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DIETARY MODIFICATION FOR BLOOD PRESSURE CONTROL IN HYPERTENSION PATIENTS IN BINDURA DISTRICT, ZIMBABWE

BY

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Abstract

About a third of the hypertensive patients reviewed at Shashi Hospital in 2019 had uncontrolled hypertension, prompting an investigation of the dietary modifications associated with this observation. The dietary components of interest in this study were the DASH diet plan, alcohol, salt and coffee consumption using the Health Belief Model as a theoretical framework. This was a retrospective 1:1 case-control study on 270 consenting adult respondents randomly selected from eligible hypertensive patients on treatment being attended at the Hospital. A structured interviewer administered questionnaire based on the World Health Organisation STEPS survey was employed to gather information from the respondents after Blood Pressure and anthropometric measurements were taken. Uncontrolled hypertension was more common in males than in females [OR 1.3, 95% CI 0.8; 2.1, p-value 0.38] and in those below 60 years of age who comprised 69.6% of the cases [OR 2.0, 95% CI 1.2; 3.2, p-value 0.009]. Earning a salary below the Poverty datum line was associated with increased odds of uncontrolled hypertension [OR 3.4, 95% CI 1.5; 7.9, p-value 0.003]. Although attaining basic education and being formally employed raised odds of uncontrolled hypertension this was not statistically significant [OR 1.4, 95% CI 0.9; 2.4, p-value 0.17 and OR 1.08, 95% CI 0.7; 1.8, p-value 0.75 respectively]. Those who were not on a prescribed diet for hypertension had four times the odds of having uncontrolled hypertension than those who were on diet control [OR 4.1, 95% CI 2.5; 6.9, p-value <0.001]. Having a BMI above 30kg/m^2 raised the odds of uncontrolled hypertension by more than 4 times [AOR 4.4, 95% CI 2.3; 8.3, p-value <0.001]. Those who did not have fruits or vegetables as part of their diet had higher odds of uncontrolled hypertension than those who did [OR 3.2, 95% CI 1.6; 6.4, and p-value < 0.001 and OR 1.3, 95% CI 0.3; 4.8, p-value 0.74 respectively]. Both High salt intake and Consuming fast-foods were significantly associated with higher odds of uncontrolled hypertension [OR 3.2, 95% CI 1.8; 5, 6, p-value < 0.001 and OR 2.6, 95% CI 1.5; 4.58, p-value < 0.001 respectively]. Consumption of coffee and alcohol slightly raised odds of uncontrolled BP although this was not statistically significant [OR 1.5, 95% CI 0.8; 2.9, p-value 0.23 and OR 1.9, 95% CI 0.9; 4.0, p-value 0.07 respectively]. After logistic regression the risk factors independently associated with uncontrolled hypertension were Not having fruits as part of the diet [AOR 2.6, 95% CI 1.1; 5.9, p-value 0.03], High salt intake [AOR 2.0, 95% CI 1.1; 4, p-value 0.03] and Consuming fast-foods [AOR 2.4, 95% 1.2; 4.5, p-value 0.01]. The study shows that there is a challenge of uncontrolled hypertension in the population under study. Interventions recommended include prescribing diet modification as part of standard clinical practise, ensuring the healthy diet is assessable and affordable and measure to ensure healthy eating practices in the populations. These interventions are multidimensional with activities at the individual, health delivery system and policy levels to ensure adherence to diet modification.

Key Words: Diet; Modification; Uncontrolled; Hypertension; Bindura District.

Declaration

I declare that this dissertation is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

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Dedication

This work is dedicated to the Almighty God who gave me the strength to persevere and to keep going even when I felt like giving up. His Blessing was on this work and it continued to completion despite the presence of many hurdles.

Soli Deo Gloria!

List of acronyms and abbreviations

AGRITEX	Agricultural Technical and Extension Services
AHA/ACC	American Heart Association/ American College of Cardiology
AOR	Adjusted Odds Ratio
BMI	Body mass index
BP	Blood Pressure
CI	Confidence Interval
CKD	Chronic Kidney Disease
DASH	Dietary Approaches to Stop Hypertension
DBP	Diastolic Blood pressure
JNC8	Eighth Joint National Committee
HBM	Health Belief Model
HTN	Hypertension
IEC	Information, Education and Communication
MH	Mantel Haenszel test
MOHCC	Ministry of Health and Child Care
mmHg	Millimeters of mercury
NCDs	Non-Communicable Diseases
OR	Odds Ratio
PMD	Provincial Medical Director
SBP	Systolic Blood Pressure
WHO	World Health Organisation
ZW$	Zimbabwe dollar

Definition of Key terms

Dietary Approaches to Stop Hypertension (DASH) diet plan: A diet that is rich in fruits, vegetables, low-fat dairy products, whole grains, nuts, and fish with a reduced amount of red meat, fat, sugar-sweetened food and beverages, and/or a vegetarian diet, which is also high in vegetables and fruits and low in animal protein.

Dietary Modification: Dietary interventions to prevent hypertension which include reduction of sodium intake, limitation of alcohol consumption, taking more potassium, and following and adhering to an overall dietary pattern such as the DASH diet.

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CHAPTER 1 INTRODUCTION

1.1 Introduction

According to the World Health Organisation (WHO), globally an estimated one billion people have hypertension (HTN) or raised Blood Pressure (BP) and two-thirds of these are in developing countries. The WHO review of the current disease pattern proved that the number of adults with HTN increased exponentially from 594 million in 1975 to more than one billion in 2015, with the increase being witnessed in developing countries mainly because of the rise in HTN risk factors in those populations (World Health Organisation [WHO], 2019). Zimbabwe had an estimated HTN prevalence of 30% in 2015 up from the 17.9% of 2005 recorded by the nationwide WHO STEPwise approach to Surveillance (STEPS) survey (Ministry of Health and Child Care [MOHCC] 2005).

Despite the availability of safe and effective antihypertensive medications and the existence of treatment guidelines, HTN remains one of the commonest Non-Communicable Diseases (NCDs). It is an important public health challenge because of the associated morbidity, premature mortality and the cost to the society through reduced productivity and cost of care. Fewer than one in five people undergoing treatment for HTN have well-controlled BP according to the World Health Organisation (2019). Though the effective management of HTN is multidimensional, a healthy diet is one of the most important non-pharmacological interventions to manage HTN which can have a universal application depending on what is available in that area. This case-control focused on dietary modification and its relationship with the BP Control in HTN patients in our setting. The diet modifications studied are based on the DASH diet plan which has been proved to be effective in many settings.

1.2 Background to the Study

The control and management of HTN is a complex and multidimensional process with goals of primary prevention, early detection and adequate secondary prevention to avoid complications and mortality. Hypertension is a silent killer and its control should be everyone's concern and it depends on understanding and implementation of the various management strategies. Management guidelines of HTN recognize the importance of behavioural modification to achieve a healthy lifestyle to reduce morbidity and mortality associated with uncontrolled BP. A body of evidence asserts that multiple dietary factors affect BP and dietary modifications have been shown to have enormous potential for preventing HTN at a cost that is less than pharmacological interventions (Bazzano, Green, Harrison, & Reynolds, 2013). Dietary modifications can be implemented using locally available foods hence there is a possible universal application and each setting can have its own unique healthy diet package.

Dietary factors have a very prominent role in BP homeostasis compared to the other environmental factors that affect BP. In individuals who are not hypertensive, BP-lowering dietary changes may prevent HTN and reduce BP thus lowering the risk of BP -related or medication-related complications. If applied to populations, even a small drop in BP has a marked favourable impact. In uncomplicated stage 1 HTN (Systolic BP of 140 to 159 mm Hg or Diastolic BP of 90 to 99 mm Hg), non-pharmacological interventions like dietary changes may serve as an initial the treatment before the start of drug therapy and at times they may be the only treatment required. Among hypertensive individuals who are already on drug therapy, dietary changes may further lower BP and promote medication reduction. Generally, the extent of BP decline from dietary measures is greater in hypertensive patients than in

those who are not hypertensive (Appel *et al.*, 2006). This is why this study focused on studying dietary modification in diagnosed hypertensive patients who were already on drug treatment.

Of public health importance and interest in our setting are findings related to blacks which show that they are especially sensitive to the BP-lowering effects of reduced salt intake, increased potassium intake, and the DASH diet plan (Appel *et al.*, 2006). These recommended dietary modifications are shown in Table 1 below.

Table 1: Dietary modification in HTN

Dietary Modification	Dose	Impact on BP in mmHg
Reduced Na+ intake	The optimal goal is less than 1500 mg per day, but aim for at least a 1000 mg per day cut	-5 - 6
DASH diet	Diet rich in fruits, vegetables, whole grains, and low-fat dairy products, with reduced content of saturated and total fat.	-11
Weight loss	Ideal body weight is the best goal but at least 1 kg reduction in body weight for most adults who are overweight. Expect about 1 mm Hg for every 1 kg reduction in body weight.	-5
Moderation in alcohol intake	In those who drink alcohol, reduce alcohol to: Men: less than or equal to 2 drinks per day Women: less than or equal to 1 drink per day	-4

Source: American Heart Association / American College of Cardiology (AHA/ ACC) Guideline for the Prevention, Detection, Evaluation, and Management of High BP in Adults (Whelton *et al.*, 2018).

The table above shows the possible impact of the various dietary modifications on BP Control. It is evident that the DASH diet plan has potentially the greatest impact followed by reducing salt intake and by weight loss. As alluded to, these reductions make a big impact on the population level. To give guidance on the goals for BP Control, The Joint National Commission eighth edition (JNC 8) has set targets for HTN control for different groups of clients and these are periodically reviewed as new evidence arises. These are widely used and will be used as reference BP Control thresholds in this study as Zimbabwe does not have its independent guidelines. These targets are shown in the diagram below:

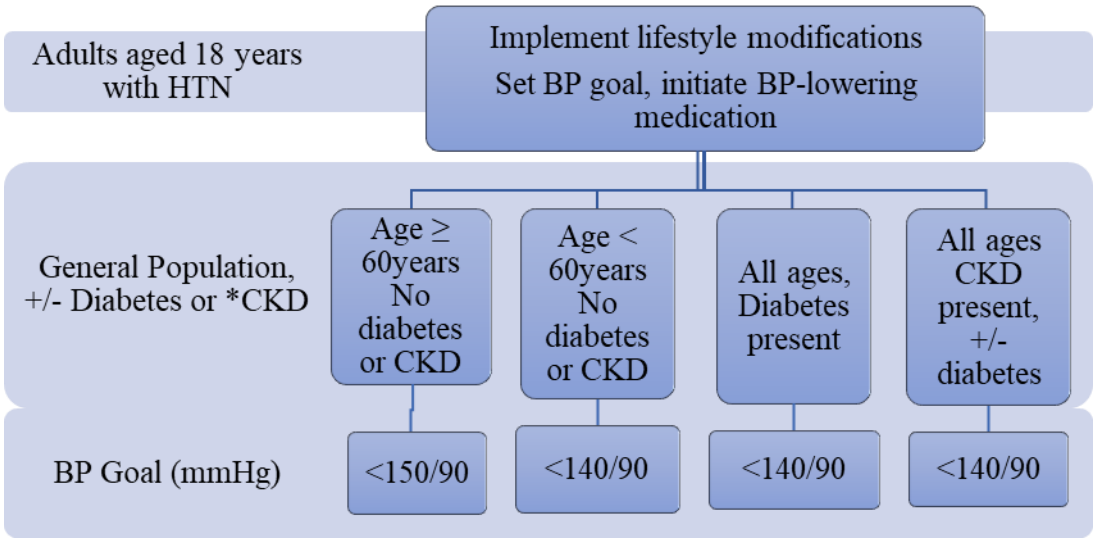

Figure 1: 2014 Hypertension Guideline Management Algorithm. Adapted from The Joint National Commission eighth edition (James *et al.*, 2014). *CKD = Chronic Kidney disease.

Although the guideline shows the thresholds to start implementing lifestyle modifications, it is important to note that these interventions are applicable and are important even for those with BP below the thresholds.

1.3 Statement of the Problem

Hypertension is one of the commonest medical conditions among adult patients seen at Shashi Hospital with an estimated prevalence of 30% in 2019 according to an analysis of the Hospital electronic medical records. Of these patients with HTN, almost a third have uncontrolled HTN according to the Joint National Commission eighth edition guidelines on BP thresholds. Medical Officers at the Hospital estimate the prevalence of poorly controlled BP to be as high as 40% among the HTN patients despite them constantly reviewing and monitoring patients on antihypertensive medication. This high prevalence of poorly controlled BP they partly attribute to patients' failure to adhere to lifestyle advice and diet modification guidelines. Among outpatients managed for HTN at the hospitals in 2018, a sizable number had sequelae of poorly controlled BP that include stroke, cardiovascular system complications (heart attack, heart failure) and renal failure. This frequency of complications has been noted to have gradually increased over time in 2019 as reported by the clinicians.

There is limited local research on dietary practices or modification for BP Control in HTN patients in our setting and most importantly in this particular setting i.e. the Private health sector. Most of the published research in Zimbabwe was done in the Public health sector as will be outlined in the review of related literature. We identified only research that focused on many aspects that could lead to poorly controlled BP and the findings lack the necessary focus and concentration on particular aspects of non-pharmacological management of HTN. This lack of adequate local research focusing on dietary modification in great depth in all health sectors has culminated in a lack of evidence-based local dietary guidelines for HTN management. Consequently, the country does not have concise HTN management guidelines or NCDs guidelines for

that matter. This study will hopefully contribute to the body of knowledge so that there is adequate evidence for well informed and appropriate guidance on dietary management of BP which can be part of our HTN management guidelines and possibly the national NCDs guidelines.

1.4 Research Objectives

1.4.1 Broad Objective

- To study the practices of dietary modification and their effect on BP Control in hypertensive patients seen at Shashi Hospital in 2019 and 2020.

1.4.2 Specific Objectives

- To determine the uptake of dietary modification and the effect on BP Control in hypertensive patients seen at Shashi Hospital in 2019 and 2020.
- To explore the determinants of the uptake of dietary modification in hypertensive patients seen at Shashi Hospital in 2019 and 2020.
- To determine the demographic characteristics of hypertensive patients seen at Shashi Hospital in 2019 and 2020.
- To find the association between demographic characteristics and uptake of dietary modification in hypertensive patients seen at Shashi Hospital in 2019 and 2020.
- To find the association between demographic characteristics and BP Control in hypertensive patients seen at Shashi Hospital in 2019 and 2020.

1.5 Research Questions

- What are the demographic characteristics of hypertensive patients seen at Shashi Hospital and their association with BP Control?

- What is the uptake of dietary modification among adult hypertensive outpatients and inpatients at Shashi Hospital?
- What is the association between uptake of dietary modification and BP Control among adult hypertensive patients at Shashi Hospital?
- What are the determinants of the uptake of diet modification among adult hypertensive patients at Shashi Hospital?

1.6 Assumptions

This study assumed that the respondents answered truthfully to the questions that were asked and that no questions were too sensitive to be answered. This was ensured by reassuring the respondents that anonymity and confidentiality were preserved and that the respondents were volunteers who would withdraw from the study at any time and with no ramifications. The study also assumed that the sample was representative of the population and assumed the similarity of the respondents who participated.

1.7 Significance of the Study

The increasing prevalence of poorly controlled BP among HTN patients may point to a knowledge gap on dietary modification or failure to ensure uptake of prevention strategies. It is thus imperative to study how much people know of dietary modification of HTN and how all that translates into recommended diet habits evidenced by BP Control. This knowledge is pertinent to guide medical practice in effectively managing HTN as it will allow for suitable interventions to reduce the cost of care while improving clinical outcomes. This is more needful in patients seen at private institutions, not all of whom can afford expensive antihypertensive drugs and the management of complications. This study is a bit unique as it offered a concentrated

effort on only one aspect of non-pharmacological management of HTN, i.e. diet modification, thus allowing for deeper exploration.

1.8 Delimitation of the Study

One of the important delimitations of the study is that focus was on dietary modification only and not drug treatment or the other non-pharmacological management or lifestyles recommended for HTN management. This was chosen to allow for an in-depth look into the impact of dietary modification on Blood Pressure control. A focus on knowledge and uptake of dietary modification was the overarching objective. The study focused on HTN patients seen at Shashi Hospital outpatients and inpatients departments. This is a private institution but it caters for people from all walks of life although it is more accessed by those on medical insurance.

1.9 Limitations of the Study

Almost all the respondents were on medical insurance so the findings may not be a true representation of those who do not have insurance. There might be social desirability bias since the behavioural practice of the study respondents were based on self-reports and performance of these behaviours was not observed and could not be confirmed. There was no actual measurement of the amount of salt consumed, type of fruits eaten, amount of alcohol consumed. However, in most studies conducted to assess the relationship between lifestyle patterns or food patterns with HTN, the amount of salt intake or the actual foods is not measured quantitatively. Time was another limitation in this study as respondents were interviewed only once however this was the practical way to conduct the study in the available time.

CHAPTER 2 REVIEW OF RELATED LITERATURE

2.1 Introduction

The literature review focused on published epidemiological and clinical studies on HTN epidemiology with a special interest in diet modification. The theoretical framework discussed below guided this study in assessing the variables.

2.2 Theoretical Framework

The Health Belief Model (HBM) is a health behaviour model used in healthcare practice which has been applied to study and promote the uptake of health services and adoption of health behaviours. A behavioural health model is a combination of knowledge, opinion, and actions taken by an individual or group in reference to their health (Raingruber, 2014). This particular model is intrapersonal, meaning that it is based on the knowledge and beliefs of each person. The HBM is used to develop preventative health programs, as well as design appropriate intervention programs where prevention has failed. The HBM asserts that patients have choices about the diet they take and may make appropriate decisions that concern their health. In this case, the HBM suggests that whether or not individuals take action to ensure their BP is well controlled through dietary modification depends on these constructs that are outlined below which are under the particular individual's control.

2.2.1 Perceived Susceptibility

Perceived susceptibility is explained as the subjective assessment of the risk of developing or getting a disease (Glanz, Rimer, & Viswanath, 2015). In our context, this means that individuals who realize that they are at risk of developing poorly controlled HTN and its complications will adopt diet modification to lessen their risk

of developing it or of complications. In contrast, individuals with low perceived susceptibility may refute that they are at risk for uncontrolled HTN and its sequelae and thus are unlikely to adopt diet modification (Raingruber, 2014). Perceived susceptibility includes issues like defining healthy weight, overweight, family history and cultural view of diet choices. The operational definition of perceived susceptibility in this study was the individual subjective belief to feel susceptible or believing that they could have uncontrolled BP if they do not adhere to diet modification.

2.2.3 Perceived Severity

According to Raingruber (2014), perceived severity is a subjective assessment of the severity of a condition and its potential outcomes. Individuals who sense that uncontrolled BP is dangerous and likely to cause complications are likely to adopt dietary modification. Perceived severity includes effects like death, disability and pain, social outcomes such as effects on work, family life, and social relations (Glanz *et al.*, 2015). The combination of susceptibility and severity has been labelled as "perceived threat". The operational definition of perceived severity in this study was an individual's belief in considering how severe HTN disease was and the awareness of the possibility of complications or the undesirable effects of HTN in their day to day life.

2.2.4 Perceived Benefits

Perceived benefits refer to an individual's assessment of the value or efficacy of engaging in health behaviour like healthy eating to improve HTN control. According to Raingruber (2014), if an individual believes that adopting a healthy diet will control HTN or decrease its complications, then he or she is likely to adhere to the diet

modification in contrast to one who does not. This includes perceived benefits like having more energy, being more economically productive and reduced morbidity, disability or mortality. The operational definition of perceived benefit in this study was the belief on advantages/ benefits that would be obtained if one has well controlled HTN through adherence to dietary modifications for Blood pressure control.

2.2.5 Perceived Barriers

The perceived barriers refer to an individual's assessment of the challenges to behaviour change towards diet modification for BP Control. Perceived barriers include things like cultural or socio-economic barriers, low motivation, low priority, lack of self-control, lack of social support and lack of information (Raingruber, 2014). The perceived benefits must outweigh the perceived barriers for diet modification to occur. The operational definition of perceived barriers in this study was the subjective belief that gave a negative impression in adhering to diet modification.

2.2.6 Cues to Action

Health Belief Model asserts that a cue, or trigger, is necessary for causing engagement in health-promoting behaviours (Raingruber, 2014). The cues may include illness of family members or close associates, mass media messages, weight loss programs, preexisting health conditions and Healthcare worker recommendations. The operational definition of cues to action in this study was the incidents or circumstances that influenced or triggered the individual to change their diet practice or take action to manage their diet and maintain it as well.

2.2.7 Self-Efficacy

Self-efficacy refers to an individual's opinion of his or her competence or capacity to adhere to dietary modification successfully, according to Raingruber (2014). It was added in 1988 to help the Health Belief Model better fit the challenges of changing habitual unhealthy behaviours, such as being sedentary, smoking, or overeating. It depends on social support (economic, cultural, religious), dieting history and availability of credible information. The operational definition of self-efficacy in this study was the judgment of the individual's ability or confidence to modify their diet or to practice and maintain healthy eating.

The diagram below illustrates the Health Belief Model.

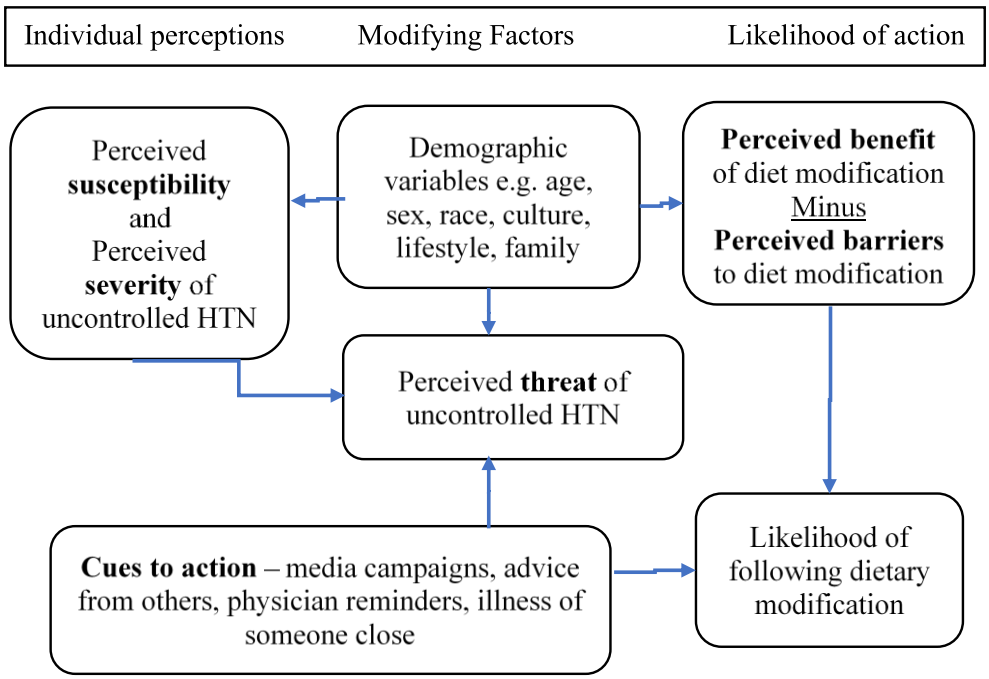

Figure 2. The HBM as applied to diet modification for BP Control. Adapted from Glanz, Rimer Viswanath (2015).

2.3 Relevance of Theoretical Framework to the Study

When the HBM was initially developed, it was an effort to try and explain the rampant failure of people to participate in disease prevention or detection programs. The Model was later extended to apply to people responses to symptoms and to their actions in response to illness and compliance to treatments as the Health Belief Model and compliance to treatment were strongly correlated (Onoruoiza, Musa, Umar, & Kunle, 2015). The constructs of the Model can thus be used to examine adherence to diet modifications for BP Control in HTN patients and also help suggest HTN information that will bring about compliance so the HBM is relevant to this study.

2.4 Variables

The Independent and Dependent variables are illustrated in the table below.

Table 2: Independent and Dependent variables

Independent Variables	**Dependent variable**
Socio-demographic factors (age, gender, education and socio-economic status)	BP Control
Physical measurement (Body mass index)	
Diet-related factors (salt, vegetables, fruits, coffee and alcohol consumption)	
Health Belief Model constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers and cues to action)	

2.5 Main Body

2.5.1 The magnitude of uncontrolled HTN

According to the WHO, about a billion people are living with poorly controlled HTN globally. In Zimbabwe, an analytical cross-sectional study in Lupane showed a 67%

prevalence of uncontrolled controlled HTN (Goverwa *et al.*, 2014). In a recent study in Morocco, the prevalence of poorly controlled HTN was high at 73% (Essayagh *et al.*, 2019). These percentages are worrisome and it is vital to understand the demographic characteristics of people with poorly controlled HTN and their knowledge as well as their uptake of dietary modifications for BP Control. There is no recent nationwide study in Zimbabwe (like the STEPS survey of 2005) to determine the prevalence of NCDs like HTN.

2.5.2. Age and Blood Pressure control

Several studies have shown that BP values and prevalence rise with age. The Zimbabwean STEPS survey confirmed a BP rise with age in both sexes. In the 25-34 years age group, a history of HTN was given in almost a tenth of the respondents which rose to a third in the above sixty-five years age group (MOHCC, 2005). This increase of BP with age may contribute to the increased burden of poorly controlled HTN with age. This was confirmed by a study in Lupane where BP was higher in the older age groups with slightly more than half of those with poorly controlled HTN being at least sixty-five years of age. Being sixty-five years of age and above was associated with more than two times the risk of poorly controlled BP compared to those below (Goverwa *et al.*, 2014). This resonates well with an Ethiopian study which showed age to be significantly associated with poorly controlled BP with patients above thirty-five years being eight to ten times more likely to have poorly controlled BP compared with patients eighteen to thirty-four years old (Tesfaye *et al.*, 2017). A surprising finding in another Ethiopian study was that from middle age onwards people experienced a lower rate of elevated BP than their young counterparts and this was attributed to the low awareness and medication experiences in young patients (Abegaz, Abdela,

Bhagavathula, & Teni, 2018). As seen above, some local studies have demonstrated the relationship between age and BP Control in HTN patients but this needs further extensive studies since there lacks a degree of congruency in the studies reviewed.

2.5.3 Gender and Blood Pressure control

The Lupane study found no significant gender differences ($p = 0.08$) in poorly controlled HTN (Goverwa *et al.*, 2014). This is consistent with findings of the study in Ethiopia which also found no gender differences (Abegaz *et al.*, 2018). However, a study in Morocco found more males to have poorly controlled HTN than females (Cheong, Sazlina, Tong, Azah, & Salmiah, 2015). In a national cross-sectional survey in Bangladesh, females in their older age (more than 56 years) were less likely to have their BP well controlled than older males (older females 36% versus older males 46%, p less than 0.05). This was partly explained by the higher prevalence of obesity in females (older females 18% versus older males 9%). However, no such statistically significant difference was observed between younger males and younger females (Rahman, Williams, & Al Mamun, 2017). There is a need for more studies on the gender differences in BP Control in our setting.

2.5.4. Education, socio-economic status and BP control

A negative association between educational level and HTN was noted in the study which showed a higher prevalence of unhealthy behaviours towards BP Control among individuals with low educational level and they postulated that this was because of poor awareness of HTN among other reasons (Al-Ghuzi & Al-Asadi, 2014). This is supported by another study which showed that patients with less than secondary education were almost two times more likely to have poor BP Control when compared with those who had secondary or higher education (Cheong *et al.*, 2015). In contrast,

primary level education and below was not statistically associated with having poorly controlled HTN in the Lupane study (Goverwa *et al.*, 2014). However, this study found that those who were married, employed and had an average monthly household income above US$200 were less likely to have poorly controlled HTN (Goverwa *et al.*, 2014). Al-Ghuzi and Al-Asadi (2014) support this when they say low education usually accompanies low income, which adds a further barrier to get medication. This is in sync with the Moroccan study showing that about 90% of those with poorly controlled HTN were not employed and 80% had a monthly income of not more than U$150 per household (Essayagh *et al.*, 2019). This is in contrast to the Bangladesh study which showed that increased wealth status was associated with poorly controlled Blood Pressure despite better checking of BP, HTN awareness and use of antihypertensive medication. Patients using antihypertensive medication in the upper two wealth quintiles (richer / richest) had 59% and 44% lower odds of having their BP controlled, compared with the poorest/ poorer individuals (Rahman *et al.*, 2017). The conclusion derived from these studies is that in countries undergoing an epidemiological transition, effects of socio-economic status on BP varies and many causes may have a role in mediating the association (Cois & Ehrlich, 2014). More studies are needed to evaluate the intricate association between Education level, employment and socio-economic standing.

2.5.5. Knowledge of HTN patients about Blood Pressure

A study in Pakistan revealed inadequate overall knowledge scores in HTN patients with scores being lower in patients with poorly controlled HTN as sufficient knowledge in patients has been associated with better BP Control. Factors associated with good knowledge scores were male gender and having poorly controlled HTN.

Curiously, having formal education did not show any relation with high knowledge scores. This suggests that specific knowledge about a disease is needed and simple education alone may not be enough (Almas, Godil, Lalani, Samani, & Khan, 2012).

2.5.6 Knowledge and uptake of dietary modification

2.5.6.1 Salt intake and BP Control

In the Ethiopian study where more than 68% of the respondents were not following a low-salt diet, 53% had poorly controlled HTN (Tesfaye *et al.*, 2017). However, in another Ethiopian study, 59% of the respondents knew the danger of salt on HTN management and 80% avoided adding salt to their food. The number of respondents with knowledge about salt control was more than in a research done in Ghana (60%) (Tesema, Disasa, Kebamo, & Kadi, 2016). A recent study in Ethiopia again proved that HTN patients with a high salt intake were more than five times more likely to have poorly controlled BP than those who took the normal amount of salt controlling for other variables (Abegaz *et al.*, 2018). In a study in Kenya, 63% of the patients were taking advised low-salt diet but only 50% had their BP well controlled. However, among the 37% of patients not reducing salt, less than 5% had their BP well controlled (Mwenda, Gitonga, & Kamweru, 2019). In this study, knowledge of the effects of excess salt intake on BP Control was not translated into practice. Also, a Zambian study found that almost all the respondents had a better understanding of the risk of excessive salt intake but the practice of salt moderation was not impressive. This inferred that patients knew that they have to reduce their salt intake but they did not have enough knowledge of total daily intake. This also applied to other dietary habits such as fatty food consumption (Ikasaya, Mwanakasale, & Kabelenga, 2018). In the Lupane study, adding salt to food was independently associated with poorly controlled

HTN (Goverwa *et al.*, 2014) but there was no in-depth study of salt consumption. The Zimbabwe STEPS survey of 2005 did not report on salt consumption hence there is a need to further explore the impact of high salt consumptions as has been done in other countries.

2.5.6.2 The DASH diet plan

Many clinical trials have proved that the DASH diet plan consistently lowers BP across a diverse range of patients with HTN and prehypertension. Due to this evidence, DASH has been a part of HTN control and management dietary guidelines since its original publication (Steinberg, Bennett, & Svetkey, 2017). However, despite this, adherence to the DASH diet plan is poor but the public health significance of poor DASH diet plan adherence cannot be overstated. The DASH study itself offered the strongest evidence to its BP-lowering effect where it lowered Systolic BP (SBP) by an average of 6 mm Hg and Diastolic Blood Pressure (DBP) by 3 mm Hg from as early as within two weeks after its introduction. For respondents with stage 1 HTN (BP 140/90– 159/99 mm Hg), the DASH diet plan was even more effective, reducing SBP by an average of 11 mm Hg and DBP by 6 mmHg (Appel *et al.*, 2006). To show the impact of the DASH diet plan 90% of those with poorly controlled HTN were not complying with diet modification in Morocco (Essayagh *et al.*, 2019). A study in China on the impact of fruits among HTN patients showed that a high intake of fruits (OR: 1.49, 95% CI: 1.15; 1.93; $p = 0.003$) was related to better Blood Pressure control (BP < 140/90 mm Hg) (Yu *et al.*, 2018).

Evidence on coffee consumption and its association with the incidence of HTN is still inconsistent. A dose-response meta-analysis showed a non-linear relationship between

coffee consumption and the risk of HTN (p for non-linearity less than 0.001). Whereas the habitual drinking of one or two cups of coffee per day, compared with not drinking, was not associated with risk of HTN, a significantly protective effect of coffee consumption was found starting from the consumption of three cups per day (RR = 0.97, 95% CI = 0.94; 0.99), and was confirmed for greater consumption (D'Elia, La Fata, Galletti, Scalfi, & Strazzullo, 2019). Another study also suggested that habitual consumption of coffee of more than three cups per day was not associated with an increased risk of HTN compared with less than one cup per day. However, a slightly elevated risk appeared to be associated with light-to-moderate consumption of between one and three cups of coffee per day (Zhang, Hu, Caballero, Appel, & Chen, 2011). There has not been a study of coffee consumption in Zimbabwe and this remains an area of study just as it is globally evidenced by literature deficiencies on coffee consumption and BP Control.

A study in Iran revealed that consuming fast-foods and high amounts of salt at the same time triggered a nearly two-fold risk of high BP (Akbarpour *et al.*, 2019). Many studies have shown that people who consume fast food consume higher amounts of saturated oil and salt which may affect vascular function and anti-inflammatory mechanisms and ultimately increase their BP (Akbarpour *et al.*, 2019). Fast food consumption and BP Control have not been adequately explored locally and this is very necessary with the proliferation of fast food outlets and the subsequent change of eating patterns not only in urban areas but also in rural areas.

Though the Zimbabwean STEPS survey explored the various aspects of diet like fats, fruits and salt, this was not to be with the DASH diet plan in mind. The Lupane study

did not assess diet as a cause of poorly controlled HTN but looked only at obesity which is often a result of unhealthy eating. This study aimed to concentrate and focus on the aspects of the DASH diet plan which is pivotal to dietary management of HTN to bring more specific findings to the body of knowledge.

2.5.6.3 Weight reduction

Higher Body Mass Index (BMI) (which is being overweight and obese) is one major contributing cause for HTN and many Randomised Clinical trials have consistently proved that BMI and BP have a direct and apparent dose-response relationship (Whelton *et al.*, 2018). Thus obesity was found to be an independent risk factor for poorly controlled HTN in the Lupane study where more than half of the HTN patients had an abnormal BMI with 26% overall prevalence of obesity, the obesity being more prevalent in females (34%) compared with males (11%) (Goverwa *et al.*, 2014). In a study in Ethiopia, the overweight patients were twice more likely to have uncontrolled HTN when compared with those patients with normal weight (Tesfaye *et al.*, 2017). In the Kenyan study, 90% of the respondents maintained their body weight but only a fifth of these had well-controlled HTN. The patients who watched their weight were 20% more likely to control their BP compared to those who did not monitor their weight. Of note is that none of the patients who did not watch their weight had well-controlled HTN. According to the researchers, the patients in this study were knowledgeable of weight control (Mwenda *et al.*, 2019). In contrast to these studies, in Bangladesh, overweight or obese males were about two and half times more likely to have their BP well controlled compared with normal BMI males. This was because being overweight or obese was associated with more BP check-ups and monitoring, HTN awareness, and antihypertensive medication use. However, compared with

normal BMI females, both thin and overweight or obese females had poor BP Control (Rahman *et al.*, 2017). There exists local evidence on the relationship between obesity and HTN control and the current study aims to add to this body of knowledge.

2.5.6.4 Alcohol intake

Studies have proved that alcohol is one of the risk factors of HTN and is cause for a significant population burden of HTN. A study by Whelton *et al.* (2018) posits that non-adherence of patients to alcohol intake recommendations makes HTN control more difficult. A Brazilian study on a large sample of adults showed a dose-response relationship between alcohol consumption and BP. Alcohol consumption was associated with high BP in men who reported moderate and excessive consumption. Women who consumed excessive alcohol were three times more likely to have poorly controlled HTN. Binge drinkers who consumed more than two to three times a month had 70% more chance of presenting with raised BP, after adjusting for consuming drinks with meals (Santana *et al.*, 2018). Supporting this is an Ethiopian study, where non-adherence to alcohol abstinence was found to cause almost two times the risk of developing poorly controlled BP than adherence to alcohol abstinence (Tesfaye *et al.*, 2017). In the Kenyan study by Mwenda *et al.,* (2019), those who consumed alcohol were three times more likely to have poorly controlled HTN compared with those who did not who had a lower Odds Ratio of 0.1. Chi-square calculation showed that alcohol consumption was significantly associated with BP Control ($\chi 2 = 23$, $N = 200$, $p = 0.000$). More than half of the participants could name the effects of excessive consumption of alcohol. The likelihood of alcohol consumption to cause poorly controlled BP is supported by the Lupane study (Odds Ratio 1.9) (Goverwa *et al.*, 2014). This is also supported by the 2005 Zimbabwe STEPS survey which revealed an

increased risk of HTN with increased alcohol consumption in many Zimbabwe provinces (MOHCC, 2005).

2.5.7 The HBM constructs and BP Control.

A Chinese study of HTN patients to assess adherence to lifestyle modification showed that based on the HBM, a higher level of self-efficacy and perceived severity and few or no perceived barriers were associated with better adherence. Self-efficacy was one of the most important mediating variables affecting adherence (Yang *et al.*, 2016). In a study on Iranian HTN patients, perceived barriers were higher in female participants as men were more committed to self-care activities than women because of the higher perceived self-ability in men because of social factors, duties and opportunities (Khorsandi, Fekrizadeh, & Roozbahani, 2017). The HBM constructs are interconnected as proved by a study which showed an indirect influence between perceived susceptibility and HTN prevention behaviour through perceived threat as the mediating variable. Also noted was an influence of perceived severity toward HTN preventative behaviour through perceived threat (Setiyaningsih, Tamtomo, & Suryani, 2016).

2.5.7.1 Perceived Susceptibility

Perceived susceptibility is one of the most important factors affecting and predicting health behaviours. For HTN patients to adopt diet modification, interventions must aim to change their beliefs so that they believe they are susceptible and at risk to poorly controlled HTN and its complications (Larki, Tahmasebi, & Reisi, 2018). Perceived susceptibility about HTN complications and adherence was a predictor of both low-salt diet (OR = 1.1) and reducing alcohol in the study (OR = 1.6). The results also

revealed that those who had more perceived severity (OR = 1.3) had significantly greater adherence to their HTN management compared to those who had less perceived severity. Also, the self-care behaviours were worse among those who had a lower perception of their predisposition to the disease (Larki *et al.*, 2018).

2.5.7.2 Perceived Severity or risk

Increasing the perceived severity has a significant role in reducing the perceived barriers, and perceived severity has a strong cognitive component related to one's awareness (Kasmaei, Yousefi, Farmanbar, Omidi Saeed, & Farhadi Hassankiadeh, 2015). In the Lupane study, the Cronbach's alpha for the nine-item scale used to assess one's perception of the risk of having complications because of HTN was 0.9. The respondents perceived themselves to be at risk of developing paralysis, heart problems and stroke. Respondents with a high-risk perception of 86% less likely to have poorly controlled HTN compared with those with low perception. Also, those who had received HTN health education were 55% less likely to have poorly controlled HTN compared with those who had not (Goverwa *et al.*, 2014). The Ethiopian study also assessed the awareness of the respondents HTN-related complications. Respondents who did not know at least two complications were less likely to have good control of their HTN than those who did and two times more likely to have poorly controlled HTN (Tesfaye *et al.*, 2017).

2.5.7.3 Perceived Barriers

Studies have shown that perceived barriers are the most powerful single factor predictor concerning behaviour modification in HTN (Glanz *et al.*, 2015). It is considered the main reason to refrain from following doctors' orders. An inverse

relationship between perceived barriers and health behaviours including HTN control has been observed, that is, the less the perceived barriers, the greater the possibility of adopting diet modification (Khorsandi *et al.*, 2017).

2.5.7.4 Perceived Benefits

Perceived benefits are the second most important construct that is effective in predicting behaviour with the extent of effect higher for prevention and risk reduction measures like dietary modification (Glanz *et al.*, 2015). Studies have also shown that awareness and proper perception of health behaviours stimulate the people to adopt such behaviours (Khorsandi *et al.*, 2017).

2.5.7.5 Self-Efficacy

Self-efficacy plays an important role in the adoption of behaviours to control HTN and it seems that patients with low health literacy may feel less certain and motivated in their ability to adhere to dietary modifications (Larki *et al.*, 2018). The Iranian study proved that patients with greater perceived self-efficacy were more likely to employ common weight management strategies (Odds Ratio = 1.1) and to adhere to a low-salt diet (Odds Ratio = 1.3) than those with lower self-efficacy. This finding supports a positive association between self-efficacy and self-care behaviours like diet modification found in previous studies (Larki *et al.*, 2018).

2.5.7.6 Cues to action

Cues to action are incidents, experiences, physical symptoms or environmental factors that influence the performance of behaviours. An Iranian study showed a negative correlation between cues to action and perceived barriers and showed that sufficient

cues to action for patients to overcome the barriers of self-care behaviours are Healthcare workers and family support (Kasmaei *et al.*, 2015). This is in unison with a study in Indonesia showing that cues to action are positively and indirectly associated with HTN preventive behaviour indirectly through perceived threat. (Setiyaningsih *et al.*, 2016).

2.6. Summary

A shown above, a substantial amount of literature exists that proves the impact of dietary modification in managing and controlling HTN. The dietary interventions have been proven by studies in various settings and in different groups of people to give them a universal application. These low-cost non-pharmacological interventions if adhered to would make a big impact on BP Control in HTN patients and prevent complications and associated costs including loss of life. However, not many studies have been done in our setting to elicit the impact of diet modifications for BP Control in HPT patients. The National Survey Zimbabwe NCDs Risk Factors survey done in 2005 was the most comprehensive study done, but even so, it did not address diet modification in-depth. For example, on salt, it only assessed being on a prescribed diet including salt reduction (MOHCC, 2005). However, it was a good study to obtain population wide data but leaving a need for studies such as this one to go in-depth into the various interventions. The Lupane study attempted to do this but focused on various factors that contributed to poorly controlled BP among hypertensive patients on treatment in Lupane District. There was no targeted focus on one intervention like diet modification or lifestyle changes. The Lupane study was not assessing the root causes of poorly controlled HTN but focused on the results, e.g. obesity was found to

be an independent risk factor for poorly controlled HTN but this is often a result of unhealthy diet (Goverwa *et al.*, 2014).

This study aims to explore the dietary factors contributing to poorly controlled BP in the patients on treatment with a special focus on the DASH diet plan. As far as we know, there is a lack of other local studies to complement or contradict the findings of the 2005 STEPS survey or the Lupane study on factors contributing to poorly controlled BP.

CHAPTER 3 METHODOLOGY

3.1 Introduction

This chapter will outline the research design and methodology followed to meet the objectives of the study. The validity of the analysis of a study rests upon a proper setting of the research design and selecting the most suitable methodology to apply. Therefore, this chapter is key to the authenticity of the results and recommendations. The chapter is organised into the subheadings of The Research Design, Population and Sampling, Data Collection Instruments, Data Collection Procedure, Analysis and Organisation of Data, Ethical Consideration and Summary.

3.2 the Research Design

A retrospective 1:1 case-control study design was used (1:1 matching not including gender). This was suitable and practical as respondents were not to be followed up over time and thus there was less time required to carry out the study since the disease (HTN) has already occurred. An analysis of their dietary habits which has led to either good or poor control of BP was done to allow comparison of the effect of diet. The design was potentially efficient in this case as it allowed an examination of multiple exposures or risk factors at the same time and it was also a practical, ethical and economical design to employ given that it was academic research by a student with limited resources and time.

3.2.1 Definition of cases and controls

A case of uncontrolled or poorly controlled HTN was a patient with either mean SBP > 150 mmHg and / or mean DBP > 90 mmHg if over 60 years old and either mean SBP > 140 mmHg and / or mean DBP > 90 mmHg if below 60 years or had Diabetes

or Chronic Kidney Disease. A control of HTN was a patient with either mean SBP < 150 mmHg and / or mean DBP < 90 mmHg if over 60 years old and either mean SBP < 140 mmHg and / or mean DBP < 90 mm Hg if below 60 years old or had Chronic Kidney Disease or Diabetes. These definitions were based on the JNC8 guidelines which are widely used.

3.3 Population and Sampling

The study setting was Shashi Hospital which is the main Private Hospital in Bindura District, Mashonaland Central Province. The target population included adult hypertensive patients (both outpatients and inpatients) seen at Shashi Hospital in 2019 and the first quarter of 2020. Inclusion criteria were a respondent 18 years old or above, fully conscious, clinically and mentally stable. Study respondents had a known diagnosis of HTN and on medication for at least 6 months before being enrolled in the study. Presence or absence of other NCDs like Diabetes Mellitus was not considered as an inclusion or exclusion factor. The study excluded pregnant women, those below 18 years of age and those who had not given informed written consent.

Simple random sampling was used from the database of hypertensive patients seen at the institution and from those present at the outpatients or inpatients departments. Patients were allocated random numbers and a random number generator was used to select the cases and the controls into the study. Those who were not present at the time were telephoned and booked to be interviewed when they would come for drug resupply or review. Controls were similar to cases in all respects other than having poorly controlled HTN or were similar to the general population from which the cases arose. The sources of controls that were considered included the spouse, friend, or

neighbour of the case, an individual hospitalized at the same time as the case but with well-controlled BP, or an individual chosen randomly from the patients at the institution. The sample size was calculated using EpiInfo StatCalc version 7.2.3.1 as shown on the picture below and the study recruited one hundred and thirty-five (135) cases and one hundred and thirty-five (135) controls.

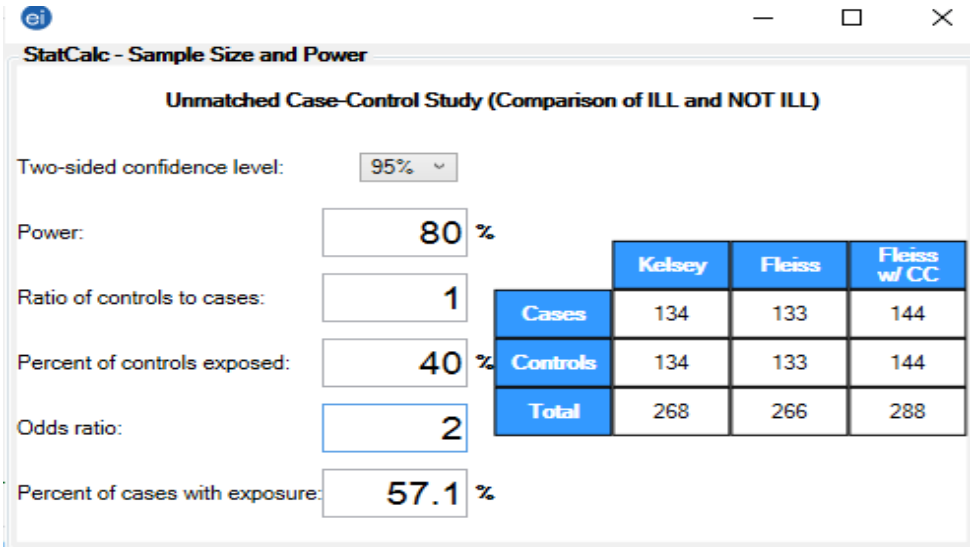

Figure 3. Sample size calculation in StatCalc.

3.4 Data Collection Instruments

A structured interviewer-administered questionnaire based on the WHO stepwise questionnaire was used to collect information from the respondents. The questionnaire was in both English and Shona and the respondents indicated their language of choice and cold also use both. The demographics elicited information about the clients while the main body focused on dietary habits and HBM constructs. Three BP recordings each five minutes apart were made and average BP calculated to classify the respondent as either case or control. Where there was doubt, two previous BP recordings were used together with the current one to BP classify based on average BP. The weights of patients were taken using a weighing scale calibrated in kilograms

and the respective heights were measured using a calibrated wall in meters to enable BMI calculation.

3.4.1 Validity and Reliability

Validity is the degree to which an instrument measures what it is intended to measure and performs as it is designed to perform and comprises both internal and external dimensions. To check for face validity, the questionnaires were given to five laypersons (clients at the institution who were not part of the study) who ascertained what the instrument is measuring. Content validity was checked by giving instruments to the field research supervisor who checked instruments' content coverage based on the study parameters. Improvements were made on the instruments based on the advice of the reviewer and the laypersons. Reliability is the consistency of the instrument to measure what it is intended to measure or its ability to yield reproducible results. Reliability was established using a pilot test by collecting data from twenty subjects from Bindura Hospital which were not included in the study sample. The test re-test approach was also used to evaluate the reliability of the questionnaire. The questionnaire was administered to this group two times, the second administration coming a week after the first.

3.5 Pretesting of instruments

The data collection instrument was pre-tested on a random sample of 20 Bindura Hospital respondents and adjustments were made according to their recommendations.

3.6 Data Collection Procedure

A structured interviewer-administered questionnaire was used to collect socio-demographic, socio-economic and socio-cultural information and also information on patient knowledge and practices towards dietary modification in HTN. Questionnaire administration was flexible and adjusted to the needs and requirements of the respondents in term of language and time taken. This was done in a relaxed, free and private setting and respondents were allowed and given time to ask questions. The questionnaire elicited a range of information which commenced with demographic information, BP history, compliance with dietary modification and information on risk factors (modifiable and non-modifiable). Measurements that were taken are BP, weight and height. BP was measured using a digital BP monitor and classified using the Joint National Commission eighth edition guidelines BP thresholds as Zimbabwe does not have independently published guidelines for classifying HTN. Each patient rested for at least five minutes before BP measurements during the interview while sitting in a chair with both feet flat on the floor and arms rested being supported at the level of the heart on a table. The patients were advised to relax as much as possible and avoid talking during BP measurement. We measured weight using a pre-calibrated bathroom scale while wearing light clothing and barefoot. We measured height with the patient standing upright against a wall using an affixed height measuring device. The respondents stood barefoot, with their backs, buttocks and heels in contact with the wall. We then calculated the BMI of each patient with a BMI calculator which uses the formula:

$$\text{Body Mass Index} = \frac{\text{Weight (kg)}}{\text{Height (meters)}^2]}$$

We defined obesity as a BMI of at least 30 kg/m^{2}and this was based on the WHO guidelines of 2000 which classify BMI as follows:

Table 3: Classification of adults according to BMI

Classification	BMI (kg/m^2)	Risk of developing health problems
Underweight	Below 18.5	Increased
Normal weight	18.5 - 24.9	Least
Overweight	25.0 - 29.9	Increased
Obese		
Class 1	30.0 - 34.9	High
Class 11	35.0 - 39.9	Very high
Class 111	Above 40.0	Extremely high

Source: (W. H. O. Consultation on Obesity & World Health Organisation, 2000)

3.7 Analysis and Organization of Data

Frequencies, proportions, percentages, Odds Ratios, p-values, 95% Confidence Intervals, stratified analyses and logistic regression analysis were done using EpiInfo version 7.2.3.1 and Microsoft Excel was used to generate graphs, tables and charts. Word clouds were done for qualitative data in the HBM constructs.

3.8 Ethical Considerations

Permission to carry out the study was sought from the management of Shashi Hospital and the Bindura Hospital Medical Superintendent (Med Sup) for Administrative clearance. The District Medical Officer and Provincial Medical Director (PMD) granted permission for the study after they had gone through the research proposals and ethical considerations. These received the proposal which was submitted to Africa University Research Ethics Committee for ethical clearance. The ethical approval was also communicated to them and the Shashi Hospital management.

Informed written consent was sought from all the respondents before being enrolled in the study for their voluntary participation. This was in both English and Shona and they were free to choose either or both and were given all the time they desired to read and understand and also to ask any questions. Those who could not read or write the informed consent was read and explained to them and they were also given time to think about it and to ask any questions. If they agreed to participate after this process, they signed on the informed consent form or put a thumbprint if not able to write. This process was done by an independent individual who was not participating in questionnaire administration. It was emphasized that participation is voluntary and respondents were free and allowed to withdraw from the study at any time or choose not to answer any questions without any victimization or negative consequence. Emphasis was also made that their participation or lack of it would not in any way affect the care they were entitled to receive at the Hospital or the future care for that matter. Respondents were interviewed in secluded, private and comfortable rooms to ensure they were relaxed and assured that issues of privacy and confidentiality were well observed. Anonymity and confidentiality were ensured as names and other identifying demographic data of respondents were not used as each questionnaire was assigned a questionnaire number which was the only identifying feature for the questionnaire. Filled data collection tools were kept under lock and key in a lockable cabinet and unauthorized access was not allowed.

There were no direct monetary, medical or other benefits offered to the study respondents and we did not compensate them for transport fares they would have used to come to the Hospital. The study was not a treatment study for HTN but just an observational study and thus no treatment or management was done. If a participant

had any question or query related to their clinical care, they were referred to the practitioners for further care or management. There were no foreseeable physical risks to the respondents as no invasive procedures were done. The only procedures involved were measurement of BP, height and weight which normally present no discomfort and may be carried out as part of routine care. Possible ethical risks included the possible intrusion into private people's habits and practices which could carry some psychological risks, for example asking about alcohol consumption which someone may desire to remain a secret. To mitigate against the divulging of secrets, respondents were interviewed alone in the secluded and private area unless they opted to be with their accompanying relatives. Family history of HTN was among one of the interview questions and this had the potential of arousing some unpleasant memories in some respondents for instance if they have had a previous bad experience with HTN, for example, loss or disability due to HTN or its complications. To mitigate against this, we explained to the respondents that they can only disclose information they are comfortable with and may choose not to answer specific questions or stop the interview at any point without any fear of untoward consequence to them. The findings from the study will be used to give recommendations management of HTN in patients at this institution, the District or Province and hopefully contribute towards the future formulation of HTN dietary guidelines with locally available foods.

3.9 Summary

A retrospective 1:1 case-control study design was utilized as respondents were not to be followed up over time and it was a practical and potentially efficient, ethical and economical way to assess the multiple exposures involved in BP Control. The study explored the dietary habits which had led to either well-controlled or poorly controlled

BP to allow comparison of the effect of the different diet practices. The study was done at Shashi Hospital targeting adult HTN patients (both outpatients and inpatients) seen at Shashi Hospital in 2019 and the first quarter of 2020. The respondents were 18 years old and above, fully conscious, clinically and mentally stable with a diagnosis of HTN and on BP medication for at least half a year before being enrolled in the study. Those who had not given informed written consent and pregnant women were excluded from the study. A total of 135 cases and 135 controls were enrolled in the study through simple random sampling of patients visiting the institution. The interviewer-administered structured questionnaire elicited information on demographic information, dietary knowledge and practices of the respondents grouped as either cases or controls. Height, weight and BP measurements were done to classify one as either case or control. Epi-Info version 7.2.3.1 was used to analyze the data. Permission to conduct the study was sought and granted from the relevant authorities, ethical approval was also obtained. Ethical considerations were observed throughout the study without any deviation or compromise.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the results of the study. First, there was a descriptive analysis of demographic variables that include, area of residence, gender, age marital status, education and income. This was followed by an analysis of the physical measurements for which both Univariate analysis and Bivariate analysis were done. Univariate analysis of single variables with descriptive frequencies was then done followed by Bivariate analysis examining two variables or two by two (2 x 2) tables looking at risk factor. Possible Effect modifiers or Confounders were identified and outcome stratified analysis of variables by these was done and lastly followed by multivariate analysis (i.e. logistic regression). The HBM constructs were also analysed descriptively and by Bivariate analysis as well as Word cloud of some of the constructs.

4.2 Data Presentation and Analysis

4.2.1 Demographic characteristics of the respondents

The study involved a total of 135 cases and 135 controls. Almost all the respondents (97.8%) were on medical insurance while only 2.2% were not on any medical insurance but were paying for medical services in cash. The majority (72.3%) of the respondents were urban dwellers while only 27.7% were from the rural areas [OR 1.3; 95% CI 0.7; 2.2, p-value 0.37]. Those from the rural areas were from the farms, resettlement areas or the communal areas. Their areas of residence are as shown in Figure 4 below and this shows that they are from areas surrounding Bindura which is the catchment area of the institution.

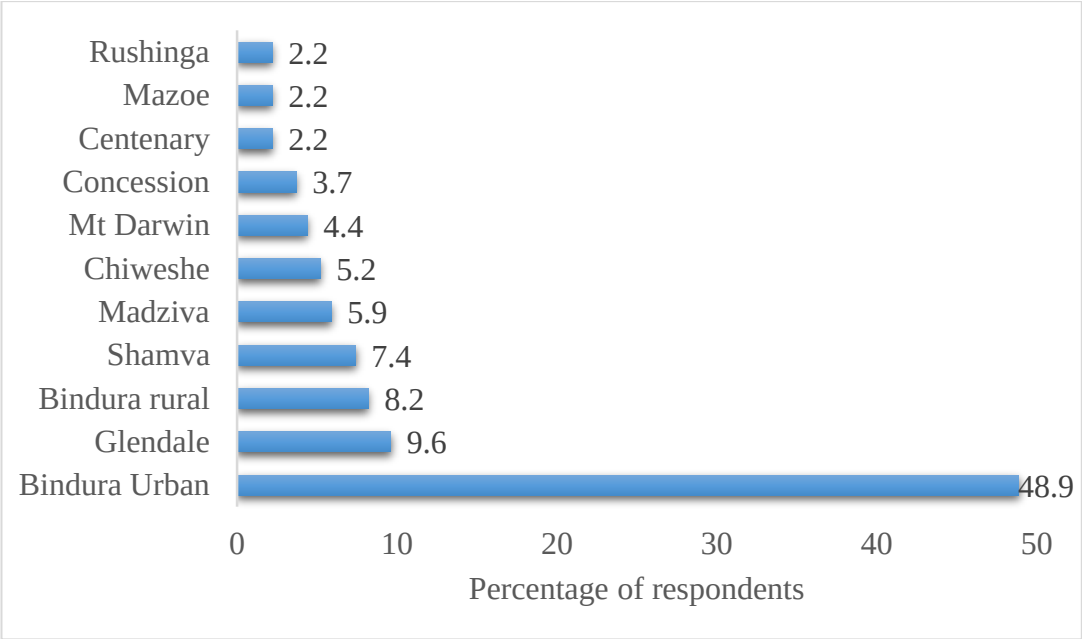

Figure 4: Areas of residence of the respondents.

4.2.1.1 Gender

Males comprised 101 (37.4%) and females were 169 (62.6%) of the respondents. The graph below shows the distribution of cases and controls in males and females [OR 1.3 95% CI 0.8; 2.1, p-value 0.38].

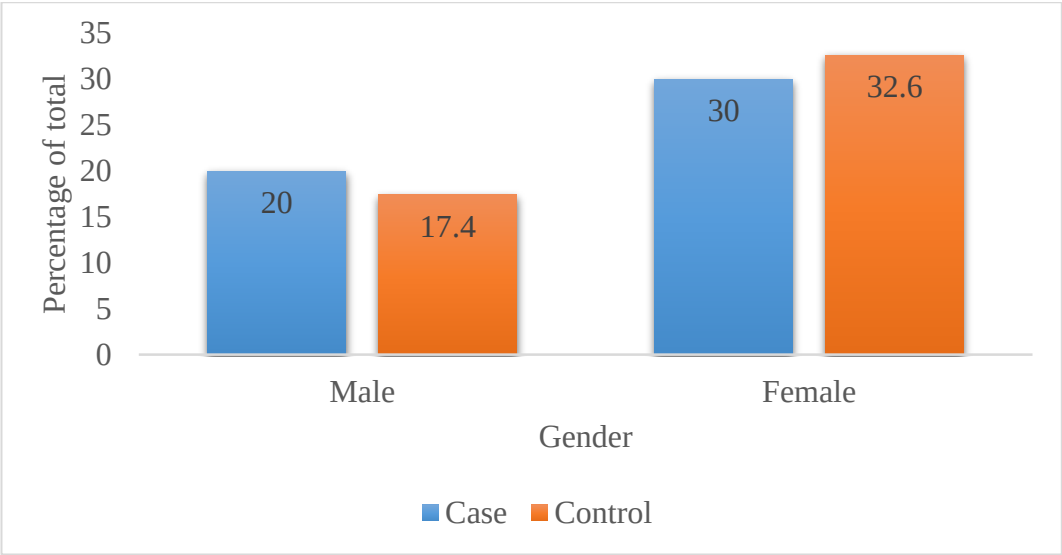

Figure 5: Distribution of cases and controls by gender, N=270.

This shows that the majority of the respondents were females although males had more cases as opposed to females.

4.2.1.2 Age

The study involved respondents from twenty-four years to ninety years of age. The table below shows the median age for the respondents.

Table 4: Median age of the respondents

	Cases (years)	Controls (years)	OR (95% CI)	p-value
Median age	53 (Q_1 = 46; Q_3 = 63)	59 (Q_1 = 50; Q_3 = 66)	2.0 (1.2; 3.2)	0.43
Overall median age 56 years (Q_1 47; Q_3 65)				

The median age was lower (53 years) for cases than for controls (59 years). The age distribution of all the respondents by twenty-year age groups is shown in the pie chart below.

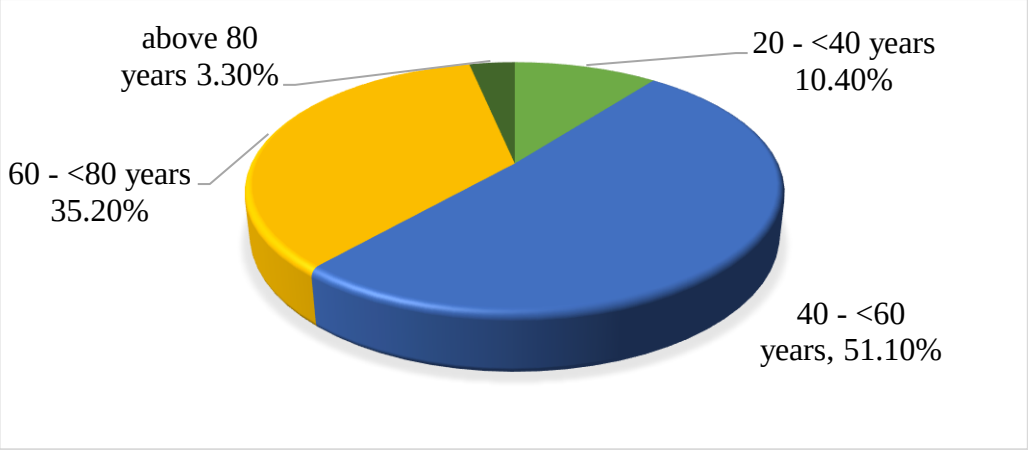

Figure 6: Age distribution of the respondents by age groups.

This shows that the majority of the respondents were on the forty to sixty years age group while few were the above eighty years age group. The chart below shows the age distributions among the cases and the controls.

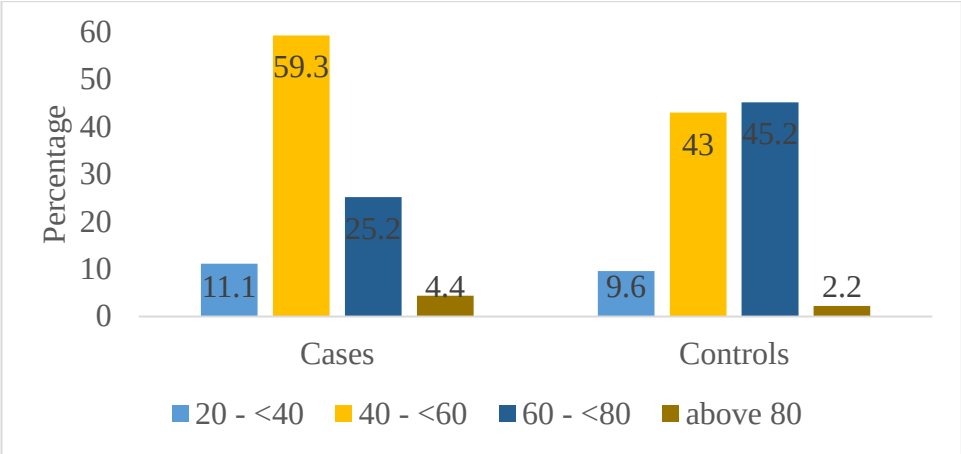

Figure 7: Age distribution of cases and controls, N=270.

This shows that the majority of the cases were in the forty to sixty years age group (59.3%). Using sixty years as a cutoff point, those below sixty years of age contributed 69.6% of the cases while those more than 60 years of age contributed 30.4%. Of the cases, 69.6% were below 60 years of age while 30.4% were above 60 years of age [OR **2.0**, 95% CI 1.2; 3.2, p-value **0.009]**.

4.2.1.3 Marital status

The majority (74.8%) of the respondents were married while 25.2% were not married [OR 1.3. 95% CI 0.8; 2.4, p-value 0.26]. The distribution of cases and controls by marital status is shown in Figure 7 below:

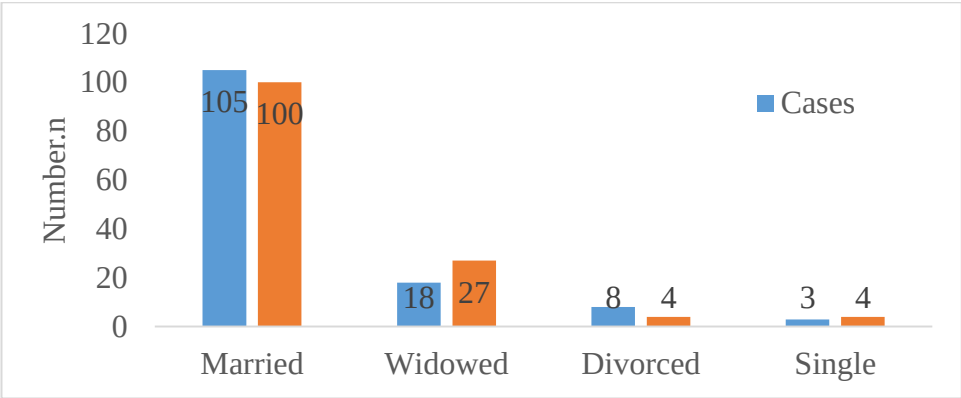

Figure 8: Cases and controls by marital status.

This shows that among the married, more were cases and this was a similar case for the divorced while it was the opposite for the widowed and the single.

4.2.1.4. Other demographic features

The other demographic features that were assessed are educational attainment, employment status, and monthly income. Basic education was defined as attained education from Grade 7 onwards and this was attained by 67.2% of the respondents while 32.8% had not attained it. Of the males, 81.2% attained basic education compared to 58.7% of the females. The distribution of cases and control and basic education attainment is shown in the table below.

Table 5: Basic education attainment in cases and controls

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio (95% CI)	p-value.
Basic Education				
Yes	96 (71.1)	84 (63.2)	1.4 (0.9; 2.4)	0.17
No	39 (29.2)	49 (36.8)		

This shows that most of the cases had attained basic education just like most of the controls. Attainment of basic education is normally associated with being employed so employment status was also assessed in this respect. Most (55%) of the respondents were informally employed while 45% had formal employment and some had other sources of income in addition to their formal employment as a source of income. The most common additional sources of income were farming and informal trading especially in females. More males (53%) were formally employed than were females (40%) most of whom were doing projects like poultry and informal trading. The distribution of cases and controls by employment is shown below.

Table 6: Cases and controls by employment status

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio (95% CI)	p-value.
Formal Employment				
Yes	62 (45.9)	59 (44)	1.08 (0.7; 1.8)	0.75
No	73 (54.1)	75 (56)		

The table shows that more of the cases were informally employed while more of the controls were informally employed. Being employed on unemployed is a determinant of one's income and hence ability to afford Healthcare or components of a healthy diet. Monthly income was assessed basing on ZW $3000 based on the Zimbabwe poverty datum line of ZW $ 3 160.00 in October 2019. The majority of the respondents (88.3%) earned a monthly income below this poverty datum line cutoff while only 11.7% earned above this. Majority of the females (90.3%) were earning below the threshold of ZW $3000 compared to 84.9% of the males. The distribution of monthly income among cases and controls is shown in table 7 below.

Table 7: Monthly income for cases and controls

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio (95% CI)	p-value
Monthly income ZW$ < 3000				
Yes	126 (94)	107 (82.3)	**3.4** (1.5; 7.9)	**0.003**
No	8 (6)	23 (17.7)		

This shows that the majority of the cases were earning below the poverty datum line threshold as well as the majority of the controls however this was expected as only a few of the respondents earned above ZW $3000.

4.2.2 Physical Measurements

The study involved measuring BP, height and weight to calculate BMI. The majority (68.9%) of the respondents had BMI less than 30 kg/m^2 while 31.1% had a BMI of 30 kg/m^2 or above. Of the males, 22.8% had a BMI of 30 kg/m^2 or above compared to 36.1% of the females. The association of BMI and BP category is shown in the table below.

Table 8: BMI for cases and controls. N=270

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio (95% CI)	p-value.
BMI > 30 kg/m^2				
Yes	64 (47.4)	20 (14.8)	**5.2** (2.9; 9.3)	< **0.001**
No	71 (52.6)	115 (85.2)		

This shows that the majority of the control had BMI less than 30 kg/m^2 whole for the cases the percentages were close to each other.

4.2.3 History of Blood Pressure.

The interview inquired about the BP history of the respondents which was assessing and previous history of defaulting HTN medication, family history of BP the past six months. The table below summarizes the findings in this area of inquiry.

Table 9: Blood Pressure history of the respondents. N=270

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio (95% CI)	p-value.
Defaulted BP drugs in the past 6 months				
Yes	47 (35.1)	19 (14.2)	**3.3** (1.8; 5.9)	< 0.001
No	87 (64.9)	115 (82.8)		
Family history of BP				
Yes	119 (88.8)	117 (86.7)	**1.2** (0.6; 2.5)	0.29
No	15 (11.2)	18 (13.3)		
BP checked > 3 months ago				
Yes	23 (17)	10 (7.4)	**2.6** (1.2; 5.6)	0.016
No	112 (83)	125 (92.6)		
Elevated BP past 6 months				
Yes	121 (90.3)	36 (26.7)	**25.6** (12.8; 50.9)	< 0.001
No	13 (9.7)	99 (73.3)		

The table shows that the majority of the controls had not defaulted BP drugs in the past six months and defaulting medication is associated with 3.3 times odds of poorly controlled HTN. The majority of the cases are shown to have a family history of BP and this had 1.2 odds of having poorly controlled HTN. Infrequent BP check associated with 2.6 higher odds of having poorly controlled HTN. History of having elevated BP in the past six months was very significantly associated with having poorly controlled HTN.

4.2.4 Dietary modifications

The variables that were assessed under this are fruits (not being a part of one's diet), vegetables not being a part of one's diet, high intake of salt and consumption of coffee, fast-foods and alcohol. Consuming vegetables and fruits for 4 to 7 days a week would

constitute them being a part of the diet. The table below shows an analysis of risk factors for cases and controls and their Odds Ratios, (95% CIs) and p-values.

Table 10: Dietary modifications and their statistical measures, N=270

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio * (95% CI.) *	p-value.
Fruits not part of routine diet				
Yes	150 (89.8)	97 (73.5)	3.2	< 0.001
No	13 (10.2)	35 (26.5)	(**1.6; 6.4)**	
Vegetables not part of the diet				
Yes	5 (3.7)	4 (7)	1.3	0.74
No	130 (96.3)	131 (97)	(0.3; 4.8)	
High salt intake				
Yes	50 (37.3)	25 (18.5)	2.6	< 0.001
No	84 (62.7)	110 (81.5)	(**1.5; 4.6)**	
Coffee consumption				
Yes	25 (18.8)	18 (13.4)	1.5	0.23
No	108 (81.2)	116 (86.6)	(0.8;2.9)	
Consuming fast-foods				
Yes	54 (41.5)	24 (18.2)	3.2	< 0.001
No	76 (58.5)	108 (81.8)	(**1.8; 5,6)**	
Alcohol consumption				
Yes	23 (17)	13 (9.6)	1.9	0.07
No	112 (83)	122 (90.4)	(0.9; 4.0)	

This shows that those who did not have fruits as part of their diet has 3.2 higher odds of having uncontrolled BP compared to those who did. The study did not assess the types or amounts of fruits consumed. Those who did not regularly consume vegetables had 1.3 higher odds of having uncontrolled BP in comparison to those who did. High salt intake increased the odds of having poorly controlled BP by 2.6 times compared to normal salt consumption. Involved in this assessment was adding salt to food on the table. Those who consumed fast-foods had 3.2 times higher odds of poorly controlled

BP than those who did not consume such. Consumption of Alcohol and coffee increased the odds of having poorly controlled BP by 1,9 and 1,5 times respectively.

4.2.5 Stratified analysis for modifying variables

The possible confounding and effect modifying factors were identified. These include monthly income and BMI. The variable that had a p-value of less than 0.01 were put into stratified analysis with these possible Confounders or effect modifiers. Firstly, Fruits being part of the diet was stratified by monthly income to control for confounding or assess Effect modification. The results of the stratified analysis are presented in Table 11 below.

Table 11: Fruits not being part of diet stratified by monthly income, N = 257.

Variable	Cases n (%)	Controls n (%)	Stratum specific OR (95% CI)	Crude OR (95% CI)	MH OR (95% CI)
Monthly income ZW$ less than 3000				3.50 (1.7; 7.2)	2.76 (1.3; 5.7)
Yes	108(90.8)	86 (82.7)	**2.1** (0.9; 4.6)		
No	11 (9.2)	18 (17.3)			
Monthly income ZW$ more than 3000					
Yes	7 (87.5)	7 (30.4)	**16** (1.6; 155.8)		
No	1 (12.5)	16 (69.4)			
Breslow Day test Chi-square of 2.8 and p-value of 0.1					

The interpretation of this is that the Stratum specific ORs are different from each other significantly but the Crude OR lies within them and the Pooled OR (Mantel Haenszel, MH) is 22% different from the Crude OR. This means that there is both Effect modification and confounding, therefore, we report Stratum specific ORs. Also, Breslow Day Chi-square is 2.8 with p-value 0.1 which is greater than alpha = 0.05 so we cannot reject the Null hypothesis and conclude that there is no evidence that the stratum specific ORs are different from each other then it would be fine to use the

Mantel Haenszel but there is also Effect modification so we cannot use it but use Stratum specific ORs.

Consuming fast-foods was stratified by being monthly income to control for confounding or assess Effect modification. The results of the stratified analysis are presented below in Table 12.

Table 12: Consuming fast-foods stratified by monthly income.

Variable	Cases n, (%)	Controls n, (%)	Stratum specific OR (95% CL)	Crude OR (95% CI)	MH OR (95% CI)
Monthly income ZW$ less than 3000				3.1 (1.8; 5.4)	3.3 (1.9; 5.9)
Yes	50 (41.3)	18 (17.1)	**3.4** (1.8; 6.4)		
No	71 (58.7)	87 (82.9)			
Monthly income ZW$ more than 3000					
Yes	4 (50)	6 (27.3)	**2.7** (0.5; 14.2)		
No	4 (50)	16 (72.7)			
Breslow day test Chi-square 0.07 p-value 0.79					

The interpretation of this is that Stratum specific ORs are different from each other significantly but the Crude OR lies within them and the Mantel Haenszel OR is 6.6% different from the Crude OR (this is less than 10% so not significantly different). Therefore, there is both Effect Modification and confounding so it means we report the Stratum specific ORs. Also, Breslow Day Chi-square is 0.07 with p-value 0.8 which is more than alpha = 0.05 so cannot reject the Null hypothesis and conclude that there is no evidence that the Stratum specific ORs are different from each other then it would be acceptable to use the Mantel Haenszel OR but there is also Effect modification hence we use the Stratum specific ORs.

Consuming fast-foods was stratified by BMI to control for confounding or assess Effect modification. The results of the stratified analysis are presented below in Table 13.

Table 13: Consuming fast-foods stratified by BMI.

Variable	Cases n (%)	Controls n (%)	Stratum OR (95% CL)	Crude OR (95% CI)	MH OR (95% CI)
BMI < 30 kg/m^2					
Yes	28 (40.6)	19 (16.8)	**3.4**	3.2	2.9
No	41 (59.4)	94 (83.2)	(1.7; 6.7)	(1.8; 5.6)	(1.6; 5.3)
BMI >30 kg/m^2					
Yes	26 (42.6)	5 (26.3)	**2.1**		
No	35 (57.4)	14 (73.7)	(0.7; 6.5)		
Breslow Day Chi-square 0.52 p-value 0.48					

The interpretation is that the Stratum specific ORs differ from each other significantly but Crude OR lies within them and the Mantel Haenszel OR is 8.8% different from the Crude OR (this is less than 10% so not significantly different). Therefore, there is both Effect Modification and confounding so we report the Stratum specific ORs. Also, Breslow Day Chi-square is 0.52 with p-value 0.48 which is greater than alpha = 0.05 so we cannot reject the Null hypothesis and conclude that there is no evidence that the Stratum specific ORs are different from each other then it would be acceptable to use the Mantel Haenszel but there is also Effect modification so we have to report the Stratum specific ORs.

High salt intake was stratified by BMI to control for confounding or assess Effect Modification. The results of the stratified analysis are presented in Table 14 below.

Table 14: High salt intake stratified by BMI.

Variable	Cases n, (%)	Controls n, (%)	Stratum specific OR (95% CL)	Crude OR (95% CI)	MH (95% CI)
BMI of more than 30 kg/m^2					
Yes	21 (30)	17 (14.8)	**2.5** (1.2;5.1)	2.6 (1.5; 4,6)	2.0 (1.1; 3.5)
No	49 (70)	98 (85.2)			
BMI less than 30 kg/m^2					
Yes	29 (45.3)	8 (40)	**1.2** (0.5; 3.5)		
No	35 (54.7)	12 (60)			
Breslow Day test Chi-square 1.12 p-value 0.28					

The interpretation is that the Stratum specific ORs differ from each other significantly and are both less than the Crude OR estimate and the Mantel Haenszel OR is 23% different from the Crude OR (this is more than 10% so is significantly different). Also, Breslow Day Chi-square is 1.12 with a p-value of 0.28 which is greater than alpha = 0.05 so we cannot reject the Null hypothesis and conclude that there is no evidence that the Stratum specific ORs are different from each other then it would be acceptable to use Mantel Haenszel but there is also Effect modification so we have to report the Stratum specific ORs as there is both Effect modification and confounding.

4.2.6 Logistic regression of variables.

Multivariate hierarchical logistic regression was performed to assess the impact of the variables that had a p-value less than 0.25 as Effect modifiers or Confounders at 95% Confidence Interval. The variables which that had a p-value less than 0.25 in Bivariate analysis were entered into multivariate modelling through hierarchical regression fashion. Variables were categorized into two different groups based on their characteristics. In the first model, socio-demographic and physical variables were entered, followed by diet variables which were entered in the second model while

controlling for the socio-demographic variables. The results of this analysis are shown in the table below.

Table 15: Logistic regression

Variable	Odds Ratio 95% CI		
	Unadjusted OR (95% CI) p-value	Adjusted Odds Ratio	
		Model 1 OR (95% CI), p-value	Model 2 OR (95% CI), p-value
Age < 60 years	2.0 (1.2; 3.2)	2.0 (1.2; 3.6)	1.6 (0.9; 2.9)
	p-value 0.01	p-value 0.01	p-value 0.14
Monthly income ZW$ < 3000	3.4 (1.5; 7.9)	0.2 (0.1; 0.5)	0.3 (0.1; 0.9)
	p-value 0.003	p-value 0.001	**p-value 0.03**
BMI above 30 kg/m^2	5.3 (2.9; 8.3)	5.3 (2.8; 10)	4.38 (2.3; 8.3)
	p-value < 0.001	p-value < 0.001	**p-value < 0.001**
Fruits not part of diet	3.2 (1.6; 6.3)	-	2.6 (1.1; 5.9)
	p-value < 0.001	-	p-value 0.03
High salt intake	2.6 (1.5;4.6)	-	2.1 (1.1; 4)
	p-value < 0.001	-	p-value 0.03
Consume fast-foods	3.2 (1.8; 5.6)	-	2.4 (1.2; 4.5)
	p-value < 0.001	-	p-value 0.01

This shows that the factors that remain statistically significant are in the second model are monthly income less than ZW$ 3000 and BMI above 30 kg/m^2 (or Obesity). Of the dietary modification variables consuming fast-foods, high salt consumptions and not having fruits as part of diet remain statistically significant.

4.2.7 Health Belief Model constructs

Table 16: Bivariate Analysis of the HBM constructs.

Variable	Cases n, (% of cases)	Controls n, (% of controls)	Odds Ratio (95% CI.) *	p-value
HTN is not a hereditary disease				
Yes	21 (16.8)	10 (8.8)	2.1 (0.9; 4.7)	0.07
No	104 (83.2)	104 (91.2)		
HTN is not a serious problem				
Yes	11 (8.2)	4 (5.6)	2.9 (0.9; 9.4)	0.06
No	123 (91.8)	130 (94.4)		
Uncontrolled BP does not lead to other health problems				
Yes	5 (3.8)	1 (0.7)	5.3 (0.6; 50)	0.21
No	128 (96.3)	132 (99.3)		
BP is not curable				
Yes	49 (37.7)	32 (25.6)	1.8 (1.0; 3.0)	0.04
No	81 (62.3)	93 (74.4)		
Can BP be well controlled?				
Yes	82 (94.2)	75 (91.5)	1.53 (0.47; 5.03)	0.48
No	5 (5.8)	7 (8.5)		
Unable to control your diet				
Yes	15 (11)	7 (5.2)	2.3 (0.9; 5.8)	0.08
No	120 (89)	128 (94.8)		
Does not seek information regarding BP Control				
Yes	64 (47.4)	52 (38.8)	1.4 (0.9; 2.3)	0.15
No	71 (52.6)	82 (61.2)		

Various questions were asked to assess the various constructs of the Health Belief Model. Perceived susceptibility was assessed by asking whether one believed HTN is a hereditary disease and this was associated with an OR of 2.1 and p-value of 0.07. The question of asking if one did not believe HTN to be a serious disease was measuring the construct perceived severity and this had an Odds Ratio of 2.9.

On Perceived benefits, not believing that HTN is curable had an Odds Ratio of 1.2 and a p-value of 0.04. In association with this, respondents were asked to outline what can be done to make sure BP is well controlled. The results are outlined in the Word cloud below picture.

Figure 9: Word cloud analysis of What may be done to control BP.

Respondents who responded that HTN is a serious disease were asked to name the health problem or complications that poorly controlled HTN causes. The most commonly named complications are stroke, heart and renal diseases and the word cloud below show the responses.

Figure 10: Word cloud analysis of Complications of HTN

Perceived barriers were assessed by checking of one was not able to control their diet and this had an Odds Ratio of 2.3 and a p-value of 0.08. There were various barriers to controlling diet and these are illustrated in the word cloud below. The commonest barrier by far was the lack of money to buy fruits.

Figure 11: Word cloud analysis of Barriers to diet control.

Cue to action we assessed by one seeking information regarding BP Control and this had an Odds Ratio of 1.4 and a p-value of 0.15. On Bivariate analysis of the HBM constructs, only Perceived benefit was statistically significant with Perceived severity being on borderline statistical significance.

4.3 Discussion and Interpretation

4.3.1 Demographics

These were a mixed group of respondents from Bindura and surrounding areas since the institution caters for people from all walks of life and there was a fair representation of the catchment areas of the institution. However, the majority of the respondents were urban dwellers and almost all of the respondents had medical insurance. Those not on medical insurance we paying cash for health services and medications and these were few compared to those on medical insurance. This is because those on cash usually go to the government institutions where services and medications are comparatively more affordable. Females composed more than 63% of the respondents and comprised more of the cases (OR 1.3) although this gender difference was not statistically significant (p-value 0.38). For males, more of them had poorly controlled BP than had well-controlled BP but this was different for females. This indicates that males had higher odds of having poorly controlled BP than females.

This study revealed that younger hypertensive patients aged below sixty years of age had higher odds of having poorly controlled BP compared to their older counterparts. Those below sixty years of age were two times more likely to be cases than those above sixty years. Those who attained basic education were 40% more likely to have poorly controlled BP than those who had not. However, this was not a statistically significant finding (p-value 0.17). The odds of having poorly controlled HTN were more than three times higher in those with monthly income less than 3000 Zimbabwean dollars (ZW$ 3000) and this was statistically significant [OR 3.4, 95% CI 1.5; 7.9, p-value 0.003]. This salary cut off of ZW$3000 was based on Zimbabwe's Poverty Datum Line (PDL) for an average family of five which was ZW$3 160 in October 2019

according to the data released by the Zimbabwe National Statistics Agency (Zimstats). According to ZimStats, the Total Consumption Poverty Line is a combination of food and non-food items that an average family requires for it not to be deemed poor. The majority of the respondents were citing financial challenges in buying the requisite foods particularly fruits even though accessibility was also an issue. These were the main barriers to diet modification for most of the respondents and for this reason many responded that fruits are not part of their diet. Having less income means less affordability of some healthy fruits especially fruits as was being cited by respondents. Because of economic hardships, they resort to consuming what is available and more often what is more readily available are the unhealthy foods.

4.3.2 Physical measurements and Prescribed diet

Being obese (BMI more than 30 kg/m^2) raised the odds of having poorly controlled HTN to more than five times compared to those who were not obese and this finding was statistically significant (p-value less than 0.001). This finding was uniformly statistically significant in both males and females. Those who were not on a prescribed diet for HTN had four times the odds of having poorly controlled HTN than those who were on diet control [OR 4.1, 95% CI 2.5; 6.9, p-value < 0.001].

4.3.3 Diet Modifications

Dietary modifications were assessed by various questions. Fruits were part of the diet in only 18.5% of the respondents. For the majority who did not have fruits as part of their diet, this raised their odds of poorly controlled BP to more than three times those who ate fruits [OR 3.2, 95% CI 1.6; 6.4, and p-value < 0.001]. Only a small number of respondents (3%) did not have vegetables as part of their diet and this raised their odds of poorly controlled BP by 1.3 times although this was not statistically significant

(p-value 0.74). For the majority of the respondents in the low to middle-income class vegetables are the affordable relish especially with the current economic hardships in Zimbabwe. Those with high salt intake had 2.6 times odds of poorly controlled HTN than those who did not [OR 2.6, 95% CI 1.5; 4.58, and p-value < 0.001]. Consumption of coffee was low (16%) among the respondents and it was not significantly associated with increased odds of poorly controlled BP [OR 1.5, 95% CI 0.8; 2.9, p-value 0.23]. Almost a third of the respondents consumed fast-foods and of these, 69.2% were cases while 30.8% were controls. Consuming fast-foods was significantly associated with 3.2 times odds of poorly controlled HTN [OR 3.2, 95% CI 1.8; 5, 6, and p-value < 0.001]. Alcohol consumption was quite low in this study with only 13.3% of the respondents being alcohol drinkers. Those who drink alcohol had almost two times odds (OR 1.9) of having poorly controlled HTN compared to those who did not but this was not statistically significant [5% CI 0.9; 4.0, p-value 0.07].

4.3.4 Health Belief Model constructs

On perceived susceptibility, the majority (87%) of the respondents believed that HTN is a hereditary disease while only 13% did not believe so. Believing in susceptibility to having poorly controlled HTN was slightly protective against poorly controlled HTN but this finding was not statistically significant [OR = 0.5, 95% CI 0.2; 1.1, p-value = 0.07]. The majority (94.4%) of the respondents perceived HTN to be a serious health problem and most of them (51.4%) were controls. A high perceived seriousness of HTN was found to be protective (Odds Ratio 0.3) against poorly controlled HTN although this was not statistically significant [95% CI 0.1; 1.1, p-value 0.06]. Almost all (97.8%) of the respondents believed that HTN can lead to other health problems if uncontrolled. This was also protective (Odds Ratio 0.19) against uncontrolled HTN

but not statistically significant [95% CI 0.0; 1.7, p-value 0.1]. On the positive side, perceived benefits of good BP Control were protective (OR 0.57) against uncontrolled HTN and this was statistically significant [95% CI 0.33; 0.97, p-value 0.04].

Stratified analysis for suspected effect modifiers or Confounders involved stratifying the significant risk factors by monthly income, gender, age and BMI. Monthly income was both an effect modifier and confounder of fruits being part of the diet. Both BMI and Monthly income were Confounders and effect modifier of consuming fast food. BMI was an effect modifier for the amount of salt required in food.

Multivariate analysis (Logistic regression) was done for variables that had a p-value less than 0.25. Model 1 had socio-demographic features and BMI while Model 2 included the diet modification variables. After logistic regression independent risk factors associated with poorly controlled HTN were *Not having fruits as part of the diet* [AOR 2.6, 95% CI 1.1; 5.9, p-value 0.03], *High salt intake* [AOR 2.0, 95% CI 1.1; 4, p-value 0.03] and *Consuming fast-foods* [AOR 2.4, 95% 1.2; 4.5, p-value 0.01].

4.4 Summary

The study had a mixed group of respondents from various surrounding areas. Most of the respondents were females although a greater percentage of the males had poorly controlled BP signifying a greater challenge of BP Control in males. Hypertensive patients below sixty years of age had greater odds of having poorly controlled BP compared to their older counterparts. This finding is very important and worrisome as those below sixty years are the workforce force and the economically most productive group. Attaining basic education, being employed and earning less income were all

associated with higher odds of poorly controlled BP and all these factors are somehow interrelated and warrant further investigation. As was expected, obesity was significantly associated with uncontrolled HTN in both sexes thus supporting the already proved direct and apparent dose-response relationship between BMI and BP. The importance of having a prescribed diet for HTN was shown as those who were not on a prescribed diet for HTN had four times the odds of having uncontrolled HTN than those who were on diet control. On the components of diet not having fruits as part of diet significantly raised the odds of uncontrolled BP to more than three times those who ate fruits. Fruits are an integral part of the DASH diet plan. As opposed to fruits whose consumption was very low, the majority of the respondents consumed vegetables regularly and this was protective of uncontrolled BP. High salt consumption significantly raised the odds of uncontrolled BP in sync with other studies that have proved a direct apparent dose-response relationship between salt consumption and BP. Consuming fast-foods was significantly associated with higher odds of uncontrolled HTN and in addition to increasing risk of uncontrolled BP, they increase the risk of obesity while also increases the risk of poorly controlled HTN. Although alcohol consumption was low in this study, it increased the odds of poorly controlled HTN. On analysis of the HBM constructs, perceived susceptibility to and perceived severity of poorly controlled HTN were protective although not statistically significant. On the positive side, perceived benefits of good BP Control were protective against poorly controlled HTN and this was statistically significant. After multivariate analysis (logistic regression) independent risk factors associated with poorly controlled HTN were “Not having fruits as part of the diet”, “High salt intake” and “Consuming fast-foods”.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This final chapter will summarize, conclude and discuss the results presented in the preceding chapter. The Chapter will commence with a discussion of the research findings, then Conclusions, Implications, Recommendations and lastly Suggestions for Further Research.

5.2 Discussion

5.2.1 Socio-demographic features

This study revealed that a greater proportion of males had poorly controlled BP than had well-controlled BP indicating higher odds of having poorly controlled BP in males than females. This is consistent with a Moroccan study which found males to have more poorly controlled HTN as opposed to females (Cheong *et al.*, 2015). However, locally, in the Lupane study, there were no significant gender differences (p-value 0.08) in poorly controlled HTN (Goverwa *et al.*, 2014). From this study, BP Control seems to be a bigger challenge in males compared to females hence control strategies need to be intensified in males. This may be because of other unhealthy habits in males like unhealthy eating (braais, fast-foods) smoking and drinking which usually happen during their socialization outdoor activities. Males also generally delay in seeking medical care and only go for care when they are more ill than females do. However, these are only possibilities and there is a need for further studies to elicit the basis of this difference.

This study revealed that younger hypertensive patients aged below sixty years of age had greater odds of having poorly controlled BP compared to their older counterparts. This is in sync with an Ethiopian study which revealed that middle-aged and elderly

people experienced a lower rate of elevated BP than their younger counterparts, and this was attributed to the low awareness and poor medication experiences in young patients (Abegaz *et al.*, 2018). However, other studies have found an increase in poorly controlled HTN with increasing age. For instance, in the Lupane study, BP was higher in the older age groups with 53% of the cases being over sixty-five years and more than two times more likely to have poorly controlled HTN compared to those below sixty-five years (Goverwa *et al.*, 2014). The finding in this study is very important and a cause for concern as those below sixty years are the labor force for our setting and hence the most economically vital group. The pressures of the work and family life may contribute to this poor BP Control but this needs further investigation to identify other factors that may influence the control in this group.

Those who attained basic education were 40% more likely to have poorly controlled BP than those who had not. In contrast, Al-Ghuzi and Al-Asadi (2014) detected a negative association between educational level and HTN and the explanation they gave is that the higher prevalence of unhealthy behaviour including unawareness of HTN is among individuals with low educational level. This was in sync with another study which showed that those with less than secondary education were almost two times more likely to have poor BP Control compared with those who had at least secondary education (Cheong *et al.*, 2015). In our study being educated may imply having to stay in an urban setting which commonly leads to an unhealthy diet (more refined, fatty and salty foods) and a more sedentary lifestyle associated with urban life and formal employment. The associated pressures of the life of being employed in those who are better educated may also contribute to the increased odds of poorly controlled BP.

There is a need for further study of this but this buttresses the importance of Workplace Health Programs with specials focus on NCDs like HTN.

The odds of having poorly controlled HTN were more than three times higher in those with low income. Goverwa *et al.,* (2014) had a similar finding that those who had an average monthly household income above US$200 were less likely to have poorly controlled HTN. This is in sync with a Moroccan study which revealed that 89% of those with poorly controlled HTN were not employed and 80% had a monthly income of less than US$ 150 per household (Essayagh *et al.,* 2019). All these studies including this one are in contrast to a Bangladesh study which showed that increased wealth status was associated with poor BP Control (Rahman *et al.,* 2017).

5.2.2 Physical measurements

Being obese raised the odds of having poorly controlled HTN to more than five times compared to those who were not obese. This is expected and consistent with other studies that have identified that BMI and BP have a direct and apparent dose-response relationship. Obesity was found to be an independent risk factor for poorly controlled HTN in the Lupane study where 63% of the HTN patients had an abnormal BMI (Goverwa *et al.,* 2014). In Ethiopia, overweight patients were two times more likely to have poorly controlled HTN when compared with normal weight patients (Tesfaye *et al.,* 2017). This finding in our study is important as there is a direct link between an unhealthy diet and obesity which is a strong risk factor for poorly controlled HTN.

Those who were not on a prescribed diet for HTN had four times the odds of having poorly controlled HTN than those who were on diet control. This is in sync with the proved importance of diet control in managing HTN which has led to the development

of the DASH diet plan. This was the main essence of this study and the significance of this is that it is important to ensure HTN patients are on a prescribed diet in addition to being on prescribed drugs.

5.2.3 Diet Modifications

For the majority who did not have fruits as part of their diet, this raised their odds of poorly controlled BP to more than three times those who ate fruits. This is consistent with many other studies including a study in China which showed that a high intake of fruits was related to better BP Control (BP less than 140/90 mm Hg) (Yu *et al.*, 2018). The strongest evidence of this is from many randomised clinical trials that have proved that DASH diet consistently lowers BP across a diverse range of patients with HTN and it is because of this evidence that the DASH diet plan has been a part of BP and dietary guidelines since its original publication (Steinberg *et al.*, 2017). In our study, many were citing financial constraints on including fruits as part of the diet. They rely mainly on seasonal fruits availability including wild fruits. This was in sync with a study in Gwanda which found a low consumption of fruits and vegetables for similar reasons (Chimberengwa & Naidoo, 2019). In contrast to fruits, only a small number of respondents did not have vegetables as part of their diet and this raised their odds of poorly controlled BP. This high vegetable consumption is a good thing is as far healthy eating is concerned and is also helped by the promotion of consuming vegetables by His Excellency the President of Zimbabwe who advised that people must consume more vegetables as they are the healthy foods.

Those with high salt intake had higher odds of poorly controlled HTN than those who did not. This is consistent with local evidence where the Zimbabwe's National Health

Strategy (2006 -2020) reported the increase in HTN prevalence mainly attributed to high salt diet in addition to other things (MOHCC, 2016). The impact of high salt intake has been proved by many studies and this is why salt restriction is a major component of the DASH diet plan. A recent study in Ethiopia proved HTN patients with high salt intake were six times more likely to have poorly controlled BP than those who took normal amount controlling for other variables (Abegaz *et al.*, 2018). Salt is the single most important factor associated with the development of high BP.

Consumption of coffee was low (16%) among the respondents and it was not significantly associated with increased odds of poorly controlled BP [OR 1.5, 95% CI 0.8; 2.9, p-value 0.23]. Literature has pointed out that evidence on coffee consumption and its association with the incidence of HTN is still inconsistent (D'Elia *et al.*, 2019). A Dose-response meta-analysis showed a non-linear relationship between coffee consumption and the risk of HTN (p for non-linearity less than 0.001). Whereas the habitual drinking of one or two cups of coffee per day, compared with not drinking was not associated with risk of HTN, a significantly protective effect of coffee consumption was found starting from the consumption of three cups of coffee per day [RR = 0.97, 95% CI 0.94; 0.99], and was confirmed for greater consumption (D'Elia *et al.*, 2019).

Consuming fast-foods was significantly associated with 3.2 times the odds of poorly controlled HTN. This is in line with other studies which have shown that people who consume fast food consume higher amounts of saturated oil and salt have a high rate of poorly controlled BP (Akbarpour *et al.*, 2019). A study in Iran revealed that consuming fast-foods and much salt at the same time carried a nearly two-fold risk of

higher BP (Akbarpour *et al.*, 2019) and the present study proves this. Alcohol consumption was associated with two times odds of having poorly controlled HTN compared to those who did not but this was not statistically significant. A study done locally found that alcohol consumption was a significant risk factor for poorly controlled HTN [OR 1.9 95% CI 1.6- 4.4] (Goverwa *et al.*, 2014). In a Brazilian large sample study, a dose-response relation between alcohol and BP was demonstrated with excessive alcohol being significantly associated with poorly controlled BP up to 3 times (Santana *et al.*, 2018). After logistic regression, independent risk factors associated with poorly controlled HTN were *Not having fruits as part of the diet* [AOR 2.6, 95% CI 1.1; 5.9, p-value 0.03], *High salt intake* [AOR 2.0, 95% CI 1.1; 4, p-value 0.03] and *Consuming fast-foods* [AOR 2.4, 95% 1.2; 4.5, p-value 0.01].

5.2.4 Health Belief Model constructs

Perceived susceptibility is an important factor affecting and predicting people's adoption of diet modification. This was also proved in another study where perceived susceptibility about HTN complications and adherence was a predictor of both low-salt diets (Odds Ratio = 1.2) and reducing alcohol (Odds Ratio = 1.6). Also, the self-care behaviours were worse among those who had a lower perception of their susceptibility or vulnerability to the disease (Larki *et al.*, 2018). For Healthcare practitioners, this is important as they can focus on raising an individual's perceived susceptibility so that the person can modify their diet. A high perceived seriousness of HTN was found to be protective against poorly controlled HTN. This is in sync with a study by Larki *et al.*, (2018), which revealed that individuals who had more perceived severity (Odds Ratio = 1.3) had significantly greater adherence to their management compared to those who had less perceived severity. Almost all respondents believed

that HTN can lead to other health problems if poorly controlled and this was also protective against poorly controlled HTN. This is in sync with the Lupane study where respondents with a high-risk perception were 86% less likely to have poorly controlled HTN compared with those with low perception (Goverwa *et al.*, 2014). This is also supported by the Ethiopian study which considered the respondents' awareness of HTN-related complications. Those who did not know at least two complications were less likely to have well-controlled HTN than those who did and two times more likely to have poorly controlled HTN (Tesfaye *et al.*, 2017). On the positive side, the perceived benefits of controlled BP were protective. The benefits of adhering to a prescribed diet for BP Control are very important to motivate patients as this positive construct can be a driving factor in adhering to the recommended diet modifications.

5.3 Conclusions

In terms of age and BP, those who were below 60 years of age had higher odds of poorly controlled BP compared to those above 60 years of age. Salary or income also had an impact on BP with having an income below the Poverty Datum line being associated with higher odds of poorly controlled BP. Obesity was significantly associated with higher odds of poorly controlled BP as has been proved in other studies. A history of elevated BP in the past six months and infrequent BP checks were associated with increased odds of poorly controlled HTN as these people likely have poor monitoring of their BP and presumably poor adherence to management.

The dietary factors that were independently associated with poorly controlled BP are consuming fast-foods and high salt consumption. Consuming fruits was a protective factor reducing the risk of poorly controlled BP. From the findings, it is evident that

people with high salt intake, high amounts of fast food consumption and don't consume fruits are several times more prone to the risk of having poorly controlled BP than people consuming a healthy diet. The HBM model constructs were determinants of the respondents' dietary modification behaviour.

5.4 Implications

The finding of a higher rate of poorly controlled BP in those below 60 years means special focus must be made in this group. This is the workforce for our setting and the most economically important group so this has far-reaching impacts on the country's economic development. It has been a long-held notion that HTN is a disease of the elderly but the findings suggest that it may be more of a problem in the younger population and clinical practice must put special focus on this group.

Obesity is a significant cause of poorly controlled HTN hence there is a need for initiatives to combat obesity through diet modification and other lifestyle interventions. This means clinical practice must actively manage and combat obesity in the routine clinical care of patients. The importance of regular BP checks and monitoring needs to be re-emphasized to reduce the prevalence of poorly controlled BP among HTN patients. Most practitioners write three months' supply prescriptions and although this is good and convenient for the patients it means one may spend three months with their BP not checked. Practitioners need to advise HTN patients to have regular BP checks even if they are not coming for treatment or medication refill. In addition to clinics, some pharmacies offer BP checks and these can be utilized. Hypertensive patients must ideally purchase their own digital BP machine for self-monitoring at home. Clinicians must emphasize and empower patients to reduce salt,

avoid fast-foods and to consume more fruits. The patients and the families need to appreciate the importance of the non-pharmacological management of HTN which should be part of every HTN management regimen. As the constructs of the Health Belief Model are important in determining and ensuring uptake of health behaviours, there is also a need for Healthcare workers to conscientize patients and their families about the complications or seriousness of HTN, their susceptibility to the complications while addressing the challenges they may have in following the recommended healthy diet.

5.5 Recommendations

The findings of this study permit the proffering of recommendations towards effective BP Control from diet modification or control. On the demographic characteristics, the study found that age below 60 years was associated with a higher chance of poorly controlled HTN. Since those below 60 years are the ones likely to be employed there is need for Workplace Health Programs that educate and ensure adherence to a healthy diet at the workplace and home in addition to other healthy habits. This action must be implemented by the Employee Safety and Health Departments at the various workplaces or industries in Bindura working together with the District Nutritionist. The Provincial Medical Director and company managers must ensure and enforce the implementation of this recommendation. The proposed timeframe for the implementation of this recommendation is one year. Resources needed include Information Education and Communication materials and the ingredients for healthy or DASH diet for those companies providing meals e.g. Bindura University and the mines. This intervention is an important win-win situation as it will ensure a healthy

workforce and thus more productivity for the companies through the reduction of job absenteeism due to ill health.

The other important finding from this study is that low income was associated with poorly controlled BP. This is so because those who earn below the Poverty Datum Line cannot afford the healthy diet components which are commonly more expensive especially in urban settings. There is thus a need to make the natural unrefined and unprocessed organic foods universally available and affordable through satisfying the laws of supply and demand. Scaling up production is one way and it can be done through existing initiatives such as Command Agriculture which has been a success in Zimbabwe. As an ongoing initiative, the Bindura Agricultural Technical and Extension Services (AGRITEX) Officer must continue working with the Ministry of Agriculture and Ministry of Finance and Economic Development to ensure expansion and continuity of this program in Bindura District.

On diet, the study revealed that those who were not on prescribed HTN diet had a greater risk of having poorly controlled HTN. As a recommendation, Healthcare workers must routinely prescribe and monitor the use of diet measures as a non-pharmacological intervention just as they prescribe drugs for HTN. Just like any other prescription, this prescription of diet needs to be maintained and adherence monitored. Clinicians must emphasize the importance and advantages of these interventions highlighting the inadequacy and inconveniences of drug management alone. This recommendation has already been shared with the Healthcare workers at Shashi Hospital and implementation started in the outpatients and inpatients departments. In line with findings in other studies, this study also revealed that Obesity is significantly

associated with poorly controlled BP. During this study, we had already recommended that Healthcare workers at the institution routinely record BMI as part of observations. This was well received and the Sister in Charge of the Outpatients department ensures that this is carried out all the time. This allows the Health practitioners to give evidence-based recommendations to clients. In line with this, there is a need to introduce Weight control support groups for NCDs at Shashi Hospital and other institutions and Companies. At Shashi Hospital, this is feasible to do within three months and this may easily begin with employees as part of employee health and wellness program already in place at the institution. Some resources are needed for this and include attire and equipment (e.g. balls, uniforms) for sporting activities and Zumba sessions. The Employee Safety and Health department is responsible for this intervention with the support of the Company Management. There is a need for companies to come up with Workplace Health Models and this can be made a regulatory requirement to enforce compliance. The preventable NCDs are a major contributor to the costs of health insurance premiums and employee medical insurance claims, and companies may save costs through such programs in addition to enduring the health of the communities.

The importance of fruits in BP Control is well laid out because not eating fruits as part of the diet was associated with poorly controlled BP in all sexes and age groups. This evidence means there is a need to establish Communal and individual Nutritional gardens & Orchards in Bindura neighbourhoods. There is also a need to boost the production of organic foods like fruits (e.g. Command Agriculture) and subsidizing of agricultural produce. This is the responsibility of the District Nutritionist and AGRITEX officer with the engagement of Zimbabwe Forestry Commission, Ministry

of Agriculture and Ministry of Finance and Economic Development. Provision or subsidizing of fruits trees can help those who cannot afford to buy trees for planting and this should be done not only on tree planting day by throughout the year. Just as the first Friday of every month is a National Cleanup day in Zimbabwe by Presidential decree, we could also have a certain day of every month as a national tree planting day. The AGRITEX Officer needs to lobby for this through the Zimbabwe Forestry Commission and Ministry of Agriculture in the next six to twelve months. In the short to medium term, the District Nutritionist and HTN patients' representatives must lobby the Ministry of Finance to introduce price subsidies for fruits and other natural foods. The Zimbabwe Revenue Authority must be lobbied through these groups to scrap import duty on fruits to make them more affordable by satisfying the Law of supply and demand. This must be done in the next 6 to 12 months to allow for policy formulation and /or re-alignment.

Consuming Fast-foods was associated with higher odds of poorly controlled HTN. This is now a big challenge with the proliferation of fast-foods outlets in some rural areas and all urban areas and including Bindura. There is a need to increase regulation and monitoring of Fast food companies to ensure adherence to standard good practices. There is a need for policies to ensure practices such as menu labelling and content specification are done, charge taxes on ultra-processed foods and more stringent rules for advertisements. This is the responsibility of City Councils through their Health Inspectorates in conjunction with the Ministry of Health and Child Care. This should be done in the next six to twelve months and the District Nutritionist will work in conjunction with the Bindura City Health Department to implement and monitor this intervention. These cadres will also work with the Ministry of Information, Publicity

& Broadcasting Services and the MOHCC to ensure that appropriate advertising and information messages are flighted on mainstream media.

The other most important finding in this study consistent with many others is that high salt consumption was associated with poorly controlled HTN. There is a need to educate and ensure that people choose foods with low sodium content through scrutinizing the contents of foods before purchasing. Locally, the District Nutritionist needs to conduct these awareness campaigns through various platforms like churches and other gatherings. Healthcare workers must also take advantage of every contact with clients to educate them on the importance of salt restriction and to choose the recommended foods with the right amount of salt. This must include practical things like making it a household policy to not have a salt shaker on the table. This intervention must commence immediately and should be ongoing. Awareness Campaigns on salt reduction must also be broadcast on mainstream media through the Ministry of Information, Publicity & Broadcasting Services and the MOHCC. Although the impact of alcohol was not significant in this study, controlling consumption may help in BP Control in HTN patients. There is a need for strategies at the policy level to control alcohol consumption and these would be including limiting its access and availability, controlling its marketing and prohibitive pricing policies including taxation on alcoholic products.

5.6 Suggestions for Further Research

This study identified areas that may need further research. The relationship of age and poorly controlled BPs warrants further exploration since some studies have findings that are in contrast to those of this study. There is also a need to explore why those

below sixty years of age have higher odds of poorly controlled HTN. These socio-demographic factors (education level, employment status and incomes and others) contributing to poorly controlled BP need more detailed examination for different settings and different groups of people to enable tailor-made interventions. On the dietary factors, there is a need for further research to explore the actual types of foods the people consume in that setting and assess their association with BP Control. This will reveal that actual fruits or vegetable those with well-controlled BP consume versus the consumption pattern of those with poorly controlled BP. To our knowledge, there are no local studies on fast food consumption and its association with BP Control and this is a necessary field of study given the proliferation of fast food consumption, especially in the urban settings.

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APPENDICES

APPENDIX 1: English Questionnaire.

Approval Number: AUREC 1198/19

Questionnaire for dietary modification for BP Control in hypertension patients.

Questionnaire Number: ……...

Case: ☐ Control: ☐

Date of Interview: _ _ /_ _ / _ _ _ _

Village/Location/Town _____ Urban ☐ Rural ☐

No	Question	Choices	Code
SECTION 1: DEMOGRAPHICS			
1	What is your date of Birth?	DD MM YY Age …….	
2	Gender (observe)	1. Male 2. Female	
3	What is your Marital status?	1. Single 2. Married 3. Divorced 4. Widowed	
4	What is your religion?	1. Christianity 2. African tradition 3. Apostolic (specify) …. 4. Other (specify) ….	
5	Does your religion allow you to seek modern medical help?	1. Yes 2. No	
6	What is the highest level of education you attained?	1. Never 2. Primary 3. Secondary 4. Tertiary	
7	What is your occupation?	1. Informal 2. Formal skilled 3. Housewife 4. Not employed	
8	Job description	1. Skilled 2. Unskilled	
9	What is your monthly income? (ZW$)	)0-3000 3. >3000	
10	Additional/Other sources of income	ZW$_____	
11	Are you on medical aid?	1. Yes 2. No	
SECTION 2: PHYSICAL MEASUREMENTS			
12	1. Height measured to the nearest 0.1 cm	Height (cm) Weight (kg)	

	2. Weight measured to the nearest 0.1 kg		
	3. BMI	1. < 30 2. >30	
BP (Readings to be 5 minutes apart)			
13	1. Reading 1 Systolic BP Diastolic BP 2. Reading 2 Systolic BP Diastolic BP 3. Reading 3 Systolic BP Diastolic BP 4. Average reading: Systolic BP Diastolic BP	*To be filled by data entry clerks*	
SECTION 3: HISTORY OF HIGH BP			
Now we will ask you questions about your history of BP.			
14	When was your BP last measured by a health professional?	1. Within the past 3 months 2. Within the past 6 months 3. 6 -12 months ago 4. 1-5 years ago 5. > 5 years 6. Never checked before	
15	During the past 12 months have you been told by a doctor or other health worker that you have elevated BP or hypertension?	1. Yes 2. No 3. N/A	
16	When do you go for your routine BP check?	1. As advised by the doctor 2. When I do not feel well 3. When out of drugs 4. Both 5. Other, specify 6. _____	
17	Is there anyone in your family (parents or siblings) who has hypertension? (elaborate)	1. Yes 2. No	
Now we are going to ask you questions about treatments for high BP			
18	1. Have you been taking any hypertension drugs in the past 6 months?	1. Yes 2. No	
	2. Have you defaulted your drugs in the past month?	1. Yes, 2. No	
19	Have you been on any prescribed diet?	1. Yes 2. No	
20	Were you given advice or treatment to lose weight?	1. Yes 2. No	
21	I eat less to help me lose weight	1. Yes, 2. No	
22	During the past 12 months have you consulted traditional healer for elevated BP or hypertension?	1. Yes 2. No	

23	Are you taking any herbal or traditional cure for your high BP?	1. Yes 2. No 3. N/A	
SECTION 4: DIET			
In this section, we will ask you questions about fruits and vegetables that you eat and also salt and coffee			
FRUITS			
24	In a typical week, how many days do you eat fruits?	Number of days	
25	How often do you eat fruits per day? *Interviewer: Please explain that one serving is equal to one medium-sized piece of banana, apple, etc*.	Number of servings	
VEGETABLES			
26	In a typical week, on how many days do you eat vegetables?	Number of days	
27	How often do you eat vegetables per day? *Interviewer: Please explain that one serving is equal to one cup of spinach/salad or a half cup of tomatoes, carrots, cabbage, onions, etc.*	Number of servings	
MEAL PREPARATION			
28	Are your meals prepared at home?	1. Yes 2. No	
29	If not eating at home, what do you eat?	1. Fast foods like chicken and chips 2. Similar foods as at home (specify)	
30	What oil is most often used for meal preparation in your household?	1. Vegetable oil 2. Butter 3. Margarine 4. Peanut butter 5. None in particular 6. None used 7. Other Specify_____	
SALT			
31	a. How much salt do you like in your food?	1. Mild 2. Average 3. A lot	
	b. I reduce my salt intake as much as possible	1. Yes 2. No	
	c. Do you often add salt to your food on the table?	1. Yes 2. No 3. N/A	
	d. Do you taste your food before adding salt on the table?	1. Yes 2. No 3. N/A	
COFFEE			

32	1. Do you drink coffee?	1. Yes, 2. No	
	2. How many times a day do you drink coffee?	1. Once 4. N/A 2. Twice 3. Over 2 times	
	3. How many days a week do you drink coffee?	1. 1- 3 days 2. 4-7 days 3. N/A	
SECTION 5: ALCOHOL CONSUMPTION			
In this section, we shall ask you questions about alcohol consumption.			
33	1. Have you ever consumed a drink that contains alcohol such as beer, wine, spirit, fermented cider, etc.?	1. Yes 2. No	
	2. Have you consumed alcohol within the past 30 days?	1. Yes 2. No 3. N/A	
	3. During the past 30 days, on how many days did you have at least one alcoholic drink?		
	4. What is the highest number of alcoholic drinks you took in the past 30 days?		
	5. During the past 30 days, on the days you drank alcohol, how many drinks did you have per day?		
	6. During each day of the past 7 days, how many standard drinks of any alcoholic drink did you have each day?	1. Monday 2. Tuesday 3. Wednesday 4. Thursday 5. Friday 6. Saturday 7. Sunday	
SECTION 6: HBM Constructs			
Perceived susceptibility			
34	1. I'll suffer from hypertension if my BP is not controlled	2. Yes 3. No 3. Not sure	
	2. Is hypertension a hereditary disease?	1. Yes 2. No 3. Not sure	
Perceived severity			
33	1. Is hypertension a serious health problem?	2. Yes 3. No 3. Not sure	
	2. Do you think high BP can lead to other health problems?	1. Yes 2. No	
	3. If yes, what other health problems can arise from high BP?		
Perceived Benefits			
34	1. Is BP curable?	1. Yes 2. No	
	2.BP control is effective in stroke prevention	1.Yes 2. No	

	3. Is there anything that can be done to prevent the consequences of high BP?	1. Yes 2. No	
	4. If yes, what can be done?		
	5. Is it best to wait until you feel sick before modifying diet?	1. Yes 2. No	
Perceived Barrier			
35	1. Are you able to control your diet?	1. Yes 2. No	
	2. Are you able to control your drinking?	1. Yes 2. No 3. N/A	
	3. What barrier do you have to diet modification?		
Cues to action			
36	1. How do you know when to make the next clinic visit?	1. On the date that is given by the nurse or doctor 2. When out of tablets 3. When unwell 4. Other (specify)	
	2. Generally, does your family help in ensuring your diet changes?	1. Yes 2. No	
	3. I seek information regarding the importance of BP Control	1. Yes 2. No	
	4. I check my blood BP regularly	1. Yes 2No	

APPENDIX 2: Shona Questionnaire

Approval Number: AUREC 1198/19

Bvunzurudzo yekuchinja zvekudya kudzikisa BP muvanhu vane chirwere che BP.

Questionnaire Number: ……..

Case: ☐ Control: ☐

Date of Interview: _ _ /_ _ / _ _ _ _

Village/Location/Town _____ Urban ☐ Rural ☐

Nhamba	Mubvunzo	Sarudzo	Kodhi
CHIKAMU CHEKUTANGA: ZVINE CHEKUITA NEZVENYU			
1	Zuva renyu rekuberekwa ichii?	Zuva /Mwedzi /Gore Makore enyu …….	
2	Munhukadzi kana Munhurume	1. Munhurume 2. Munhukadzi	
3	Makaroorwa kana makaroora?	1. Handina kuroora/rwa 2. Ndakaroora/rwa 3. Takarambana 4. Ndakafirwa	
4	Chitendero chenyu chinonzii?	1. Chikiristu 2. Chivanhu 3. Chipostori (Tsanangudza) …. 4. Chimwewo (Tsanangudza) ….	
5	Chitendero chenhu chinokubvumidzai kurapwa kuchipatara kana kiriniki?	1. Hongu 2. Kwete	
6	Makadzidza kusvika papi?	1. Handina zvachose 2. Dzidzo ye Puraimari 3. Sekondari 4. Dzidzo yepamusoro	
7	Munoita basa rei?	1. Ndinozviitira mabhindauko 2. Unyanzvi hwekudzidzira 3. Mai vemba 4. Handishandi 5. Mwana wechikoro 6. Zvimwewo _____	

8	Tsananguro yebasa	1. Unyanzi 2. Risina unyanzvi	
9	Munowana /munotambira marii pamwedzi?	1.Pasi pe chiuru chimwe 2.Pakati pechiuru chinwe nezviuru zvitatu 3.Kupfuura zviuru zvitatu	
10	Imarii yamunowana nedzimwe nzira pamwedzi?	Madhora …….	
11	Munoshandisa medhikari eidhi here	1. Hongu 2. Kwete	
CHIKAMU CHEPIRI: KUYERWA KWEMUVIRI			
12	1.Hurefu 2.Huremu	Hurefu (cm) Huremu (kg)	
	3.Kumira kwehuremu hwemuviri	1. Pazasi pemakumi matatu 2. Kupfuura makumi matatu	
BP (Yakaitwa kwapera maminetsi mashanu ega ega)			
13	1.Chiverengo chekutanga: BP yepamusoro / BP yepazasi		
	2.Chiverengo chepiri: BP yepamusoro BP yepazasi		
	3.Chiverengo chetatu: BP yepamusoro / BP yepazasi		
	4.BP yepakati: BP yepamusoro BP yepazasi		
CHIKAMU CHETATU: NHOROONDO YE BP			
Tave kukubvunzai nezve BP yenyu			
14	Makapedzisira rinhi kutorwa BP yenyu kuchipatara kana kwachiremba?	1. Mumwedzi mitatu yapfuura 2. Mumwedzi mitanhatu yapfuura 3. Kwapfuura mwedzi mitanhatu kusvika gore 4. Kwapfuura makore ari pakati perimwe nemashanu 5. Makore anopfuura mashanu 6. Handisati ndakambotorwa BP	
15	Mumwedzi gumi nemiviri yapera makamboudzwa kuti BP yenyu	1. Hongu 2. Kwete 3. Handina kutariswa BP	

	yakakwira naChiremba kana mukoti here?		
16	Munoenda kunotorwa BP yenyu kana zvaita sei?	1. Pakataurwa namukoti kana chiremba 2. Kana ndisiri kunzwa zvakanaka 3. Kana mishonga yapera 4. Zvese zvepamusro 5. Zvimwewo _____	
17	Kumhuri kwenyu kune ane chirwere che BP here? (tsanangurai)	1. Hongu 2. Kwete	
Iyezvino tave kukubvunzai nezvekurapwa kweBP yenyu.			
18	1.Pamwedzi mitanhatu yapfuura mange muri kutora mushonga we BP here?	1. Hongu 2. Kwete	
	2.Makamboregedza kutora mapriritsi e BP memwedzi wapfuura here?	1. Hongu 2. Kwete	
19	Murikudya zvekudya zvamakanzi munofanira kudya here?	1. Hongu 2. Kwete	
20	Makayambirwa kuti mudzikise uremu hwenyu here?	1. Hongu 2. Kwete	
21	Munodya chikafu chishoma kuti muedze kudzikira huremu here?	1. Hongu 2. Kwete	
22	Pamwedzi gumi nemiviri yapfuura makamboenda here kunobvunzira nezve BP yenyu kuna godobori wechivanhu kana mupositori?	1. Hongu 2. Kwete *(Tsanangurai)*	
23	Muri kunwa mushonga yechivanhu ye BP here?	1. Hongu 2. Kwete 3. Handina kumboita zvechivanhu	
CHIKAMU CHECHINA: ZVEKUDYA			
Muchikamu chino tichakubvunzai pamusoro pemichero nemirivo yamunowanzodya			
MICHERO			
24	Munodya michero mazuva mangani pavhiki?	Mazuva …….	
25	Munodya michero kangani pazuva? *Mubvunzi: Tsanangura kuti chipimo chinwe chakaita se bhanana kana eporo rimwe.*	Huwandu hwekamunodya……	
MURIWO			
26	Munodya muriwo mazuva mangani pavhiki?	Mazuva……	
27	Munodya muriwo kangani pazuva? *Mubvunzi: Tsanangura kuti chipimo chinwe chakaenzana nekapu imwe*	Huwandu hwekamunodya……	

	yemuriwo kana iri pakati yemadomasi, makaroti, kavichi kana hanyanisi.		
KUBIKWA KWECHIKAFU CHAMUNODYA			
28	Kudya kwenyu kunobikwa pamba penyu here?	1. Hongu 2. Kwete	
29	Kana musiri kudya kumba mafamba munowanzodya chii?	1. Zvekudya zvinobikwa nekukurumidza zvakaita sehuku ne machipisi 2. Zvakafanana nezvekumba (tsanangudzai)	
30	Munonyanyoshandisa mhando ipi yemafuta pakubika?	1. Mafuta emuriwo 2. Bhata 3. Majarini 4. Dovi 5. Tongoshandisa chero 6. Hapana atinoshandisa 7. Amwewo Tsanangudzai_____ _____	
MUNYU			
31	1. Munoda munyu wakawanda sei muchikafu chenyu	1. Mushoma 2. Uri pakati nepakati 3. Wakawanda kwazvo	
	2. Munowanzowedzera munyu pakudya chikafu here	1. Hongu 2. Kwete	
	3. Musati mawedzera munombonzwa kuti munyu wacho wakawanda sei here?	1 Hongu 2 Kwete 3 Handiwedzeri munyu	
KUNWA KOFI			
32	1. Munonwa Kofi here	1. Hongu 2. Kwete	
	2. Munonwa kofi kangani pazuva	1. Kanwechete 2. Kaviri 3. Kupfuura kaviri 4. Handinwi kofi	
	3. Munonwa kofi mazuva mangani pavhiki	1. Pakati perimwe nematatu 2. Pakati pamazuva mana nemanonwe	
CHIKAMU CHESHANU: KUNWA DORO			
Muchikamu chino tichakubvunzai nezve kumwa doro/hwahwa			
33	1. Makambonwa zvinodhaka zvakaita sedoro, waini, tototo here?	1. Hongu 2. Kwete	

	2. Makambonwa zvinodhaka pamazuva makumi matatu apfuura here?	1. Hongu 2. Kwete	
	3. Pamazuva makumi matatu apfuura mazuva mangani amakanwa bhotoro redoro rinopfuura rinwe?		
	4. Pamakanwa doro rakawanda mumazuva makuni matatu apfuura anga ari mabhotoro mangani?		
	5. Pamazuva makumi matatu apfuura, pamazuva amunonwa doro munowanzonwa rakawanda sei?		
	6. Pamazuva manomwe apfuura makanwa doro rakawanda zvakadiii pazuva roga?	1. Muvhuro 2. Chipiri 3. Chitatu 4. China 5. Chishanu 6. Mugovera 7. Svondo 8. Handinwi doro	
CHIKAMU CHECHITANHATU: PFUNGWA MAERERANO NEZVEUTANO			
Kufungira kuti munogona kuita zvirwere			
34	1. Ndinogona kurwara ne BP kana isina kudzikiswa	1. Hongu 2. Kwete 3. Handizivi	
	2. BP chirwere chinogona kutevera mumhuri here?	1. Hongu 2. Kwete 3. Handizivi	
Kufunga Hudzamu hwe BP			
35	1. BP chirwere chakadzama here?	1. Hongu 2. Kwete 3. Handizivi	
	2. BP inogona kukonzera amwe matambudzika ehutano here?	1. Hongu 2. Kwete 3. Handizivi	
	c. Kana zvirizvo, inogona kukonzerei?		
Zvakanakira kutevedzera zvekudya zvinokurudzirwa			
34	1. BP inorapika here?	1. Hongu 2. Kwete 3. Handizivi	
	2. Kudzikisa BP kunodzivirira ku stroka here?	1. Hongu 2. Kwete 3. Handizivi	
	3. Pane zvingaitwa here kudzivirira zvinwe zvinokonzerwa ne BP?	1. Hongu 2. Kwete 3. Handizivi	
	4. Kana zviripo, zvii?		
	5. Zvakanaka here kumira kusvika usisanzwi mushe wozotanga kugadzirisa nyaya dzezvekudya?	1. Hongu 2. Kwete	
Zvibingaidzo pakutevera zvokudya			
35	1. Munokwanisa here kutevedzera zvekudya zvinokurudzirwa paBP?	1. Hongu 2. Kwete	
	2. Munokwanisa here kudzikisa kunwa doro?	1. Hongu 2. Kwete 3. Handitonwi	

	3. Mune zvibingaidzo zvipi pakuteedzera zvekudya zvinokurudzirwa pamunhu ane BP?		
Zvinogona kuita kuti muite zvinodiwa			
36	1. Munoziva sei kuti makufanira kuchienda kunoonekwa kuchipatara nenhau ye BP?	1. Kana zuva randinenge ndakaudzwa kuti ndidzoke rasvika 2. Kana mapiritsi angu ave kupera 3. Kana ndiri kurwara 4. Zvimwewo _____	
	2. Kazhinji mhuri yenyu inokubatsirai here kuona kuti madya sezvinokurudzirwa?	1. Hongu 2. Kwete	
	3. Ndinombotsvaga ruzivo rune chekuita nekudzikisa BP	1. Hongu 2. Kwete	
	4. BP yangu inogara ichitariswa	1. Hongu 2. Kwete	

APPENDIX 3: English Informed Consent form

Approval Number: AUREC 1198/19

Informed consent for dietary modification for BP Control.

My name is Norman Chikonzo a final year Master of Public Health student from Africa University on attachment in Bindura District. I am carrying out a study on the dietary modification for BP Control in patients with hypertension. I am kindly asking you to take part in this study by answering the following questions.

Your rights

Before you decide whether to take part in this study, you must understand its purpose, how it may help you, the risks to you, and what is expected of you. This is called informed consent.

What you should know about the study:

Purpose of the study:

The purpose of the study is to determine the dietary knowledge and practices that contribute to BP Control in people with hypertension. You were selected for the study because you have BP and you are under care at this institution. The study involves other 270 people like you.

Procedures and duration

If you decide to participate you will have your BP checked three times, weight and height are taken to determine your BMI. This will take about 10 minutes. You will then be interviewed and your responses recorded on a questionnaire. This part will take about 30 minutes. All in all, this should take about 40 minutes

Risks and discomforts

We do not foresee any physical risks, discomforts or inconveniences to you during this study. There is a slight possibility of psychological discomfort as we will ask personal questions like drinking habits which may be private and family history may elicit some memories of experiences. To address these, you are free to decline to answer any questions you are not comfortable with or would not like to disclose to anyone. You may also stop the interview without any effects. Your responses will be used for academic purposes only and there is no wrong or right answer.

Benefits and/or compensation

You will not be offered any direct compensation, gift or payment (monetary or otherwise) for taking part in the study. You will not be compensated for the transport fare you use to come to the Hospital. You will also not be offered treatment or medication because you participated in this study but you will receive the care you were going to receive whether you take part in this study or not.

Confidentiality

If you indicate your willingness to take part in this study by signing this document, you must know that your input will be kept confidential. Names and other identifying data will not be asked in this study and if there is any information that is obtained in this study that may be identified with you it will remain confidential and will be disclosed only with your permission. We plan to disclose the study findings to the Hospital executives, research supervisors, Bindura District Medical Officer, Provincial Medical Director and to the College of Health Agriculture and Natural Sciences of Africa University.

Voluntary participation

Participation in this study is voluntary. If you decide not to take part in this study, your decision will not affect your access to care or treatment at this Hospital. If you participate, you are also free to withdraw your consent and to stop participation at any point without penalty or victimization.

Offer to answer questions

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

Authorization

If you have decided to take part in this study please sign this form in the space provided below as an indication that you have read and understood the information provided above and have agreed to take part.

---------- ----------

Name of Research Respondent (please print) Date

Signature of Research Respondent or legally authorized representative

If you have questions concerning this study or consent form beyond those answered by the researcher including questions about the research, your rights as a research respondent, or if you feel that you have been treated unfairly and would like to talk to someone other than the researcher, please feel free to contact the Africa University Research Ethics Committee on telephone (020) 60075 or 60026 extension 1156 email aurec@africau.edu

APPENDIX 4: Shona Informed Consent form

Approval Number: AUREC 1198/19

Tendero kubva kune vachabvunzwa mutsvakiridzo yezvekudya zvinobatsira kudzikisa BP muvanhu vane chirwere che BP.

Zita rangu ndinonzi Norman Chikonzo ndiri mugore rekupedzisira rekuita Masters mune zvehutano hweruzhinji pa Africa University ikozvino ndiri kubata ndiri mudunhu reBindura. Ndiri kuita tsvakiridzo ye zvokudya zvine chekuita nekuderedza puresha yeropa muvanhu vane chirwere cheBP. Ndiri kukumbira kuti mupinde mutsvakiridzo iyi nekupindura mibvunzo ichatevera.

Kodzero dzenyu

Musati mafunga kuva kana kurega kuva norupandi mutsvakiridzo ino, munofanira kunzwisisa chinangwa, chekuti zvichakubatsirai sei, njodzi kwamuri uye zvamakatarisirwa kuita. Iyi inonzi mvumo inopiwa nevavhunzwi mutsvakiridzo mushure mokunge vawana ruzivo rwakakwana nezvetsvakiridzo kubva kumutsvakiridzi. Kuva norupandi mutsvakiridzo iyi isarudzo yenyu.

Zvamunofamira kuziva nezve tsvakiridzo iyi:

Chinangwa che tsvakiridzo:

Chinangwa che tsvakiridzo iyi ndechekuona ruzivo nemaitiro pane zvechikafu evanhu vane BP anogona kuita kuti iderere. Makasarudzawa kuti mupinde mutsvakiridzo iyi nokuti mune chirwere che BP uye munorapwa pachipatara pano. Handimi chete muri mutsvakiridzo iyi asi pana vamwe mazana maviriri nemakumi manonwe ane vanonwe vakaita semi.

Zvichaitwa nenguva yazvichatora

Kana masarudza kuva mutsvakiridzo iyi muchatorwa BP yenyu katatu mozotorwa zvekare huremu ne hurefu kuti tione huremu hwemuviri wenyu zvichienderana nemuviri wenyu. Izvi zvichatora maminitsi anogona kuita gumi. Muchazobvunzwa mibvinzo uye mhinduro dzenyu dzichange dzichinyorwa pabepa rebvunzurudzo. Izvi zvinogona kutora maminitsi anoita makumi matatu. Saka zvese zvinogona kuita maminitsi anokwana makumi mana.

Njodzi, kusagadzikana kana kushungurudzika kungavapo

Hapana njodzi, kusagadzikana kana kukanganisika kwemuviri kwatinofungira kuti kungaitika kwamuri mutsvakiridzo iyi. Pada pangangoita hako kakushungurudzika mupfungwa dzimwe nguva neimwe mubvunzo yezveupenyu hwenyu yatingabvunza seyakaita seyezvekunwa doro izvo zvamunogona kunge musingade kuti zvitaurwe pachena. Tichabvunzawo nhorooondo ye BP mumhuri iyo inogona kumutsa pfungwa dzezvakamboitika kare zvingave zvisingafadzi. Kudzivirira kushungurudzika uku, makasununguka kuramba kupindura imwe mubvunzo yamusingafari nayo kana kutoti bzunzurudzo yacho ngaitomirira ipapo. Kumisa kwenyu bzunzurudzo chero pamadira hakuna zvakunokukanganisai. Zvese zvatichataura tichazvishandisa kune zvekudzidza chete uye hapana mhinduro yamuchapa yatichati yakanaka kana kuti yakaipa.

Zvingakuyamuraiwo kana muripo wenyu pakupinda mutsvakiridzo iyi

Hapana chamuchapiwa, chipo kana mubhadharo (mari kana zvimwe) pakupinda mutsvakiridzo ino. Kunyange mari yamafamba nayo kuuya kuchipara hapana kudzorerwa. Uye zvekare kupinda mutsvakiridzo ino hazvirevi kuti zvichaita kuti mupiwe kumwe kurapwa kana mushonga. Muchangowana izvo zvamaifanira kuwana zvisinei kuti mapinda mutsvakiridzo here kana kuti hamuna.

Kuchengetedzwa kwehumbowo hwenyu

Kana mukataridza kuti munoda kuva mutsvakiridzo ino kuburikidza nekusaina bepa rino kana kuisa matsimba echigumwe chenyu, zivai kuti mhinduro dzenyu dzichange dzakachengeteka. Mazita nezvimwe zvingaita kuti muzivikanwe kuti ndimi hazvidiwi mutsvakiridzo ino. Kana pane umbowo hwatorwa mutsvakiridzo ino hunogona kuita kuti muzikanwe kuti ndimi hucharamba hwakachengetedzwa uye hunongoburitswa chete nemvumo yenyu. Tichazivisa zvatawana mutsvakiridzo iyi kuvakuru vezvipatara, vakuru vehutano mudunhu re Bindura uye ku Chikoro che Africa University.

Kupinda kana kubuda mutsvakiridzo

Kupinda kana kusapinda kwenyu mutsvakiridzo izvi zviri kwamuri. Kana masarudza kusapinda mutsvakiridzo iyi, sarudzo iyi haina chainoshandura pakubatwa kana kurapwa kwenyu pachipatara pano pari zvino kana mune ramangwana. Kana masarudzo kupinda mutsvakiridzo, makasununguka kubuda zvekare paneipi zvayo nguva pasina kutya kuti mungazoitirwa zvakaipa kana kushungurudzwa nekuda kwesarudzo iyoyo.

Kupindura Mibvunzo yenyu

Musati masaina bepa rino, makasununguka kubvunza mibvunzo yamungava navo pane chipi nechipi zvacho che tsvakiridzo ino kana kuti kujekeserwa zvisina kujeka kwamuri. Munogona kutora nguva chero yamunoda kufunga nezvazvo.

Kubvumidza

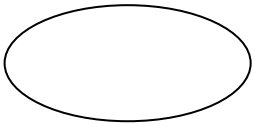
Kana masarudza kupinda mutsvakiridzo iyi sainai bepa rino panzvinbo iri pasi sehumbowo hwekuti maverenga kana kuterera mukanzwisisa zvataurwa nebepa rino uye mukabvuma kuva mutsvakiridzo ino.

---------- ----------

Zita remubvunzwi (Nemavara makuru) Zuva

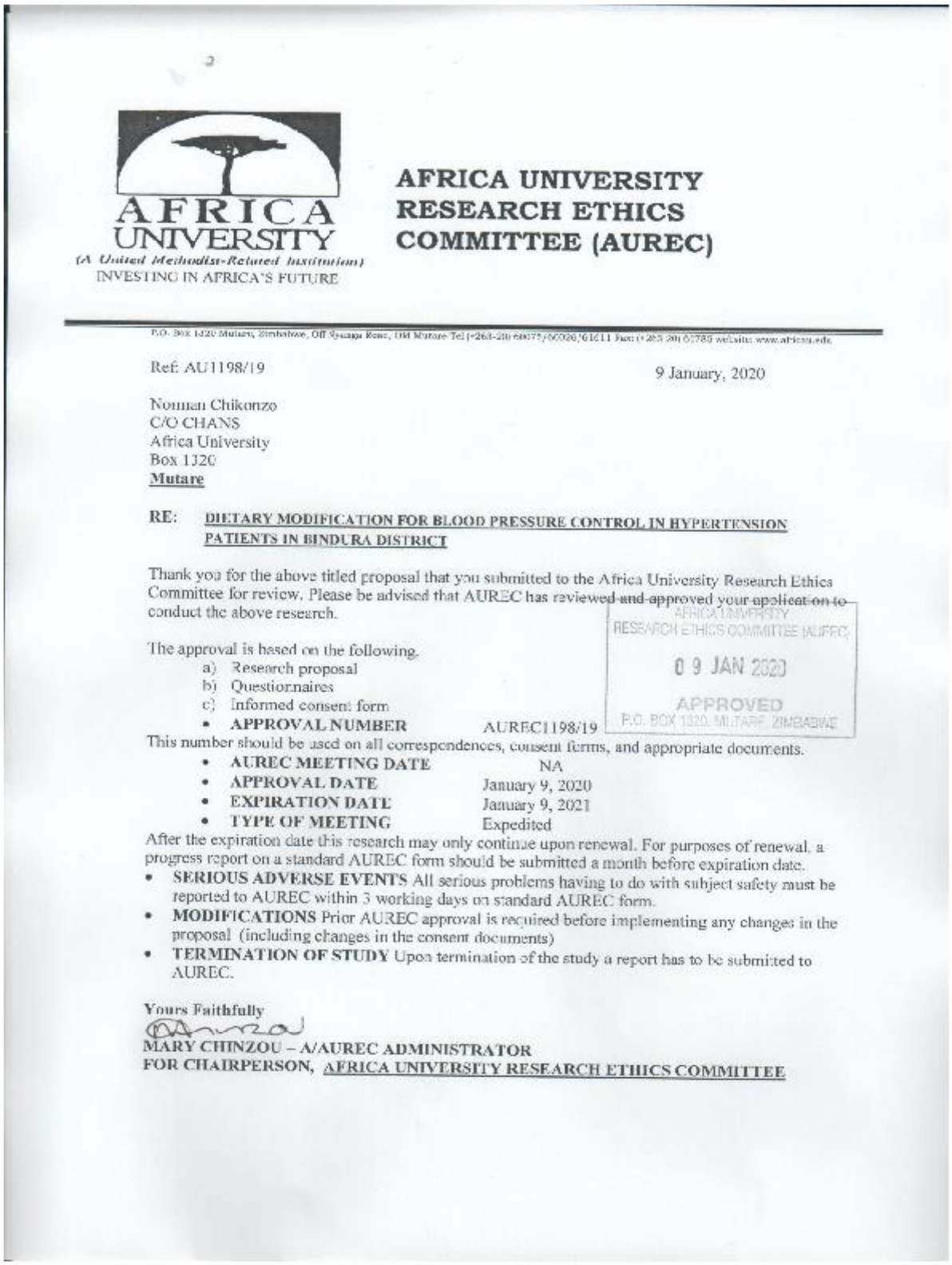
Siginecha yemubvunzwi kana kuti

Matsimba eChigumwe chihombe cheruoko rwerudyi kune vasingagoni kunyora



Kana muine mibvunzo pamusoro petsvakiriridzo ino kana bepa rechitenderano iro isina kukwanisa kupindurwa nemutsvakiridzi inosanganisira zvetsvakiridzo, kodzero yenyu semu tsvakurudzwi, kana kuti kana muchinzwa kuti mabatwa zvisina kunaka uye muchida kutaura neumwe munhu asiri mutsvakiridzi, makasununguka kuchaya runhare ku Africa University Research Ethics Committee pa nhare dzinoti (020) 60075 kana 60026 ichienda ku 1156 kana tsamba yemagetsi pa aurec@africau.edu

APPENDIX 5: AUREC Approval letter



AFRICA UNIVERSITY
(A United Methodist-Related Institution)
INVESTING IN AFRICA'S FUTURE

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare Tel (+263-20) 60075/60026/61611 Fax (+263 20) 61785 website www.africau.edu

Ref: AU1198/19

9 January, 2020

Norman Chikonzo
C/O CHANS
Africa University
Box 1320
Mutare

RE: **DIETARY MODIFICATION FOR BLOOD PRESSURE CONTROL IN HYPERTENSION PATIENTS IN BINDURA DISTRICT**

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your applicat on to conduct the above research.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
0 9 JAN 2020
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

The approval is based on the following.

a) Research proposal
b) Questionnaires
c) Informed consent form

- **APPROVAL NUMBER** AUREC1198/19

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

- **AUREC MEETING DATE** NA
- **APPROVAL DATE** January 9, 2020
- **EXPIRATION DATE** January 9, 2021
- **TYPE OF MEETING** Expedited

After the expiration date this research may only continue upon renewal. For purposes of renewal, a progress report on a standard AUREC form should be submitted a month before expiration date.

- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

Yours Faithfully

MARY CHINZOU – A/AUREC ADMINISTRATOR
FOR CHAIRPERSON, AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

APPENDIX 6: Letter of Permission from PMD

Telephone 071-6291/6267/6555
Fax 071-6869

ZIMBABWE

MINISTRY OF HEALTH AND
CHILD WELFARE
PMD MASH CENTRAL
P. Bag 98
BINDURA

26 November 2019

To Whom it may concern

RE: PERMISSION FOR NORMAN CHIKONZO TO CONDUCT A STUDY ON DIETARY MODIFICATION FOR BLOOD PRESSURE CONTROL IN HYPERTENSION PATIENTS IN BINDURA DISTRICT.

The above cadre who is in the final year of Master of Public Health with Africa University will be conducting a study on *Dietary modification for blood pressure control in hypertension patients* in 2020. He has been granted permission to conduct the study at Bindura Hospital and Shashi Hospital. Findings from the study will be shared with the Province and the District.

May you therefore assist him in this regard.

MIN. OF HEALTH & CHILD CARE
PROVINCIAL MEDICAL DIRECTOR
MASHONALAND CENTRAL
26 NOV 2019
P.O. BOX 98, BINDURA
ZIMBABWE

Dr C Tshuma pp

PROVINCIAL MEDICAL DIRECTOR – MASHONALAND CENTRAL

APPENDIX 7: Letter of Permission from Bindura Hospital Med Sup

Telephones
Med Supt: 066210-7861
HSA: 066210-6869
Matron 066210-6877
PRO 066210- 6872

ZIMBABWE

MINISTRY OF HEALTH AND CHILD CARE
Bindura Provincial Hospital
P. Bag 940
BINDURA
Hospital Email:
bindurahospital@gmail.com

29 November 2019

TO WHOM IT MAY CONCERN

- *Attention: NORMAN CHIKONZO*

RE:REQUEST FOR PERMISSION TO CONDUCT A STUDY ON "DIETARY MODIFICATION FOR BLOOD PRESSURE CONTROL IN HYPERTENSION PATIENTS AT BINDURA PROVINCIAL HOSPITAL"

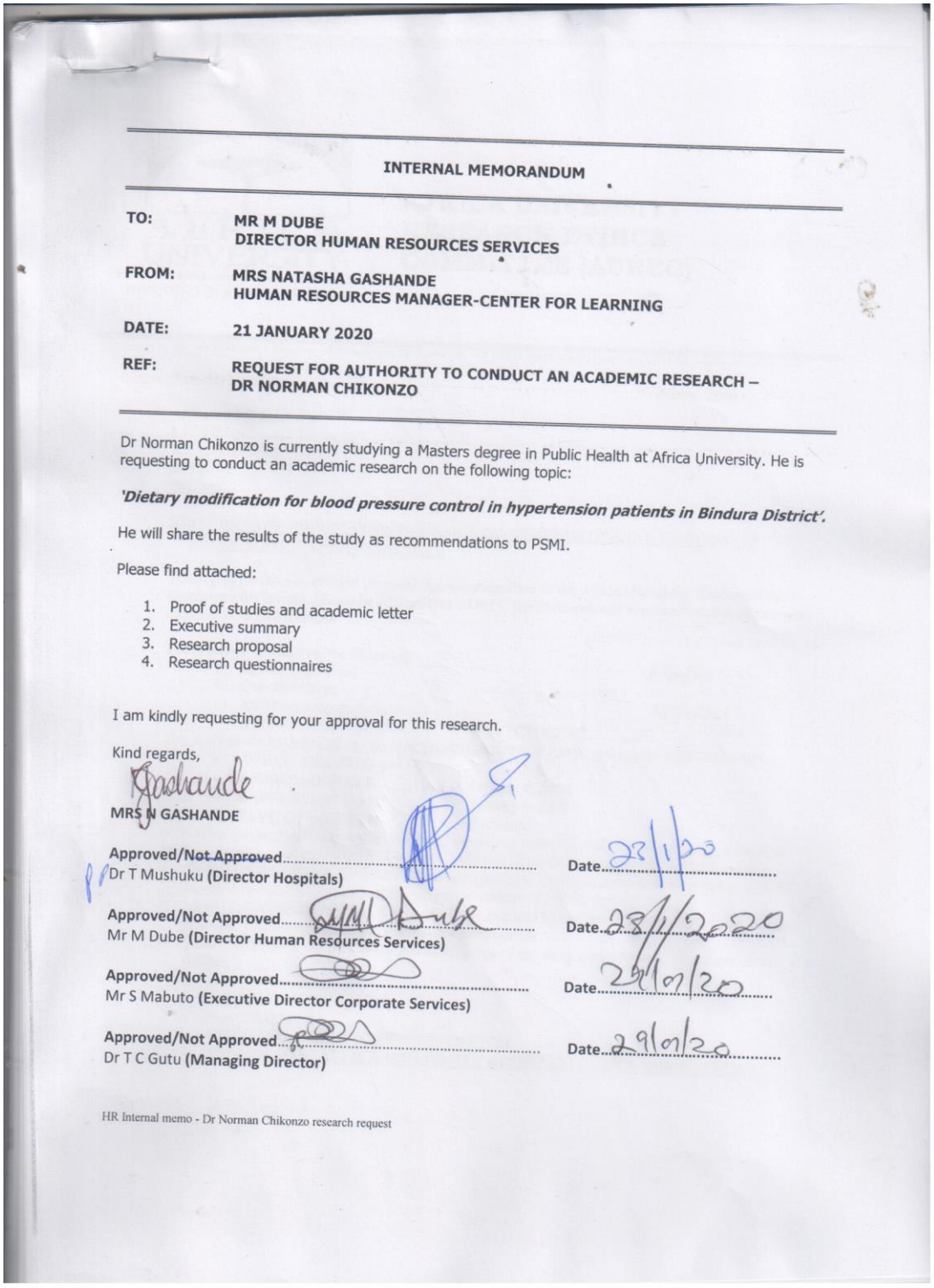
The above cadre who is in the final year of Masters of Public Health with Africa University will be conducting a study on Dietary modification for blood pressure control in hypertension patients in 2020. He has been granted permission to conduct the study at Bindura Provincial Hospital Outpatients and Inpatients Departments.

Findings from the study will be shared with the Hospital Executive.

THE MEDICAL SUPERINTENDENT
BINDURA PROVINCIAL HOSPITAL
02 DEC 2019
P. BAG 940, BINDURA
ZIMBABWE

Dr Gwagwa BW
MBChB (UZ)
MEDICAL SUPERINTENDENT – BINDURA PROVINCIAL HOSPITAL

APPENDIX 8: Letter of Permission from PSMI Directorate



INTERNAL MEMORANDUM

TO: **MR M DUBE**
DIRECTOR HUMAN RESOURCES SERVICES

FROM: **MRS NATASHA GASHANDE**
HUMAN RESOURCES MANAGER-CENTER FOR LEARNING

DATE: **21 JANUARY 2020**

REF: **REQUEST FOR AUTHORITY TO CONDUCT AN ACADEMIC RESEARCH – DR NORMAN CHIKONZO**

Dr Norman Chikonzo is currently studying a Masters degree in Public Health at Africa University. He is requesting to conduct an academic research on the following topic:

'Dietary modification for blood pressure control in hypertension patients in Bindura District'.

He will share the results of the study as recommendations to PSMI.

Please find attached:

1. Proof of studies and academic letter
2. Executive summary
3. Research proposal
4. Research questionnaires

I am kindly requesting for your approval for this research.

Kind regards,

Gashande

MRS N GASHANDE

Approved/~~Not Approved~~..... **Date**..28/1/20
Dr T Mushuku **(Director Hospitals)**

Approved/Not Approved..... **Date**..28/1/2020
Mr M Dube **(Director Human Resources Services)**

Approved/Not Approved..... **Date**..29/01/20
Mr S Mabuto **(Executive Director Corporate Services)**

Approved/Not Approved..... **Date**..29/01/20
Dr T C Gutu **(Managing Director)**

HR Internal memo - Dr Norman Chikonzo research request

APPENDIX 9: Letter of Permission from Shashi Hospital management

PSMI
SHASHI HOSPITAL
PRIVATE LIMITED

02 December 2019

RE: PERMISSION FOR NORMAN CHIKONZO TO CONDUCT A STUDY ON DIETARY MODIFICATION FOR BLOOD PRESSURE CONTROL IN HYPERTENSION PATIENTS AT SHASHI HOSPITAL

The above cadre who is in the final year of Master of Public Health with Africa University will be conducting a study on Dietary modification for blood pressure control in hypertension patients in 2020. He has been granted permission to conduct the study at Shashi Hospital outpatients and inpatients Departments. Findings from the study will be shared with Shashi hospital executive.

PSMI SHASHI HOSPITAL
163 CHURCH RD. BINDURA
TEL: 066 7103/6
CELL: 0782 704 373/4, 0731 005 005
DATE:.....

V. L Murambiwa

HOSPITAL SERVICES MANAGER – SHASHI HOSPITAL

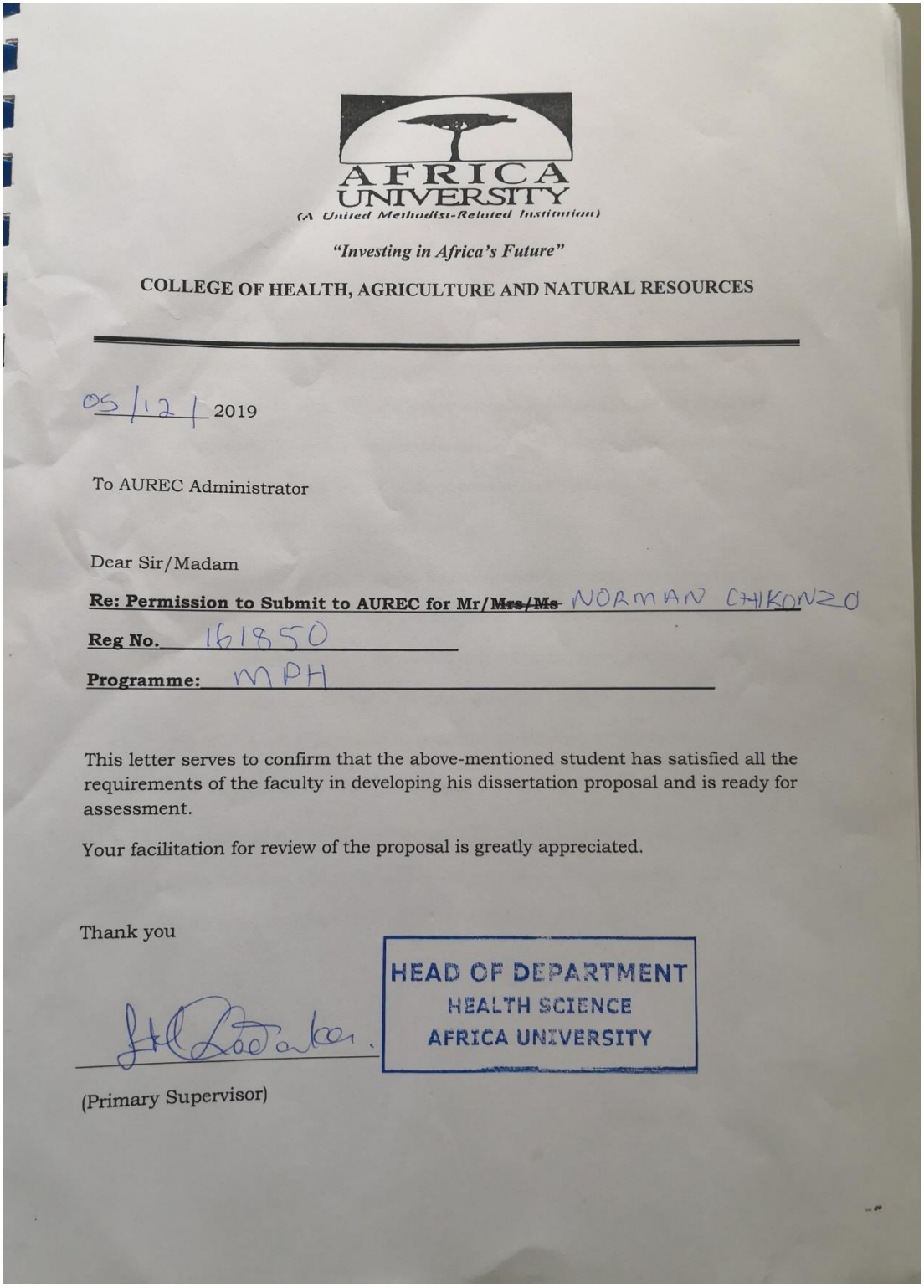
Cell: 0773589429

Email: vlmurambiwa@psmi.co.zw

PSMI SHASHI HOSPITAL
163 CHURCH RD. BINDURA
TEL: 066 7103/6
CELL: 0782 704 373/4, 0731 005 005
DATE:.....

A member of the P.S.M.I. group.

APPENDIX 10: Letter from the Head of Department AU



AFRICA UNIVERSITY
(A United Methodist-Related Institution)

"Investing in Africa's Future"

COLLEGE OF HEALTH, AGRICULTURE AND NATURAL RESOURCES

05/12/2019

To AUREC Administrator

Dear Sir/Madam

Re: Permission to Submit to AUREC for Mr/~~Mrs/Ms~~ NORMAN CHIKONZO

Reg No. 161850

Programme: MPH

This letter serves to confirm that the above-mentioned student has satisfied all the requirements of the faculty in developing his dissertation proposal and is ready for assessment.

Your facilitation for review of the proposal is greatly appreciated.

Thank you

HEAD OF DEPARTMENT
HEALTH SCIENCE
AFRICA UNIVERSITY

(Primary Supervisor)

APPENDIX 11: Receipt for AUREC fees