times more likely to be hypertensive than those who were physically active but this was not statistically significant. Participants who drink alcohol were 7% less likely be hypertensive than those who do not drink and again, this was not statistically significant.

**Table 15**: Lifestyle –related factors associated with hypertension among Bulawayo City Council employees, 2010

| **Factors** | | **Hypertensive** | **Non-Hypertensive** | **OR** | **95%CI** |
|---|---|---|---|---|---|
| Add salt to food | Yes | 77 | 94 | 1.93 | 1.19 – 3.12 |
| on the table | No | 39 | 92 | | |
| Tobacco | Yes | 12 | 12 | 1.67 | 0.73 – 3.86 |
| Smoking | No | 104 | 174 | | |
| Physically | Yes | 69 | 91 | 1.53 | 0.93 – 2.52 |
| inactive | No | 47 | 95 | | |
| Drinking alcohol | Yes | 23 | 39 | 0.93 | 0.52 – 1.66 |
| | No | 93 | 147 | | |

**Family and co-morbidity related factors**

Table 16 shows that obese participants were 4.39 times more likely to be hypertensive than those who were not obese and this was statistically significant. Participants with an immediate family member with hypertension were 2.73 times more likely to be hypertensive than those who did not have. Diabetic participants were 2.05 times more likely to be hypertensive than non diabetic participants but however this was not statistically significant.

**Table 16**: Family and disease related factors associated with hypertension among Bulawayo City Council employees, 2010

| **Factors** | | **Hypertensive** | **Non-Hypertensive** | **OR** | **95%CI** |
|---|---|---|---|---|---|
| Obese | BMI≥30 | 47 | 25 | **4.39** | 2.42 – 8.00 |
| | BMI<30 | 69 | 161 | | |
| Family history of hypertension | Yes | 77 | 78 | **2.73** | 1.69 – 4.43 |
| | No | 39 | 108 | | |
| Diabetes mellitus | Yes | 5 | 4 | 2.05 | 0.47 – 9.31 |
| | No | 108 | 177 | | |

**Stratified analysis**

The association between marital status and hypertension was modified by gender such that males who were married were more likely to be hypertensive than their female counterparts but however this was not statistically significant. This is shown on the Table 17.

**Table 17**: The association of marital status with hypertension stratified by sex among Bulawayo City Council employees, 2010

| Variable | | Hypertensive | Non hypertensive | OR | 95%CI |
|---|---|---|---|---|---|
| **Female** | | | | | |
| Marital status | Married | 44 | 44 | 1.62 | 0.87 – 3.02 |
| | Single | 25 | 47 | | |
| **Male** | | | | | |
| Marital status | Married | 39 | 62 | **5.19** | **1.71 – 15.78** |
| | Single | 4 | 33 | | |
| **Crude** | | | | | |
| Marital status | Married | 83 | 106 | **1.90** | **1.15 – 3.12** |
| | Single | 33 | 86 | | |

*$X^2$ for differing odds ratio =3.20 and p= 0.07*

**Table 18**: The association of obesity with hypertension stratified by sex among Bulawayo City Council employees, 2010

| Variable | | Hypertensive | Non hypertensive | OR | 95%CI |
|---|---|---|---|---|---|
| **Female** | | | | | |
| Obese | BMI≥30 | 36 | 19 | **3.69** | **1.86 – 7.30** |
| | BMI<30 | 37 | 72 | | |
| **Male** | | | | | |
| Obese | BMI≥30 | 11 | 6 | **5.10** | **1.74 – 14.91** |
| | BMI<30 | 32 | 89 | | |
| **Crude** | | | | | |
| Obese | BMI≥30 | 47 | 25 | **4.39** | **2.42 – 8.00** |
| | BMI<30 | 69 | 161 | | |

*$X^2$ for differing odds ratio =0.25, p = 0.62*

Table 18 above shows that the association of obesity with hypertension was neither modified nor confounded by gender.

**Multivariate Analysis**

On controlling for sex, family income, alcohol consumption and physical inactivity on logistic regression, independent risk factors risk factors for hypertension were age of 40 years or older, being obese, current tobacco smoking, having an immediate family member with hypertension and married as shown on Table 19 below.

**Table 19**: Independent risk factors for hypertension among Bulawayo City Council employees, 2010

| Variable | AOR | 95% CI | Coefficient | P-value |
|---|---|---|---|---|
| Aged 40 years and above (Yes/No) | **5.95** | 3.29 – 10.77 | 1.78 | 0.0000 |
| Obesity (Obese/non-obese) | **3.66** | 1.89 – 7.06 | 1.30 | 0.0001 |
| Current smoking (yes/No) | **3.26** | 1.05 – 10.10 | 1.18 | 0.0407 |
| Family member with hypertension | **2.87** | 1.56 – 5.28 | 1.06 | 0.0007 |
| Being married (Yes/No) | **1.95** | 1.03 – 3.67 | 0.67 | 0.0391 |

## CHAPTER 5: DISCUSSION

The prevalence (38.4%) of hypertension among Bulawayo City employees was higher than the prevalence reported in Zimbabwe general population of 27% other African countries of 33.1% in Mozambique, 26.3% in Egypt, 16.4% and 12.1% in Cameroon men but comparable to European countries such as Turkey with a prevalence of 44%.[10,16,17,19] This may be due to the high prevalence of obesity and the relatively older age group (median age 41years) compared to the general population in which the majority are below the age of 35 years. Bulawayo, being an urban setting is expected to have generally high prevalence compared to general population surveys which includes rural settings. Higher prevalence of hypertension in urban cities compared to rural setting was reported in Cameroon, Egypt, Mozambique and Zimbabwe.[10,16,17,19] A number of factors have been implicated in the development of hypertension in urban population, notably adoption of Western-type lifestyles, especially diet, physical inactivity and increased psychosocial stress.[26]

The prevalence of hypertension was higher in females than in males. Similar findings were reported in Turkey in a general population survey where hypertension prevalence was higher in women (46.1%) than men (41.6%).[16] The higher prevalence in females may be due to the high level of obesity and physical inactivity which were more common in among females than males. Among Bulawayo City Council employee, the prevalence of hypertension increased with age. In Turkey, the prevalence of hypertension was found to be strongly linked to age, with 16.9% and 84.4% of the age groups 20- 29years and 60-69 years respectively being hypertensive[16].

Similar pattern was seen in Egypt in which the youngest age group (25 to 34 years) hypertension was present in 7.8% of the population, whereas the prevalence rate was 59.4% in the 65-74 age group.[18] The increasing prevalence of hypertension with age represents the biological effect of increased arterial resistance due to thickening arterial wall that comes with age.[5,27]

High prevalence (14%) of undiagnosed hypertension is consistent with finding of the 2005 Zimbabwe STEPS Survey.[10] In the United States, undiagnosed was common in men, young adults and people who had less access to health care (those who did not have medical insurance).[28]

Although there was a high percentage of diagnosed hypertensive participants that were on treatment, the majority had blood pressure that was not well controlled. This means that the majority were still at risk of developing complications of hypertension despite being on treatment, the primary goal of hypertension is to reduce the incidences of hypertension related diseases and deaths. According to World Health Organization, the risk of cardiovascular disease doubles for each increment of 20/10 mmHg of blood pressure, starting as low as 115/75 mmHg.[29]

Poor control of hypertension may be due to the low uptake of non pharmacological measures such as salt intake reduction, losing weight and physical activity which has been found in this study. In a study of the sex difference in the awareness and treatment of hypertension in France, women were found to have a better awareness of hypertension than do men (69.8% and 51.8%) and their hypertension was treated and controlled better (51.2% and 25.3% compared to 30.0% and 9.2% for treatment and control in females and males respectively).[16]

Similar findings were reported in Turkey in a general population where more than half of the hypertensive participants (54.5%) were being treated for hypertension but only 24.3% of these had adequate control of the blood pressure[16] leaving more than 85% of hypertensive participants still at high risk of developing hypertensive related morbidity and mortality. After assessment of the evidence concerning hypertension in Sub-Saharan Africa, Juliet Addo et al concluded that hypertension was of public health importance in sub-Saharan Africa, particularly in urban areas but there was evidence of considerable under-diagnosis, treatment, and control.[9].

In this study, hypertension family history was strongly associated with hypertension. This stresses the importance of familial and genetic factors in susceptibility to hypertension and the need for regular screening in this high risk group.[2,29] The commonly reported family member were the mothers of participants and on stratified analysis, the association of hypertension and family history of hypertension was stronger in females that males suggesting that inheritance of susceptibility to hypertension might be linked to sex. However in hypertension prevention programs, more emphasis should be put on behavioral factors which can be modified and yield greater impact than concentrating on familial and genetic factors.[9,29]

Being married remained a risk factor after controlling for age, sex, obesity and family income and the association for being married was stronger for males than females on stratified analysis. This suggests that there may be other factors that were not measured in this study such as psycho-social and stress which may need to be explored by another study.

Obesity was significantly associated with hypertension after controlling for possible confounders such as sex, age and family history of hypertension.

Although more females were obese than males, stratified analysis showed that the association of obesity and hypertension was stronger in males than that in females. Similar findings were reported by Mufunda J et al in Eritrea where the effect of BMI was greater in males than in females, especially in the below 45 year age groups.[26]

Several studies have confirmed the blood pressure-lowering effect of a modest weight loss in both hypertensive and non-hypertensive obese patients. A modest weight loss can normalize blood pressure levels even without reaching ideal weight. In patients taking antihypertensive medication, a modest weight loss has been shown to lower or even discontinue the need for antihypertensive medication.[30] To achieve optimum health, the median BMI for an adult population should be in the range of 21 to 23 $kg/m^2$, while the goal for individuals should be to maintain BMI in the range 18.5 to 24.9 $kg/m^2$. This is far below the median BMI of 26 $kg/m^2$ reported among Bulawayo City Employees in this study.[29] Weight reduction may also be tried in Bulawayo City Council employees to reduce the prevalence of hypertension in this population and at individual level to reduce risk of hypertension related complications.

In this study, abdominal obesity was the more prevalent type. Abdominal obesity is more associated with hypertension, and cardiovascular events compared to non abdominal obesity. According to WHO, Waist circumference or waist-to-hip ratio (measures of abdominal obesity) are more powerful determinants of subsequent risk of hypertension and type 2 diabetes than body mass index.[29]

In United State of America the population attributable risk of hypertension due to abdominal obesity was approximately 24.9% and 15.9%, in black men and black women, respectively.[31]

Cigarette smoking was also a risk factor for hypertension among Bulawayo City employees. A person's risk of heart attack greatly increases with the number of cigarettes he or she smokes and the longer a person smokes, the greater their risk of heart attack. People who smoke a pack of cigarettes a day have more than twice the risk of heart attack than non-smokers.[32] In this study the median number of cigarettes smoked was 8.5 (very close to one pack). Chronic heavy smoking also increases the risk of developing other non-communicable diseases such as peripheral vascular disease, lung cancer and chronic obstructive airway diseases.[33,34]

Despite government regulation forbidding public smoking, passive (also known as secondhand) smoking was still occurring among Bulawayo City employees with 43.5% of passive smokers exposed at work place. This maybe because there is no policy in Bulawayo City Council baring people from public smoking or its not being enforced. Second hand smoking has the same components as direct smoke and has the same health effects and therefore should be prevented.[33,35]

People who drink alcohol excessively (over two drinks per day) have a one and a half to two times increase in the frequency of high blood pressure (hypertension). The association between alcohol and high blood pressure is particularly noticeable when the alcohol intake exceeds five drinks per day.[36] In this study alcohol consumption was protective against hypertension though not statistically significantly. It is well known that moderate alcohol intake reduce the risk of cardiovascular diseases but excessive alcohol intake carries a risk of developing obesity, and subsequent cardiovascular events.[5]

Among Bulawayo City Council employees, although there were a high proportion of people who had episodes of heavy drinking, the frequency of drinking was low and hence the total amount

consumed were not too much. Because of the small number of people who consumed alcohol in this study, it was not possible to stratify the amount of alcohol consumed and explore the effects of the different quantities consumed on blood pressure.

The causal relation between habitual dietary salt intake and blood pressure has been established through experimental, epidemiological, migration, and intervention studies.[3,5], high although salt intake a risk factor on bivariate analysis in this study, it was not a independent predictor for hypertension. This maybe because hypertensive patients were given advice to reduce salt intake and as a result current salt intake may not be a good indicator. The method used to estimate salt intake in this study was a list of questions on 'high salt food' and adding salt to food on the table but however it is estimated that about 80% of salt intake is in the form of processed food. Hence measurement of salt intake may not have been accurate and resulting in misclassification of salt intake.

Physical inactivity was not a significant risk factor as expected in this study. The measurement of physical activity relied on participants' reported estimation of time spend on various activities, and hence subjective measures of intensity by different participants. The method is also prone to false reporting and recall bias. This may have resulted in misclassification of intensity and duration of physical activities.

In this study use of oestrogen-based contraceptive pill was not associated with hypertension, contrary to report by the American Heart Association.[13] This might have been because it was being used by relatively young women who were at a low risk of developing hypertension but however the number of participants who were on the pill was not large enough to make any conclusion.

Unless addressed, the mortality and disease burden from these health problems will continue to increase. World Health Organization projected that, globally, non communicable disease deaths would increase by 17% over the next ten years. The greatest increase would be seen in the African region (27%) and the Eastern Mediterranean region (25%).[29]

With the high prevalence of pre-hypertension, obesity and physical inactivity, the prevalence of hypertension among Bulawayo City Council employees is bound to increase in the next 10 to 15 years. If the current treatment and control levels are not improved, there is likely to be a significant increase in the hypertension morbidity and mortality among Bulawayo City Council employees which is contrary to the Zimbabwe Ministry of Health and Child Welfare National Health Strategy of 2009-2013 of reducing the burden of non-communicable diseases by between 15 and 20% by 2013.[10]

# CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

The prevalence of hypertension among Bulawayo City council employees was high. The prevalence was higher in females than males and increased with age. The risk factors for hypertension were obesity, family history of hypertension, current tobacco smoking, being married and age of 40 years or older. The proportion of hypertensive employees on treatment was low and those on treatment had poorly controlled blood pressure. Obesity and physical inactivity were prevalent but tobacco smoking and alcohol consumption was lower than Zimbabwe general population.

In light of the high rate of unawareness of hypertension (high prevalence of undiagnosed hypertension) the Director of Health Services should set up a program for health education and promotion of awareness and treatment of hypertension. This could be done in form of campaigns at work places educating people on hypertension, the importance of screening for hypertension and the association between hypertension with obesity and smoking. High risk groups such as people with family history of hypertension, females and aged forty years and above should be encouraged to have more regular blood pressure checks. Posters which encourage losing weight and physical activities such as using stairs instead of elevator may also be used to covey the information.

Set up a surveillance system for risk factors of hypertension which will be used to monitor and evaluate health education and promotion activities.

Information on pre-employment and periodic medical examination can be expanded to include risk factors and then recorded and regularly analyzed. This may serve as a system to monitor the prevalence of hypertension and risk factors and used to evaluate interventions put in place.

A proper system for referral of employees who have raised blood pressure during routine medical examinations need to be put in place such that all patients with raised blood pressure during medical examination will be referred for evaluation and subsequent treatment if needed.

Town Clerk should ensure that Bulawayo City Council regulations forbid public smoking at work places and heads of departments will ensure that this is adhered to by all employees.

In light of the knowledge gaps coming Public Health Officers should carry out further study on the factors associated with poor control of blood pressure among people on treatment hypertension, knowledge and attitude of Bulawayo City Council employees towards physical activity and obesity. In view of the high prevalence of among Bulawayo City Council employees compared to the general population, a study comparing Bulawayo City Council employees and the general population may spell out if there are factors peculiar to Bulawayo City Council employees.

## Study limitations

- The temporal relationship of questionnaire responses and anthropometric measurements to hypertension could not be assessed since this was a cross-sectional study.
- Number of people who smoke tobacco and those who drink alcohol was not large enough to assess the dose response effect of these factors on hypertension
- Number of females who were taking oral contraception was not large enough for assessment of its effect of on hypertension among Bulawayo City female employees
- Measurement of salt intake may not have been accurate since we relied on added salt but this is estimated to be at most 20% of daily intake, 80% of salt intake contributed by consumption of processed food.

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**Annexes**

**Questionnaire**

My name is Dr Amon Marwiro. I am a Public Health Officer attached to Bulawayo City Council, Health Services Department. I am carrying out a study on high blood pressure among Bulawayo City Council employees. This involves asking you a number of questions on the risk factors for raised blood pressure and taking some measurements of your blood pressure, weight, height waist and hip circumference. All the data collected will be treated with strict confidentiality and anonymity. If you feel that you cannot continue participating in the study, you are free to withdraw at any stage of the interview. The findings will give a better understanding of the hypertension situation among Bulawayo City employees and also help in finding ways of addressing the hypertension problem in the City. If you have any queries please contact the MPH coordinators on 04-791631 or the Director of Health Services, Bulawayo City Council on 09-750111.

## A. Socio-demographic characteristic

1. How old are you? *Uleminyaka emingaki?* ……completed years
2. Sex *(*observe) ☐ Male ☐ Female
3. Parity (for females only) *Usuzithwale kangaki)*……
4. Are you currently pregnant? *(for females only) Okwakhathesi uzithwele?*

   ☐Yes ☐ No
5. Race Ungumhlobo bani (observe) ☐ Black ☐ Indian ☐ Caucasian ☐ Colored
6. What is your religion? *Inkolo yakho yiphi?* ☐Apostolic ☐Pentecostal ☐Protestant ☐ Traditional ☐Other, specify ……
7. Occupation *Umsebenzi wako ngowani?* …….

8. What is the highest level of education you attained? *Wafunda wacina kuliphi ibanga?*

☐ None
☐ Primary
☐ Secondary
☐ Tertiary

9. What is your marital status? *Utshadile na*? ☐ single ☐ married ☐ divorced ☐ widowed ☐ separated ☐ co-habiting

10. What is the family's average monthly income? *Imuli yakho ithola malini (iyonke) ngenyanga?* US$……..

11. How many dependants do you have? *Ugcine abantu abangaki? .....*

12. Do you have a medical insurance (medical aid)? *Ule medical aid na?*

☐ Yes ☐ No

13. If yes which one? *Nxa kunjalo, yiphi?* ☐ Bulawayo City ☐ CIMAS ☐ PSMAS ☐ MASCA ☐ Other, Specify

…….

## B. Lifestyle

(I am now going to ask you questions about consumption of alcoholic drinks, smoking and diet and physical activity). *Sengizakubuza imibuzo ephathelene lokunatha okudakayo, ukubhema,ukudla lemsebenzi edinisa umzimba*

**Alcohol consumption *Ukunatha utshwala***

14. Have you ever consumed an alcoholic drink? *sowake wanatha utshwala?*

☐ Yes ☐ No

15. During the past twelve months, how frequently have you had at least one alcoholic drink? *Kunyanga ezilitshumi lambili ezedluleyo, unathe kangaki utshwala?*

☐ Daily
☐ 5-6 days per week
☐ 1-4 days per week
☐ 1-3 days per month

☐ Less than once a month
☐ None

16. During the past 30 days, on how many occasions did you have at least one alcoholic drink? *Kunsuku ezingamatshumi amathathu ezedluleyo, unathe kangaki utshwala lokudakayo?*
    ☐ Daily
    ☐ 5-6 days per week
    ☐ 1-4 days per week
    ☐ 1-3 days per month
    ☐ Less than once a month ☐ None

16a. In the past 30 days, on average, how many alcoholic drinks do you drink on one drinking occasion? *Ngehlandla linye unatha imbodlela zokudakayo ezingaki?*……..

16b. In the past 30 days, what was the maximum number of alcoholic drinks that you had on one drinking occasion? *Mhla usithi unathile uyabe unathe imbodlela zokudakayo ezingaki ngehlandla elilodwa?* …….

17. During the past 30 days, how many times did you have 5 or more (4 or more for women) standard alcoholic drinks in a single drinking occasion? *Kunsuku ezingamatshumi amathathu ezedluleyo, kukangaki lapho onathe amambodlela kumbe amangilazi amahlanu (omama amane) kusiya phezulu ngesikhathi sinye?*…….

18. During the past 30 days, when you consumed alcohol, how often was it with meals? *Kunsuku ezingu 30 ezedluleyo, lapho unatha okudakayo bekukangaki lapho onathe khona ngesikhathi usidla?*……

**Smoking Ukubhema**

19. Have you ever smoked any tobacco products? *Sewake wabhema igwayi?*

    ☐ Yes ☐ No

20. Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes? *Okwalezi insuku uyabhema igwayi, njengosekeledi, isigazo noma ingidi na?*

    ☐ Yes ☐ No

21. If stopped smoking, state date of stopped. *Nxa sewama ukubhema, tshono ukuthi nini?……..*

22. If yes to question 20, do you currently smoke tobacco products **daily**? *Nxa uthe yebo ku 20, ungabe ubhema igwayi nsukuzonke na?* ☐Yes ☐No

23. If yes to Q22, for how long have you been smoking daily? *Nxa uthe yebo ku 22, ulesikhathi esinganani ubhema nsukuzonke?* ……

24. On average, **how many** of the following do you smoke each day? *Ngesilinganiso, ubhema okungakingelanga kokulandelayo?*

    a) Cigars ……..
    b) Manufactured cigarettes *Mhlanga wegwayi* ……
    c) Hand-rolled cigarettes *igwayo lokugoqa* ……..
    d) Pipes full of tobacco *ingidi* ……..

25. During the past 7 days, on how many days did someone **in your home** smoke when you were present? *Kunsuku ezingu 7 ezedluleyo, kukwezingaki insuku lapho omunye endlini yangakini obheme wena ukhona?* ……

26. During the past 7 days, on how many days did someone smoke in closed areas in your workplace *(in the building, in a work area or a specific office)* when you were present? *Kunsuku ezingu 7 ezedluleyo, kukwezingaki insuku lapho omunye abheme endaweni evalekileyo emsebenzini wakho (esakhiweni, osebenzela khona noma ewofisini) wena ukhona?*

    ……..

**Physical activity**

*(*I am now going to ask you questions about your work and activities that you do when you are not working) *Sengizakubuza ngomsebenzi wakho lalokho ophatheka kukho nxa ungekho emsebenzini*

**Work**

27. Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like *(carrying or lifting heavy loads, digging or construction work)* for at least 10 minutes continuously? *Ingabe umsebenzi wakho ugoqela ukusebenza ngamandla okwenza uphefumulele phezulu noma inhliziyo yakho tshaye ngokuphangisa okwemizuzu elitshumi kusiya phambili?* ☐Yes ☐No
28. In a typical week, on how many days do you do vigorous-intensity activities as part of your work? *Ngesilinganiso seviki, imisebenzi edinga amandla uyenza amalanga amangaki?* Number of days ……
29. How much time do you spend doing vigorous-intensity activities at work on a typical day? *Singakanani isikhathi osiqeda usenza umsebenzi odinga amandla ngelanga ngokwejwayelekileyo?* ……..Min
30. Does your work involve moderate-intensity activity, that causes small increases in breathing or heart rate such as brisk walking *[or carrying light loads]* for at least 10 minutes continuously? *Umsebenzi wakho uhlanganisa ukusebenza okukhathalisa phakathi laphakathi okubangela ukuthi inhliziyo noma ukuphefumula okungathi kuyaqansa kancane?*

    Yes ☐No ☐
31. In a typical week, on how many days do you do moderate-intensity activities as part of your work? *Ngeviki elajwayelekileyo, zinsuku ezingaki lapho owenza umsebenzi onjalo?* …….. days

32. How much time do you spend doing moderate-intensity activities at work on a typical day? *Singakanani isikhathi osiqeda usenza umsebenzi onjalo ngelanga elejwayelekileyo?……..min*

**Travel to and from places *Ukuhamba ezindwaweni***

*The next questions exclude the physical activities at work that you have already mentioned. Now I would like to ask you about the usual way you travel to and from places. For example to work, for shopping, to market, to place of worship*

33. Do you walk or use a bicycle *(pedal cycle)* for at least 10 minutes continuously to get to and from places? *Uyahamba noma ukutshova ibhayisikili okwemizuzu elitshumi loba eyedlulayo ungaphumulanga ukuya lapha lalaphaya?* ☐Yes ☐No

34. In a typical week, on how many days do you walk or bicycle for at least 10 minutes continuously to get to and from places? *Ngeviki elejwayelekileyo ukwenza kangaki lokho*? …….days

35. How much time do you spend walking or bicycling for travel on a typical day? *Singanani isikhathi osiqeda uhamba noma utshova ibhasikili ngelanga elejwayelekileyo?* ……min

**Recreational activities**

The next questions exclude the work and transport activities that you have already mentioned. Now I would like to ask you about sports, fitness and recreational activities (leisure.) *imibuzo elandelayo kayibalisi imsebenzi lokuhamba osukhulume ngakho khathesi ngizakubuza ngezemidlalo lozithokozisa ngakho*

36. Do you do any vigorous-intensity sports, fitness or recreational *(leisure)* activities that cause large increases in breathing or heart rate like *[running or football]* for at least 10 minutes continuously? *Uyenza imidlalo loba uzithokozise ngendlela edinga amandla amakhulu okwenza ukhefuzele njengokugijima, ukudlala ibhola okwemizuzu elitshumi kusiyaphezulu ungaphumulanga na?* ☐ Yes ☐ No

37. In a typical week, on how many days do you do vigorous-intensity sports, fitness or recreational *(leisure)* activities? *Ngesilinganiso seviki, mangaki amalanga owenza imidlalo loba ukuzijabulisa ngendlela edinga amandla?* ……days

38. How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day? *Ngelanga, uqeda isikhathi esinganani usenza imidlalo loba ukuzijabilisa ngendlela edinga amandla?* ……..min

39. Do you do any moderate-intensity sports, fitness or recreational *(leisure)* activities that cause a small increase in breathing or heart rate such as brisk walking*, [cycling, swimming, volleyball, etc]* for at least 10 minutes continuously? *Uyenza ukuzijabulisa ngendlela edinga amandla angamanengi kangako okwenza ukhefuzele njengokutshitsha, (ukutshova ibhayisikili, ukubhukutsha, lokudlala ivolleyball) okwemizuzu elitshumi kusiyaphezulu?*

☐ Yes ☐ No

40. In a typical week, on how many days do you do moderate-intensity sports, fitness or recreational *(leisure)* activities? *Ngesilinganiso seviki, mangaki amalanga owenza imidlalo loba ukuzijabilisa ngendlela engadingi amandla amanengi?* …….days

41. How much time do you spend doing moderate-intensity sports, fitness or recreational *(leisure)* activities on a typical day? *Ngelanga, singanani isikhathi osiqeda usenza imidlalo loba uzijabilisa ngendlela engadingi amadla amanengi?* ……min

42. How much time do you usually spend sitting or reclining on a typical day? (excluding sleeping time) *Uqeda isikhathi esinganani uhlezi kumbe ucambalele ngelanga (ungabali isikhathi sokulala)*……..hours

**Diet *Ukundla***

43. In a typical week, on how many days do you eat fruits? *Ngeviki, udla izithelo amalanga amangaki?*…….

44. How many servings of fruit do you eat on one of these days? *Ngelanga odla izithelo njalo,udla ezingaki?* ……..

45. In a typical week, on how many days do you eat vegetables? *Ngeviki, mangaki amalanga odla khoma izilimo?* ……

46. How many servings of vegetables do you eat on one of these days? *Ngelanga usidla izilimo, izidla kangaki?* ……

47. On average, how many meals per week do you eat that were not prepared at home? *Nxa ulingisa, ngeviki udla ukudla okungaphekwanga ngekhaya kangaki?*……

48. How frequent do you eat food prepared by the following methods? *Ukudla kangaki ukudla okulungiswe ngendlela ezilandelayo?*

    a) Boiling *Ukubilisa* …
    b) Frying *ukukhanzinga* …
    c) Grilling *Ukosa*…
    d) Stewing *ukuxhwathisa* …
    e) Remove visible fat before cooking *Ukukhipha amahwahwa owabonayo ungakapheki*…

49. In a typical week, how frequently do you add salt to your food at the table? *Ngeviki, kukangaki usengeza isawudo ekudleni?*……..

50. In a typical week, how frequent do you eat the following foods? *Ngeviki, ukudla kangaki ukudla okubaliswe ngaphansi?*

| Foods | Frequency |
|---|---|
| a) Dried salted fish ( Matemba) | |
| b) Canned food (beef, beans, etc) | |
| c) Dry salted nuts | |
| d) Bacon | |
| e) Cheese | |
| f) Chips (if salt added) | |
| g) Ham | |
| h) Smoked meat and fish | |

51. In a typical week, how frequently do you use the following oil/fat for preparing meals?

*Ngeviki, uyebenzisa kangaki amafutha alandelayo?*

a) Vegetable oil _____

b) Butter _____

c) Animal fat _____

## C. Family history

52. Is there anyone from your family *(father, mother or siblings)* who suffered or is suffering from hypertension? *Ukhona kumuli yangakini (ubaba, umama, loma umfowemi) owake noma ovele egula iBP?* ☐Yes ☐No
53. Is there anyone in your family who suffered from the following complications of hypertension? *Ukhona emulini yangakini oseke wabalemikhuhlane elandelayo isenziwa yi BP?*

a) Heart failure *we nhliziyo* ☐ Yes ☐No

b) Stroke *Ukufa uhlangothi* ☐ Yes ☐No

c) Kidney failure *ukungasebeni kwezinso* ☐Yes ☐No

d) Ischaemic heart disease *i heart attack* ☐ Yes ☐No

e) Peripheral vascular disease *Umkhunhlane wemithambo yegazi* ☐Yes ☐ No

54. Is there anyone from your family who suffered or is suffering from diabetes? *Ukhona emulini yangakini owake loba obulawa ngumkhuhlane we tshukela?* ☐Yes ☐ No

55. Anyone from your family from had sudden death? *Ukhona emulini owaphombukufa?*

☐Yes ☐No

## D. History of Hypertension, its complications of hypertension and co-morbidity

56. Have you ever been diagnosed of hypertension? *Wake wabanjwa umkhunhlane we BP?*

Yes☐ No ☐

57. When was the last time you went to the clinic/your doctor for any reason? *Ucine nini ukuya ekilinika/kudokotela ungezwa kuhle?* …….

58. Was your blood pressure checked? *Bakuthatha iBP?* ☐Yes ☐No

59. Have you ever been diagnosed of the following diseases? *Usuke wabanjwa ulale imikhunhlane na? (Check medical records if available)*

a) Heart failure *isifo senhliziyo* ☐Yes ☐ No

b) Peripheral vascular diseases *Umkhunhlane wemithambo yegazi* ☐Yes ☐No

c) Renal disease *ukungasebeni kwezinso* ☐Yes ☐No

d) Ischemic heart disease (heart attack) *i heart attack* ☐Yes ☐ No

e) Diabetes mellitus *Umkhunhlane wetsukela* ☐ Yes ☐ No

60. If yes to any of the above diseases, were you on any treatment of hypertension when you develop the complication(s)? nxa uthi yebo kweminye yemikhuhlane ephezulu, wawunatha amaphilisi e BP uqalise lemikhuhlane? ☐Yes ☐No

61. Do you suffer from other chronic disease(s)/ condition(s)? *kule mikhuhlane engomahlalakhona olayo?* ☐Yes ☐No

62. If yes, what are the diseases/conditions? *Nxa kunjalo, ngeyiphi?*

……..

63. Are you taking any drugs? *(not for hypertension but includes recreational drugs and family planning) kulamanye amaphilisi owanathayo yini? (hatshi awe BP kodwa kugoqela amaphilisi lemithi yokuzithokozisa)*

1.
2.
3.

## E. **Treatment of hypertension** *(only for those that are aware of their hypertension)*

64. Have you ever taken drug for high blood pressure? S*ewake wanatha amaphilisi e BP?*

☐Yes ☐No

65. If yes to Q64, Have you taken drugs for hypertension within the last two weeks? *Nxa kunjalo, usuke wanatha amaphilisi e BP kuviki ezimbili ezedluleyo?*

☐Yes ☐No

66. If stopped treatment, state date and reason for stopping treatment *Nxa sowayekela ukunatha amaphilisi, tshono ilanga lesizatho sokwekela?*

a. Date of stopping treatment. *usuku lokuma*…….
b. Reasons for stopping treatment. *izizatha zokuma* ……

……

67. Where do you usually go for you blood pressure check? *wejwayele ukuyahlolwa ngaphi i BP?* ☐ Clinic ☐ Private Doctor ☐ Public hospital ☐ Other, Specify……..

68. Are you usually seen by the same health care provider? wejwayele ukubonwa ngoweze mpilakahle oyedwa na? Yes☐ No ☐

69. When was the last time you have your blood pressure checked? *Ucine nini ukuhlolwa i BP?* ……..

70. Drugs prescribed for hypertension. *Amaphilisi owanatha ngenxa ye BP*

| **Drug** | **Date started** | **Dose** (mg) | **Frequency** (no of times/day) | **Currently taking treatment(**yes/no) | **If not taking treatment** | |
|---|---|---|---|---|---|---|
| | | | | | **duration default** | **Reason for default** |
| 1 | | | | | | |
| 2 | | | | | | |
| 3 | | | | | | |

71. Non-medical measures/advice being taken

| **Non pharmacological interventions** | **Advice given** | **Advice being taken** | **Duration** |
|---|---|---|---|
| Diet modification | | | |
| Start or increase exercise | | | |
| Lose weight | | | |
| Quit smoking | | | |
| Quit/reduce alcohol | | | |
| Other (specify) | | | |
| | | | |

72. Have you visited a traditional healer for hypertension or related illness within the past 12 months? *Kunyanga ezilitshumi lambili usuke waya enyangeni ngenxa ye BP kumbe eminye imikhuhlane ehambelana layo?* ☐ Yes ☐ No

73. Are you currently taking any herbal remedies for hypertension? *kulezihlahla ozinathayo ukwelapha i BP na?* ☐ Yes ☐ No

## F. Measurements

74. Weight …….kg

75. Height ……cm

79 (a) BMI …… *(to be calculated)*

76. Systolic blood pressure 1st …… 2nd ……. average……

77. Diastolic blood pressure 1st …… 2nd …… average…….

78. Waist circumference ……cm

79. Hip circumference …… cm

80. Waist/hip ratio ……. *(to be calculated)*

## Consent Form

**INFORMED CONSENT FORM**

***Prevalence and Factors associated with hypertension among Bulawayo City Employees***

**Principal Investigator** Amon Marwiro [MBChB]

**Phone numbers** 0912 284 710 or 09- 750111 ext 2088

**What you should know about this research study:**

- We give you this consent so that you may read about the purpose, risks, and benefits of this research study.
- Routine care is based upon the best known treatment and is provided with the main goal of helping the individual patient. The main goal of research studies is to gain knowledge that may help future patients.
- We cannot promise that this research will benefit you. Just like regular care, this research can have side effects that can be serious or minor.
- You have the right to refuse to take part, or agree to take part now and change your mind later.
- Whatever you decide, it will not affect your regular care.
- Please review this consent form carefully. Ask any questions before you make a decision.
- Your participation is voluntary.

***Okumele ubekwazi ngaloluphenyo/ ucwayisiso.***

- *Sikupha lelifomu lokuvuma ukuba ubale ngenjongo, ingozi loncedo lwalolucwayisiso.*
- *Ukwelatshwa kwemihla ngemihla kwenziwa kusetshenziswa indlela ezazakalayo njalo ezophathesayo kakholo. Kodwa ke injongo mqoka yocwayisiso yilotholaulwazi olungasiza isigokani kwelizayo.*
- *Asithembisi ukuba lolucwayisiso kuzaba loncedo kuwe. Njengo kwelatshwa okunjwayelekileyo, uncwayisiso lolu lungahambelami lomzimba.*
- *Ulelungelo lokwala ukuphatheka kulolucwayisiso kumbe ungavuma khathesi ubususala ngaphambili.*
- *Iloba kuyini okunqumayo akusoke kuphambanise ukwelatshwa kakho okwejayeleyo.*

- *Bala leli fomu uzwisise okugcweleyo, ungabuza, iloba yiphi imbuzo olayo anduba wenze isiqumo.*
- *Awubanjwa ngamandla ukuba uphatheke kulocwayisiso*

**Purpose**

You are being asked to participate in a research study of the prevalence and factors associated with hypertension (high blood pressure)**.** The purpose of the study is to find out the proportion of Bulawayo City Employees with raised blood pressure (hypertension) and the determinants of high blood pressure. You were selected as a possible participant in this study because you are one of the Bulawayo City Council Employees, and a total of three hundred and fifty eight (358) Bulawayo City Council Employees will be selected for the research.

***Iinjongo.***

*Ucelwa ukubana ube yingi enye kulolu. cwayisiso lokubhaka loku kwe BP lokuyibangelayo. Injongo yalolucwayisiso yikuthola isilinganiso sezisebenzi ze Bulawayo City Council ezile B.P. ephezulu lalokho okuyibangelayo. Wena ke ukhethiwe njengomunye ongaphatheka kulolucwayisiso ngokuba ungesinye isisebenzi manisipala. Izisebenzi zika manispala ezingamakhulu amathathu alamatshumi amahlanu lesitshiya ngalombili zizaphatheka kulolucwayisiso.*

**Procedures and duration**

If you decide to participate, you will undergo an interview in which you will be asked questions about age, income, medical history, smoking and alcohol consumption, physical activity and family history. After the interview, measurements of your blood pressure, height, weight, waist and hip circumference will be taken. The process will take about thirty (30) minutes.

***Inqobo lobubanzi bazo***

*Unganquma ukuphatheka, uzabuzwa imbuzo ephathelane leminyaka yokuzalwa iyakho, inzuzo, ezempilakahle yakho, ukubhema lokunatha utshwala, physical activity lokwemuli kanye losendo lakwenu. Ngemva kokuphendula imibuuzo uzathathwa iB.P. ubude, isisindo somzimba, ububanzi bekhalo kanye lenqulu. Konke lokho kuzathatha imizuzu engamatshumi amathathu (30 minutes)*

**Risks and discomforts**

The process of measuring blood pressure may be associated with a little discomfort during measuring but will immediately disappear after measuring.

***Ingozi lokungaphatheki kahle***

*Ukuthatha i B.P. kungenza ukungaphatheki kahle kancane kodwa okuphela masinyane uqeda kuthathwa i B.P.*

**Benefits and/or compensation**

We cannot and do not guarantee or promise that you will receive any benefits from this study.

***Uncedo lokuhlawulelwa***

*Asithembisi ukuba uzathola uncedo lokuhlawulwa ngokuphatheka kulolocwayisiso*

**Confidentiality**

No names or any form of identity will be written on questionnaires and any information that is obtained in connection with this study that can be identified with you will remain confidential and will be disclosed only with your permission.

***Ezemfihlo***

*Ibizo lakho iloba kuyini okungakhomba wena akusoke kubhalwe ephepheni lembuzo njalo konke okutholakale kulolucwayisiso okhuphathalene lawe kuzahlala luyimfihlo, lungavezwa kuphela ngemvumo yakho.*

**In the event of injury**

In the event of injury resulting from your participation in this study, treatment can be obtained at Khami Road Clinic. You should understand that the costs of such treatment will be your responsibility. Financial compensation is not available.

***Nxa ungalimala***

*Nxa ungalimala ngenxa yokuphatheka kwakho kulolucwayisiso ungelatshwa e Khami Clinic. Ukubhadalela indleko zokwelatshwa kuzaba ngumlandu wakho. Ukubhadalwa imali akukho kulolocwayisisio.*

**Voluntary Participation**

Participation in this study is voluntary. If you decide not to participate in this study, your decision will not affect your future relations with the Bulawayo Health Services Department, its personnel, and associated hospitals and Masters in Public Health Programme, Department of Community Medicine, University of Zimbabwe. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty.

***Ukuphatheka Ngokuzifunela***

*Uphatheka ngokuzifunela kololu cwayisiso. Ungala ukuphatheka akusokekwaphambanisa ubudlelwano bakho logatisha lwezempilo ko Bulawayo, kumbe lezisebenzi zayo labe, University of Zimbabwe Master in Public Health Program. Ungaquma ukuphatheka kulolocwayisiso ulelungelo lokutshiya iloba yisiphi esikhathi. Awusoke ujeziswe ungatshiya.*

**Offer to answer questions**

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

***Uukuphendulwa kwembuzo ongabalayo***

*Uyavunyelwa ukubuza yonke imbuzo ongaba layo mayelana locwayisiso lolu. Ungathatha isikhathi obona sifanele ukucabangisisa ngalolu cwayisiso andubana usayine lelifomu.*

**Authorization**

You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understood the information provided above, have had all your questions answered, and have decided to participate.

The date you sign this document to enroll in this study, that is, today's date, MUST fall between the dates indicated on the approval stamp affixed to each page. These dates indicate that this form is valid when you enroll in the study but do not reflect how long you may participate in the study. Each page of this Informed Consent Form is stamped to indicate the form's validity as approved by the MRCZ.

***Ukuvuma Ukuphatheka***

*Lapha wenza isinqumo sokuba uyafuna ukuphatheka kulolucwayisiso kumbe hatshi. Isiginetsha yakho iveza ukuba obale wazwisisa konke osokubethwe ngaphambilini njalo yonke imbuzo obungabe ulayo isiphendululwe ngakho usunqume okhuphatheka.*

*Nanzelela ukuba ilanga lapho ofaka khona isiginitsha yakho uvuma ukuphatheka alikadluli ilonga elibhalwe kusidindo esisekhasini lonke lalesi sivumelwano. Amalanga la atshengisa ukubana lelifomu liqotho njalo lisafanele ukusentshenziswa. Awatshengisi ukubana lolucwayisiso luzaphela nini. Isidindo lesi sitshengisa ubuqotho baleli fomu njengokuvunywa yi MRCZ okuyinhlanganiso ekhangela ngecwayisiso zonke eziphathelene lezempilo e Zimbabwe.*

_____ ____/_____/_____

Name of Research Participant (please print) Date

*Ibizo lakho (maphatheka kulolocwayisiso)* *(Ilanga lanamuhla)*

_____ _____ AM

Signature of Participant or legally authorized representative Time *(Isikhathi)* PM

*(Isiginitsha kamaphatheka kumbe ovunyelwe okusemthethweni ukumela)*

_____ _____

Signature of Witness Signature of Staff Obtaining Consent

*Isiginetsha yomfakazi* *Isiginitsha yomunye weqembu eliquba lolucwayisiso*

**You will be given a copy of this consent form to keep.**

If you have any questions concerning this study or consent form beyond those answered by the investigator, including questions about the research, your rights as a research subject or research-related injuries; or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Medical Research Council of Zimbabwe on telephone 791792 or 791193.

***Kumafomu ozawasayina enye izaba nyeyakho ukuba uyigcine***

*Uma ungaba leminye imbuzo engaphendulwanga okusuthisekayo, kumbe uma ungaphathwa kakubi ngabacwayisisi loba ulokunye ongeke wakukhuluma labacwayisisi ungatshayela ucingo abe Medical Research Council of Zimbabwe ku (04) 791792 or 791193 okuyibo osibakhulu kwezencwayisiso ezempilo.*