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PATIENT-RELATED FACTORS ASSOCIATED WITH CONTROL OF HYPERTENSION AT JABULANI DUMANE COMMUNITY HEALTH CENTRE, GAUTENG PROVINCE

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A research report submitted to the Faculty of Health Sciences,
University of the Witwatersrand, Johannesburg,
in partial fulfilment of the requirements for the degree
Master of Medicine in Family Medicine

18th April 2017

DECLARATION

I, Mahamba Nyanga, declare that this research report is my own, unaided work. It is being submitted for the degree of Master of Medicine in Family Medicine (MMed Fam Med) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other university.

M Nyanga

Signature: 

Date: 13th January 2017

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DEDICATION

To our Lord Jesus-Christ;

To my late father Nyanga Mahamba, and my mother Mrs Misenga M Nyanga;

To my precious wife Mrs Suzanne Ntanga Kalanga, and my children: Rachel Nyanga, Fortunat Nyanga, Stephanie Nyanga, and Ketsia Nyanga; and to my brothers and sisters.

ABSTRACT

TITLE: Patient-related factors associated with control of hypertension at Jabulani Dumane Community Health Centre, Ekurhuleni, Gauteng province.

INTRODUCTION: Jabulani Dumane Community Health Centre offers comprehensive care to hypertensive patients. Following the establishment of healthcare workers' responsibilities in hypertension control by a quality improvement project, this study aimed to establish patient-related factors in hypertension control. A hypothesis understudy was done to affirm that the psychosocial characteristics and demographics of patients are among the most important contributors to the control of hypertension. It is believed that the findings of this study will provide healthcare workers with the information they need to counsel their patients.

METHOD: This was a cross-sectional descriptive study. Patients were directly interviewed to obtain information about their demographics and psychosocial characteristics. Previous blood pressures were obtained directly from records. All information gathered was described and analysed. Association between each variable and control of hypertension was analysed. Statistical tests used were Chi-square and Fisher's exact test.

RESULTS: Results showed a statistically significant association between the following variables and hypertension control: marital status (p=0.002); adherence to medication (p=0.0060); adherence to physical exercises (p = 0.0029).

CONCLUSION: Patient-related factors associated with control of hypertension included marital status, adherence to treatment, and physical exercise. Hypertension control can be enhanced by improving adherence to treatment and healthy lifestyle (physical exercise and diet).

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ABBREVIATIONS

BMI: Body Mass Index

BP: Blood Pressure

CCF: Congestive Cardiac Failure

CHC: Community Health Centre

CKD: Chronic Kidney Disease

CVA: Cerebro Vascular Attack

CNS: Central Nervous System

CVD: Cardiovascular Disease

DM: Diabetes Mellitus

DOT: Direct Observation of Treatment

EPI: Extended Programme of Immunisation

HCPS: Health Care Providers

HF: Heart Failure

HHD: Hypertensive Heart Disease

HIV: Human Immunodeficiency Virus

JDCHC: Jabulani Dumane Community Health Care Centre

PAD: Peripheral Arterial Disease

PHC: Primary Health Care

PMTCT: Prevention of Mother to Child Transmission

QIP: Quality Improvement Project

RCT: Randomised Control Trial

TOP: Termination of Pregnancy

USA: United States of America

VCT: Voluntary Counselling and Testing

WBOT: Ward-based Outreach Team

WHO: World Health Organisation

CHAPTER 1. INTRODUCTION

1.1 Background

Hypertension is one of the most common cardiovascular diseases and is regarded as a major public health problem worldwide, including in the Republic of South Africa (RSA). It affected more than a quarter of the world's adult population in the year 2000, and is projected to increase by about 60% in 2025.[1] This prevalence is progressively increasing in traditional African societies with the recently observed urban lifestyle changes in many African countries.[2] In the United States of America (USA) hypertension accounted for 29% in years 2011-2014.[3] Duncan found that in Kwazulu-Natal, South Africa, hypertension rate was 21% among those aged 15 years and older.[4]

Optimal control of hypertension prevents the incidence of hypertension-related complications, including stroke, heart failure (HF), chronic kidney disease (CKD), peripheral artery disease (PAD), and hypertensive retinopathy.[5] This is achieved by adhering to the recommended treatment regimen, including non-pharmacological and pharmacological therapy, and both patient and healthcare provider (HCP) play a crucial role in the control of the disease.[6]

These hypertension-related complications are increasing considerably in Sub-Saharan Africa.[3] In their systematic review of 43 randomised controlled trials (RCT) on the prevalence of hypertension in Sub-Saharan Africa (Nigeria), Ogah et al. found that the overall prevalence of hypertension-related major complications was 39% for stroke, 22% for congestive cardiac failure, 9.4% for chronic kidney disease, and 1.7% for hypertensive encephalopathy.[5] The rapid increase of hypertension and its morbidity and mortality makes it a major public health burden worldwide, including Africa,[7] and contributes 7.7% of the overall direct healthcare expenditure in South Africa.[7] The above paragraphs show that many patients suffer from morbidity and mortality related to poorly controlled hypertension. This raison motivated the researcher to conduct this current study.

Hypertension is defined as persistent elevation of office blood pressure equal to 140/90 mm Hg.[8] There are two types of hypertension: primary hypertension which accounts for more than 90 % of cases worldwide, and secondary hypertension, which has identified causes such as renal artery stenosis.

Risk factors of hypertension include smoking, dyslipidaemia, diabetes mellitus (DM), age, family history of cardiovascular disease (CVD), and abdominal obesity.[8] The pathophysiology of hypertension involves integration of cardiovascular, neural, renal, endocrine and local tissue control.[9]

The South African hypertension guidelines summarise the treatment of hypertension in non-pharmacological therapy and in pharmacological therapy.[8] It has been recommended that during consultation, healthcare providers should assess the level of control of all chronic diseases, including hypertension[10] The importance of this was demonstrated by Kathi et al. in their systematic review of qualitative and quantitative studies on patient and healthcare providers' barriers to hypertension management.[10] Optimal control of hypertension has the potential to prevent hypertension-related major complications, including stroke, CCF, CKD, PAD, and hypertensive retinopathy.[5]

Depending on BP level, this can be achieved either by non-pharmacological therapy alone or in combination with pharmacological therapy.[10] Data shows that worldwide, there is a low proportion of controlled hypertension, therefore it is very important to identify factors associated with control of hypertension in order to prevent morbidity and mortality. This will ultimately optimise patient care and prevent many hypertension-related complications, including stroke, CCF, CKD, PAD, and hypertensive retinopathy.[5]

1.2. Rationale

While working at Jabulani Dumane Community Health Care Centre (JDCHC), the researcher was struck by the high number of patients presenting with bad blood pressure readings and hypertension complications. A quality improvement project (QIP) was conducted at JDCHC. It was found that healthcare providers showed shortfalls in the management and control of hypertension. Factors identified included poor adherence to guidelines, lack of efficient check-ups to identify problems, and lack of accessible guidelines. Potential patient–related factors are also associated with the control of hypertension,[11] as demonstrated by Kayima et al.[12] It is crucial to the control of hypertension that healthcare providers identify patient-related factors, thus allowing for them to be specifically addressed.

To the researcher's knowledge, there are few published studies that have investigated primary healthcare patient-related factors in the control of hypertension in semi-urban settings in South Africa. Online research yielded a study by Duncan et al. in Kwazulu-Natal, and another done in several South African provinces by Peltzer et al.[4, 13] The two studies were conducted respectively in rural settings and tertiary hospitals in 2014 and 2013. No recent South African studies have attempted to determine patient-related factors associated with hypertension control in Ekurhuleni. Therefore, the purpose of this study is to determine the patient-related factors associated with control of hypertension at JDCHC, which is a semi-urban Community Health Centre. This study has relevance to family medicine, as hypertension has a significant morbidity and mortality, especially in South Africa, a developing country with a developing primary healthcare (PHC) system facing resource constraints.[15]

The researcher hopes that the recommendations made from the findings of this study to the management of the Ekurhuleni Health District will result in increasing the rates of controlled hypertension at JDCHC. This information will also be useful to policymakers and facility managers nationally, especially at the PHC level, in optimising patient care and improving health- care services.

1.3. Organisational report

The research report has five central chapters. Chapter 2 is a literature review, Chapter 3 deals with materials and methods, Chapter 4 covers results, Chapter 5 is discussion, and Chapter 6 contains conclusions and recommendations. These chapters are followed by appendices and references. The following chapter reviews the literature relevant to the study.

1.4. Aim and objectives

1.4.1. Study aim

To explore patient-related factors associated with control of hypertension in patients attending Jabulani Dumane Community Health Centre.

1.4.2. Study objectives

1. To determine the proportion of patients with controlled hypertension at Jabulani Dumane Community Health Centre.

2. To describe the socio-demographic characteristics associated with hypertensive patients at Jabulani Dumane Community Health Centre.

3 To determine the associations between patient-related factors and control of hypertension in patients attending Jabulani Dumane Community Health Centre.

CHAPTER 2. LITERATURE REVIEW

In order to answer the research question, the researcher explored the literature on the following websites: PubMed, Cochrane Library, SUM search 2, TRIP database, Up to date, Essential Evidence Plus, and Google Scholar. Relevant studies were selected for review, and the information obtained is presented. It includes proportion of patients with hypertension, socio-demographic characteristics of hypertensive patients, adherence to treatment, and their association with the control of hypertension.

2.1. Proportion of patients with hypertension

Several studies across the world indicate that hypertension is common in primary healthcare settings. High numbers of patients are seen in PHC, as this is the starting point of care for many patients.[16] In 2010, a World Health Organization (WHO) report stated that globally, 40% of people aged 25 and above had hypertension .[17] This prevalence included all countries at all levels of care.

Prevalence of hypertension in the USA was 33.5% of the population in 2014; 54% of them were controlled.[18] This prevalence is lower than the global prevalence. Multiple socio-economic factors explain why the prevalence is low in the USA and elsewhere.[19, 20, 21, 22] Prevalence of hypertension in Europe was reported to be 60% adult patients.[22] In their study on the epidemiology of hypertension in Europe, Magrini et al. reported a prevalence of 44% to 60% in elderly populations.[23] When analysing these results, one must keep in mind that the European population is constituted of a large proportion of elderly people. Considering that hypertension proportions increase with age, high prevalence in Europe is to be expected.

Studies conducted in Asia reported contradictory findings on prevalence. In India, Premkumar et al. found that there was a decrease in hypertension prevalence from one-third to one-fifth in 2015.[24] Further studies need to be done to establish the reasons for this decrease. Surour et al. reported a prevalence lower than the global prevalence (7.4%) in people aged 25 years and above in Saudi Arabia.[25] On the other hand, Krishnan et al. reported a higher prevalence (close to the global one) of 35% in South-East Asia.[26] However, a powerful systematic review conducted by Neupane et al.[27] reported a prevalence of 27% in South East Asia.[27] Review of these studies conducted in Asia reveal that prevalence of hypertension in Asia is not uniform, but each sub-region has a different prevalence. These differences can be attributed to socio-economic discrepancies within the Asian continent.

The prevalence of hypertension in Africa was 24% in 2015.[28] The African proportion of hypertension is also lower than the global proportion. This was confirmed by Yan et al. who reported a prevalence of 23.1% among patients attending rural PHCs in Zambia.[28] South African prevalence is higher than the African one. It is reported to be over 40% in adults aged 25 and above.[7] This is partially attributed to high

salt intake in the country.[29] These findings contradict those of Hasumi et al[30] who conducted a nationwide survey on 59 227 adults aged 18 and older. Self-reported prevalence of hypertension was 10.4% in 2010, [30] which is similar to another study conducted in South Africa.[31] Results of the two latest studies contradict those of Day, and other studies which reported higher incidences.[7, 8] One must keep in mind that these low incidences can be attributed to the fact that hypertension was self-reported in the mentioned studies.

A review of studies on proportion shows that the highest prevalence of hypertension is found in Europe (up to 60%), followed by South Africa as a country, Asia, the USA, and lastly, the African continent.

2.2. Socio-demographic characteristics associated with control of hypertension

Many studies have documented several socio-demographic characteristics associated with hypertension and its control.[32, 33]

2.2.1. Age

Old age is a significant characteristic associated with the control of hypertension.[34, 35, 36] Along with Campbell et al. who conducted a systematic review of 34 RCTs in the USA, Gillespie[35], and Lloyd-Sherlock [34] reported on studies conducted in Germany and Brazil respectively, where it was found that hypertension was better controlled in older adults than younger adults aged 18 to 39 years (p value <0.05). Studies conducted worldwide, including Africa, agree that hypertension prevalence increases with age. A published study reported that, of all the countries in the world, South Africa had the highest rate of high blood pressure reported among people aged 50 and over at any time in contemporary history, and that less than one person in ten had their blood pressure controlled.[31] Recently, it was found that more and more younger people are presenting with hypertension, but control remains higher among older patients.[32] A national household survey conducted in South Africa revealed that prevalence of hypertension increased to above 40% in 2010 among people aged 25 years and older, but control is better among older patients.[30]

2.2.2. Gender

It is generally reported that females are associated with high prevalence and better control of hypertension.[33, 34, 35] A systematic review of 38 studies was conducted in 23 African countries on treatment and control of hypertension and related factors.[12] Results showed that overall, women had a higher prevalence and better control of hypertension than men (all p <0.05).[12] Different study designs conducted in the USA and South Africa also reported similar findings.[34, 35] In a study of gender and control of hypertension, Staffileno et al. reported that the majority of hypertensive patients were females.[44] Furthermore Peltzer and Basu found that the prevalence of hypertension was higher among women, against a lower one in men.[31, 37] When comparing control between male and female patients,

studies show that female patients have better hypertension control than male hypertensive patients in USA.[38] Gillespie et al. and Lloyd-Sherlock et al. also compared the control rate and they found that prevalence of hypertension was higher, and control rate better in women.[35,36]

2.2.3. Marital status

Causland et al reported marital status being independently associated with lowering in systolic hypertension.(OR 2.25, 95% CI : 1.26- 4.03; p = 0.01) .[39] His findings contradict those of a cross-sectional study conducted in 2015 by Supiyev et al. in Kazakhstan, who found that hypertension control was not associated with marital status.[40] Despite differences in hypertension control between married and unmarried patients, the prevalence is higher among unmarried and persons living alone persons.[41] South African studies on association between marital status and control of hypertension are not available to date.

2.2.4. Racial groups and ethnicity

An indirect way of assessing hypertension is to measure sodium and potassium excretion in urine.[29] Swanepoel et al collected data from two cross-sectional studies and one ten-year prospective study in 2015. Studies assessed over 24 hours the sodium and potassium excretion in white, Indian and black populations. It was found that the highest excretion was collected among the black population.

A South African study found that there was a wide variation in hypertension prevalence across provinces.[42] The North West, Free State, Northern Cape and Limpopo provinces were found to have the lowest prevalence of hypertension.[42] within the same provinces, ethnic and racial differences were also reported. Seedat et al. conducted an inter-racial study on hypertension prevalence in Durban, on 1 000 persons of each racial group.[8] Africans (Zulus) were found to have a prevalence of 25%, the white population 22.8%, and the Indian population 19%.[8] These studies were descriptive, hence they did not assess association between ethnicity and hypertension control. Association was assessed in a study conducted in the USA[44], which showed no association between ethnic origin and hypertension control.[44]

2.2.5. Socio-economic environment

Socio-economic status is reported as one of the factors influencing blood pressure and its control.[37, 45] While blood pressure control is increased by improved economic situations, half of hypertensive patients do not have their hypertension under control in low- and middle-income countries.[45] Basu and Millett conducted a study on the social epidemiology of hypertension in middle-income countries.[37] They reported the highest proportion of uncontrolled hypertension was in low-income coutries.[37] These results can be extrapolated to South Africa because South Africa is also a middle-income country.

Agyemang conducted a study on rural and urban differences in blood pressure and hypertension in Ghana, West Africa.[46] He found that implementation of cost-effective measures such as normalising body weight, promotion of physical activity in urban areas, reduction of smoking among rural men, and reduction of salt intake may have positive effects on hypertension control in Sub-Saharan countries.[46] It must be reminded that social and economic situation in Africa improve as people move from rural to urban settings. Migrations from rural to urban areas and vice-versa cause change in socio-economic situation, hence in control of hypertension. The longer a patient resides in a particular setting, the more he is likely to have his blood pressure controlled or uncontrolled. One of the strengths of this study was that both urban and rural populations were included. A similar study conducted by Kadiri et al. on urbanised workers in Ibadan, Nigeria, reported a correlation between elevated blood pressure, adverse living and working conditions, having numerous children, smoking, alcohol consumption, anxiety and lack of recreation.[47] These findings are in line with those of Seedat et al. who reported that socio-economic factors impair control of hypertension in developing countries.[8]

2.2.6 Employment status

Hypertension prevalence is higher among unemployed people.[20] A South African study conducted in Limpopo by Ntuli et al[21], along with another South African study[22] reported that hypertension prevalence is higher among unemployed patients.[21, 22] A further South African study conducted among patients with poorly controlled hypertension showed that unemployment is positively associated with poor control of hypertension.[48] The weakness of these studies is that they considered only patients working in occidental companies, without taking into account the self-satisfaction of self-employed patients, who mostly performed agriculture in rural areas. The researcher is of view that the nature of work performed by employees can determine the amount of their emotional stress and hence the increase in blood pressure levels.

2.2.7 Level of education

It is assumed that educated patients understand health education better than uneducated patients. This better understanding helps them to adopt a lifestyle that prevents and controls disease. A study conducted in Uganda showed that prevalence of hypertension was higher among people who had not attended school, compared to those who had attended school.[49] The proportion of hypertension between those who had tertiary education and those who had not attended school was 1 in 3.[49] Results of this study can be extrapolated to South African settings because of population similarity. However, the Ugandan study failed to compare control according to different levels of education.

A cross-sectional study conducted in high-, middle-, and low-income countries reported that low levels of education were associated with poor control of hypertension, irrespective of the countries' economic status.[45] These findings were similar to those of studies conducted in several Latin American countries including Brazil, which reported that low levels of education were associated with poor control of hypertension.[50] As mentioned earlier, the association between levels of education and control of hypertension is not limited to developing countries, as the same findings have been reported from developed countries.

In South Africa, Steyn et al. reported that hypertension was significantly associated with low levels of education (OR 0.63, 95% CI 0.47-0.84).[51] The worst hypertension control was found among uneducated, poor, young men.[51] The merit of Steyn study was that it went beyond levels of education by comparing patient gender with regard to hypertension control. Factors associated with compliance were age (OR 3.4, 95% CI 1.5-7.6) and educational level (OR 6.2, 95% CI 1.8-20.9).[51]

2.3 Adherence

Poor adherence is reported to be the major cause of poor control in chronic conditions.[52] Many studies done on adherence report high prevalence rates of self-reported adherence, but control remains low among hypertensive patients.[53, 54, 55] Studies performed on populations which are similar to those of South Africa, show that adherence is relatively high in the black population. Staffileno et al[36] reported a high adherence (65-98%) among black American female patients, with a significant association to hypertension control.[36] Contradictory findings were reported with regard to medication adherence and blood pressure control.[54, 55] Daugherty et al[54], and Onzenoort [55] reported a lack of statistically significant association between adherence to medication and hypertension control while Ramli reported that adherence was associated with hypertension control in primary health clinics in Malaysia.[53]

In South Africa, adherence is significantly associated with control of hypertension;[52] several reasons have been reported by patients to explain their poor adherence.[52] Forgetfulness was the major cause of poor adherence to hypertension treatment.[52] Different findings were reported by Turner et al. who reported that running out of pills was the major cause of poor adherence in primary healthcare.[44]

2.4 Other factors

A study conducted in Ghana, Africa by Agyemang showed that body mass index was associated with hypertension and its control.[46] They found that hypertension odds increased with older age, family history of hypertension, higher body mass index, problematic alcohol intake, physical inactivity and urbanisation. Furthermore, Peltzer et al found that in selected South African communities, patients self-medicate with traditional herbal medicine, raising the question about interaction between traditional herbal medicine and prescribed medication, and hypertension control.[31] A legitimate question may be asked about behavioural risk factors to be blamed for the conversion from optimal blood pressure to hypertensive status in black South Africans. It was found that patients who converted to hypertension had abdominal obesity, atherosclerosis, and lifestyle. They demonstrated that these variables are predictors of cardio-vascular changes.[31]

2.5. Summary of literature review

The above literature review has shown that control of hypertension is a global problem. Patient-related factors remain a challenge in developing countries, including South Africa. Identified factors include age, gender and marital status, level of education, social status, income, and adherence.

CHAPTER 3. METHOD

3.1. Study design

This was a cross-sectional descriptive study.

3.2. Study setting

This study was conducted at the JDCHC, which is located in Vosloorus between extensions 2, 14 and 28 in the municipality of Ekurhuleni, Gauteng province in South Africa. The total population of Vosloorus is 60 436, and the township is four square kilometres in size. Ninety nine percent of the population have access to electricity, sanitation and piped water. JDCHC has one facility manager, 15 chief professional nurses, two senior professional nurses, eight professional nurses, 12 enrolled nurses, five enrolled nursing auxiliaries, three administrative clerks, one health promoter, eight general assistants, one dentist, two dental assistants, three rehabilitation staff, five lay-counsellors, one DOT supporter, one Hast CCLO, one driver, three permanent medical officers, one sessional medical officer and one family physician. The clinic belongs to the local government authority. The facility and its environs are maintained by the provincial government.

Services rendered by JDCHC include primary healthcare (adults and paediatric; oral health service; expanded programme of immunisation (EPI)); rehabilitation; a primary mental health service; prevention of mother-to-child transmission of HIV (PMTCT) and voluntary counselling and testing for HIV (VCT); choices on termination of pregnancy (CTOP); speech and hearing therapy; physiotherapy; youth-friendly services; school health services; and 24-hour emergency services. Recently, community health workers visited patients at the Health Centre for identification of poorly controlled diseases and health education.

3.3 Study population

The study population for this research included all hypertensive patients aged from 18 years and above, who had been on blood pressure medication for at least one year.

3.4. Sampling:

3.4.1. Sample size

The number of hypertensive patients attending J Dumane CHC is about 4 000**.** The minimum sample size that met the inclusion criteria to reach a statistical value was calculated using the online sample size calculator. Survey software from Creative Research Systems was used, with a confidence level of 95%, variability degree or standard deviation of 50%, and margin of error of 5%. When all these values were introduced, a sample size of about 322 files was calculated.

3.4.2. Sampling method

All hypertensive patients aged 18 years and older and being on anti-hypertensive treatment for at least one year were selected. Those having normal average blood pressure reading for the last three consultations without co morbidities were classified as well controlled. Those who had an average blood pressure reading of 140/90 and above for the last three consultations and/or with hypertension complications were classified poorly controlled. Patients were screened as they presented to the clinic until a sample of 322patients was obtained.

Patients who met the inclusion criteria received an explanation of the aim of the research and were requested by the researcher to sign consent to participate to the study.

3.5. Inclusion and exclusion criteria

3.5.1. Inclusion criteria:

-All adult hypertensive patients, receiving treatment for at least one year.

-All patients capable of giving consent, irrespective of co morbidities.

3.5.2. Exclusion criteria

- Refusal to participate to the study

3.6. Data collection

In the consulting room, a written information sheet was given to the patients by the researcher. Selected patients entered the consulting room with urine dipstick results and latest blood test results. All patients fulfilling inclusion criteria were given a 15-minute structured close-ended questionnaire by the researcher, and answers were immediately recorded. Depending on their blood pressure reading and presence of complications, patients were classified as well-controlled or poorly-controlled. Patients were interviewed by the researcher as they presented to the consulting room. A structured questionnaire was used to collect all information about patients. Information included socio-demographic background, ethnicity, level of education, smoking history, alcohol consumption, physical activity and adherence to treatment. Blood pressure was measured during the consultation and compared to the two previous readings recorded in the file. . The average blood pressure was calculated and recorded.

General examinations were performed including visual acuity, cardio-vascular and respiratory examinations and findings were captured**.** Some parameters, such as blood pressure, weight, height, renal

complications, eye complications, cardio-vascular complications and previous admissions were analysed in all patients. Controlled hypertension was defined as systolic blood pressure of less than 140mm Hg, and diastolic blood pressure of 90 mm Hg. Body mass index (BMI) was calculated using a scale available in the consulting room that allows measure of weight electronically and of height manually. Once the height is set, the scale calculates BMI automatically.

3.7. Pilot study

A pilot study, comprising a sample of six participants, was done to test if the questions in the study questionnaire would be well understood by the participants. This sample was not included in the data analysis. There were no major adjustments necessary in the study questionnaire. Minor changes were made to the numbering of questions to simplify data capturing and analysis.

3.8. Ethics

Ethical approval was obtained from the Human Research Ethics Committee (HREC) of the University of the Witwatersrand, Johannesburg. The ethics committee number was M150634.

Approval to conduct the study was obtained from the facility manager of the JDHC. Consent was requested and participants interviewed using a structured questionnaire (see appendices). Participants' information was kept strictly confidential. Data records were Access to the data was restricted to the researchers. There was no harm to or discrimination against participants in the study.

CHAPTER 4. RESULTS

In this chapter, results of the study are presented using the frequency analysis technique and exploratory visual representations of the data, namely, tables, histograms, and charts. The remainder of the chapter is Organised as follows: section 4.1 describes the socio demographics of the hypertensive patients; section 4.2 presents statistics on the prevalence of hypertension in the patients; section 4.3 gives an analysis of the hypertension control strategies; section 4.4 describes the proportion of well-controlled and poorly-controlled hypertension for each patient-related factor; and section 4.5 presents a summary of the chapter.

4.1 Socio-demographics

4.1.1 Age

Table 4.1 Proportion of hypertensive patients by age group

Age in years	Frequency	Percent	Cumulative Percent
20-30 Years	6	1.86	1.86
30-40 Years	23	7.14	9.01
40-50 Years	61	18.94	27.95
More than 50 Years	232	72.05	100.00

A large proportion of patients was represented by those aged 50 years and more (72%, n= 232) and the smaller proportion by those aged between 20 and 30 years (7%, n= 6).

4.1.2. Gender

The majority of hypertensive patients were females 58% (n=187), while males consisted of 42% (n=135) of patients.

4.1.3. Marital status

The findings of the distribution of hypertensive patients by marital status are displayed in Figure 4.1 below.

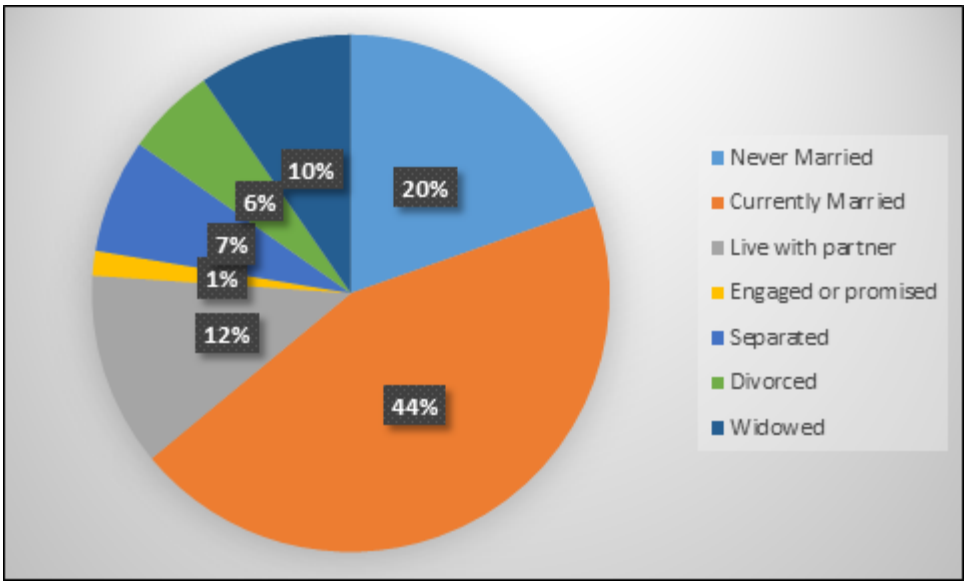


Figure 4.1 Marital statuses of hypertensive patients

The majority of patients were married (44%, n=143) and the smaller proportion were either engaged (1%, n=5) or divorced (6%, n=18).

4.1.4 Ethnicity

The majority of hypertensive patients were Zulu (34%, n= 111), and a minority were Venda (7%, n= 21)

Results are displayed in Figure 4.2 below.

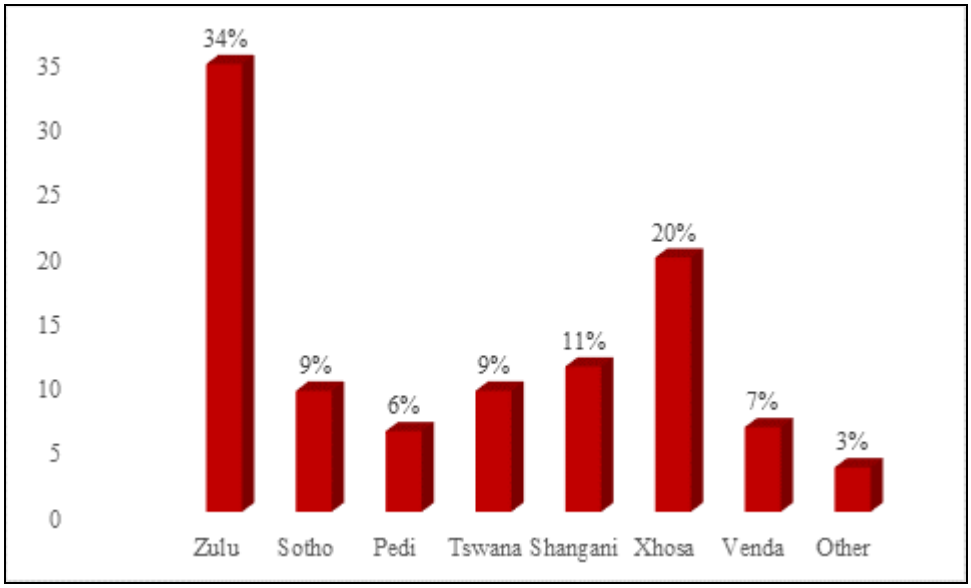


Figure 4.2 Ethnicity of hypertensive patients

The most spoken language among hypertensive patients at J Dumane was Zulu (34% n=111) and the least was Pedi (6% n=20).

4.1.5 Length of residency

Findings of the distribution of hypertensive patients by length of residency are displayed in Figure 4.3 below

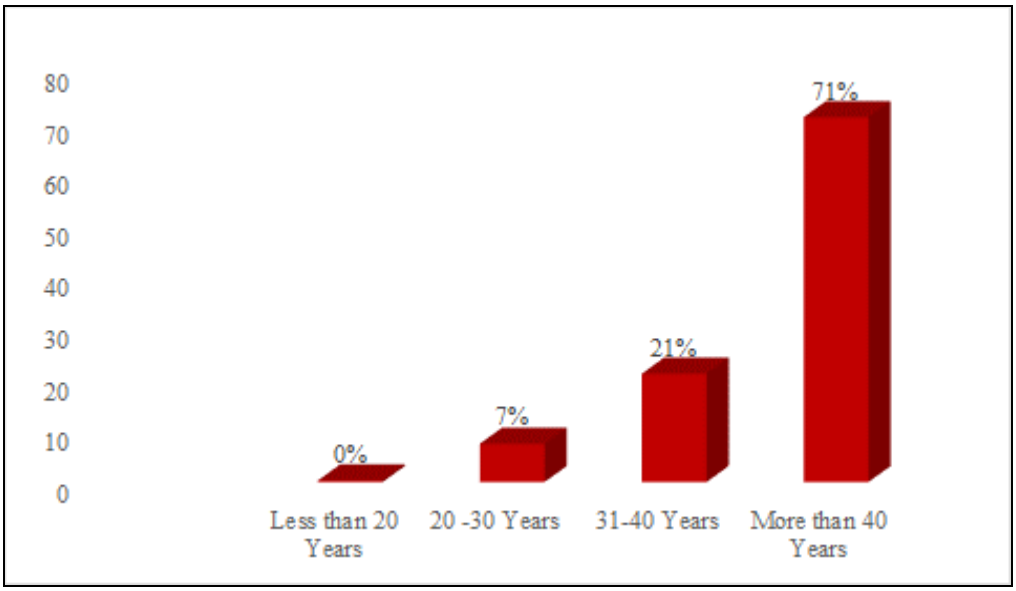


Figure 4.3 Length of residency of patients

The majority of hypertensive patients (71%, n =229) had lived in Ekurhuleni for more than 40 years, and the least (7%, n = 34) for 20 to 30 years.

4.1.6 Internal migration

Table 4.2 below shows hypertensive patients' internal migration according to their age group.

Table 4.2 Internal migrations

	Frequency	Percent	Cumulative Percent
Stay all the time	121	37.58	37.58
Go home sometimes	201	62.42	100.00

The majority of patients went home sometimes (62.42%, n=201), and the remaining 37.58(n= 121) stayed in Ekurhuleni all the time.

4.1.7. Employment status

The difference between the proportion of employed and unemployed patients was only 2%. Forty-nine percent of patients were unemployed, while 51% were employed.

4.1.8. Income distribution according to age of hypertensive patients

Table 4.3 shows the distribution of patients per age and monthly income.

Table 4.3 Income of hypertensive patients

QAQ11	Frequency	Percent	Cumulative Percent
Less than R1 000	67	20.81	20.81
R1 000 - R10 000	199	61.80	82.61
R10 000 - R100 000	56	17.39	100.00

The largest proportion of patients earning between R1 000 and R10 000 per month was found among those aged more than 40 years (47% n= 138), followed by those aged 30 to 40 years (10% n=29), then those aged less than 30 years (13% n=38). Patients earning R100 to R10 000 per month accounted for 70% of all hypertensive patients in Ekurhuleni. The majority of patients earning more than R10 000 per month were found among the age group of 40 years and more, followed by 30 to 39 years. The majority of those earning less than R10 000 per month was found among those aged between 30 and 40 years.

In summary, the largest proportion of hypertensive patients earned between R1 000 and R10 000 per month, followed by those earning more than R10 000 Rands per month, then those earning less than R10 000 per month.

4.1.9. Contribution of other people to the household

The majority of hypertensive patients (56%, n= 213) benefited from other family members' contributions to the household. The remaining 44 % did not receive any financial assistance.

4.1.10. Amount of contribution to the household

The largest proportion of patients benefiting from financial assistance received less than R1 000 per month (96% n=309). Only 8% (n=26) received between R1 000 and R5 000 per month.

4.1.11. Adherence to doctor's instructions

Distribution of hypertension by adherence to doctor's instructions is shown in Table 4.4 below.

Table 4.4 Adherence to medication

	Frequency	Percent	Cumulative Percent
Always	229	71.12	71.12
Frequently	93	28.88	100.00

The majority of patients stated that they adhered to instructions prescribed by their doctors. Though most patients adhered to their doctor's instruction, 79% (n=254) adhered to their diet regimes, 73% (n=235) adhered to their exercise regimes, and 72% (n= 232) adhered to their prescribed medication.

4.1.12 Raisons for non-adherence to lifestyles

Table 4.5 below shows the distribution of reasons why patients did not adhere to their doctor's instructions on lifestyle.

Table 4.5. Raisons for not keeping to lifestyle

QBQ7	Frequency	Percent	Cumulative Percent
I forget	204	63.35	63.35
I am not responsible enough	35	10.87	74.22
I do not believe that it will help me	1	0.31	74.53
I struggle to motivate myself	9	2.80	77.33
I do not have enough time for that	6	1.86	79.19
Other reasons	67	20.81	100.00

4.1.13 Body mass index (BMI)

Among the hypertensive patient population in the study, the majority (41%) were found to be overweight BMI 25-29 kg/m^2, of which 35% were more than 50 years, followed by 5% aged 40-50 years, and 1% aged 30-40 years. The overweight group was followed by those having normal body mass index (31%), followed by those who were obese (16%). Those with low body mass index accounted for 11% of the hypertensive population.

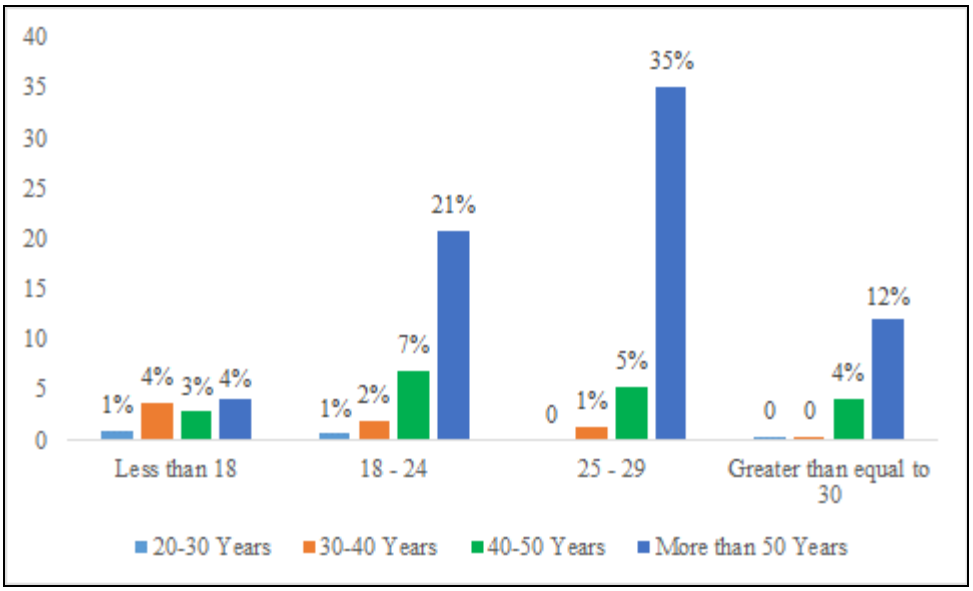


Figure 4.3 Distribution of BMI according to Age

4.1.14. Distribution of BMI of hypertensive patients according to gender

Female patients constituted the majority of all the body mass index groups. Among the 16% obese patients, 10% were female, 6% who were male; among the 41% who were overweight, females accounted for 25% and males 16%; among the 31% who had normal body mass index, females accounted for 17%, and males 14%; and among the 12% with low body mass index, females accounted for 7% and males 5%.

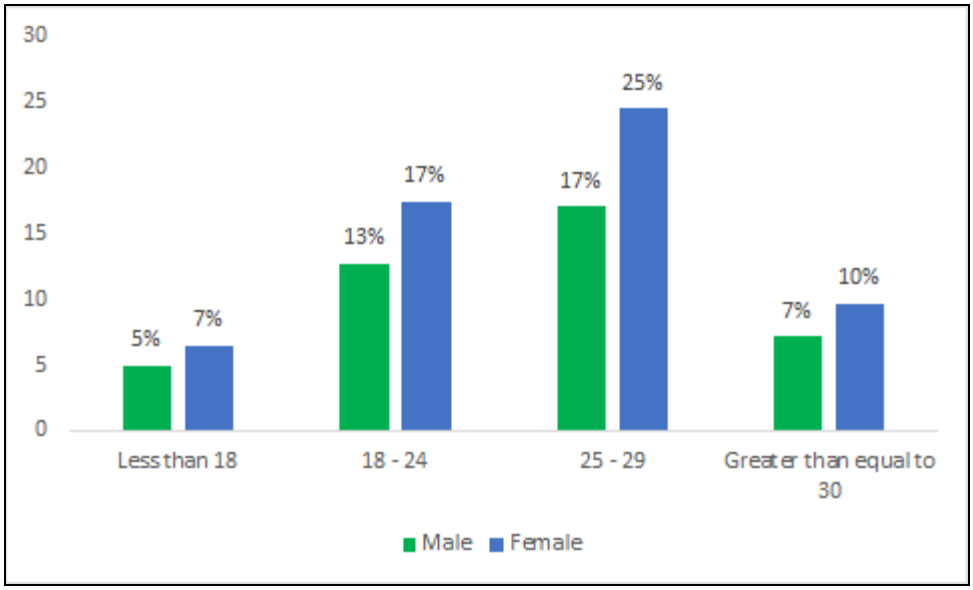


Figure 4.5 Distribution of BMI according to Gender

4.1.15. Distribution of hypertensive patients by type of complication

Among the hypertensive patients in Ekurhuleni, the majority presented with eye complications (34%), and the least had suffered a stroke (18%).

Figure 16 below shows the distribution of hypertensive patients according to their complications.

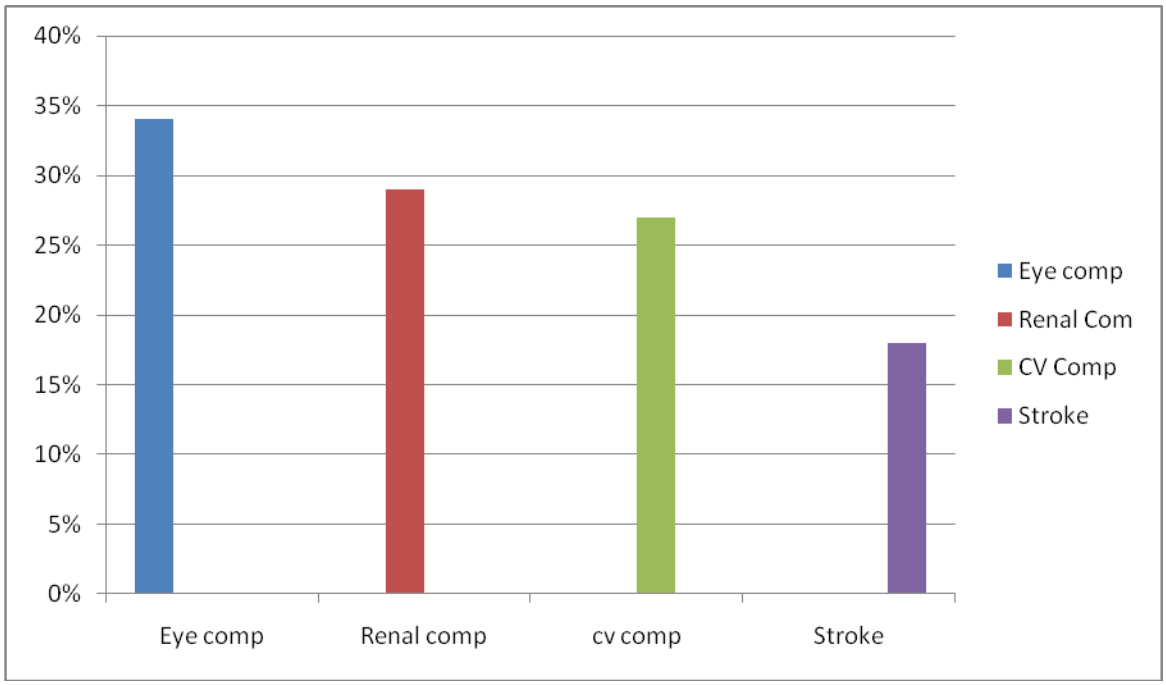


Figure 4.6 Distribution of hypertensive patients by type of complication

4.1.16 Distribution of hypertensive patients by blood pressure reading

The last three blood pressure readings of all hypertensive patients were recorded. For the first reading, 54% of patients had a systolic blood pressure greater or equal to 140 mm Hg, while the majority (57%) had a diastolic blood pressure below 90 mm Hg. For the second reading, the majority of patients had a systolic blood pressure of less than 140mm Hg, and a diastolic blood pressure less than 90 mm Hg. The third reading showed that a large proportion of patients had a systolic blood pressure of less than 140 mm Hg and 56% had a diastolic blood pressure of less than 90mm Hg.

Figure 4.6 below shows the distribution of patients according to blood pressure.

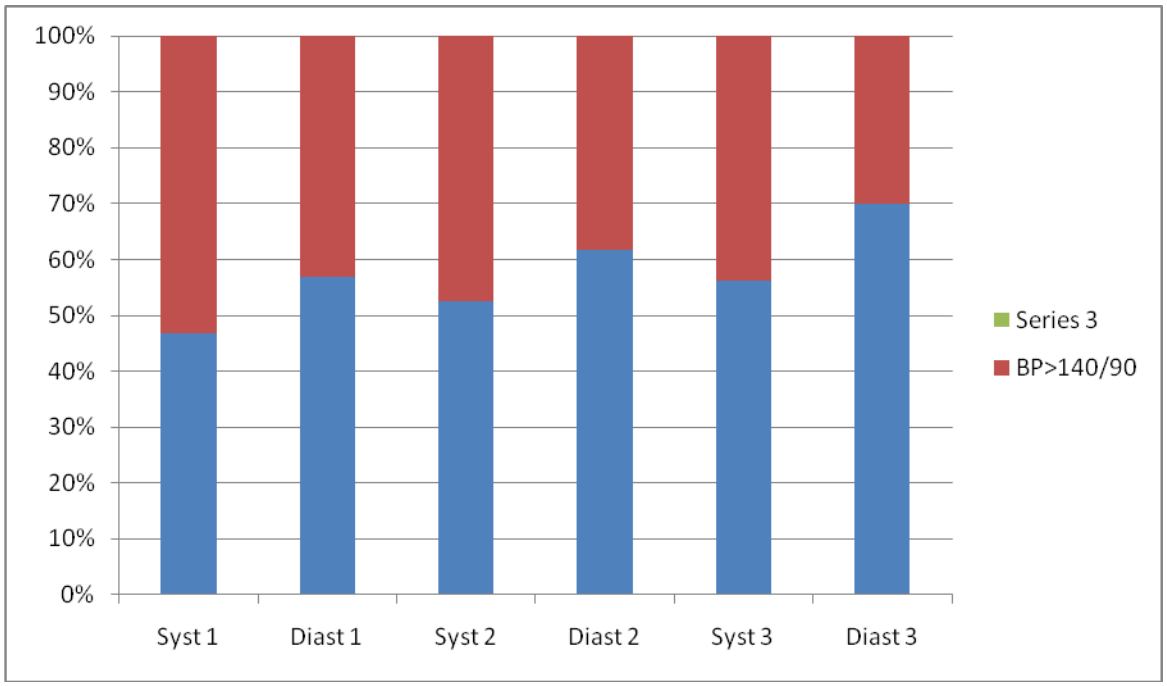


Figure 4.7 Distribution of patients by Blood Pressure

4.2. Statistics on patient-related factors and their association with control of hypertension

Demographic, socio-economic and adherence variables have been described in relation to the control of hypertension. Demographic factors analysed were age, gender, marital status, spoken language, and province of origin. Socio-economic status included education levels, income, employment status, and type of housing. Adherence included diet, physical exercise, and the way the patients practiced what their health- care providers had told them in connection with taking medication.

4.2.1 Age and control of hypertension

Table 4.6 below shows results of association between age and hypertension control.

Table 4.6 Age and control of hypertension

Age and control			
Age in years	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
20-30 Years	0.31	1.55	1.86
30-40 Years	4.04	3.11	7.14
40-50 Years	9.63	9.32	18.94
More than 50 Years	31.06	40.99	72.05
Total	145 45.03	177 54.97	322 100.00

Results in Table 4.6 show that there was no statistical significance associated with patient ages (Chi-square 4.3515, p value 0.2260)

4.2.2. Gender and control of hypertension

Table 4.7. Gender and control of hypertension

Gender and control			
Gender	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Male	19.25	22.67	41.93
Female	25.78	32.30	58.07
Total	145 45.03	177 54.97	322 100.00

Results in Table 4.7 show that there was no statistical significance associated with gender of patients and control of hypertension (Chi-square 0.0752, p value 0.7839).

4.2.3 Marital status and control of hypertension

Table 4.8 Marital status and control of hypertension

Marital status and control			
Marital Status	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Never Married	10.25	9.32	19.57
Currently Married	15.22	29.19	44.41
Live with partner	8.07	4.04	12.11
Engaged or promised	1.24	0.31	1.55
Separated	1.55	5.59	7.14
Divorced	3.42	2.17	5.59
Widowed	5.28	4.35	9.63
Total	145 45.03	177 54.97	322 100.00

Results show a statistically significant association between marital status and control of hypertension ($p = 0.0002$, Chi-square = 26.0411, degree of freedom = 6).

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4.2.4 Province of birth and control of hypertension

Table 4.9 Province of birth and control of hypertension

Place of birth and control			
Where were you born?	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Gauteng	11.18	10.25	21.43
KZN	6.21	11.80	18.01
Limpopo	5.59	7.45	13.04
North West	4.35	6.21	10.56
Western Cape	4.35	6.52	10.87
Eastern Cape	6.21	7.14	13.35
Mpumalanga	4.35	3.42	7.76
Free State	1.86	1.24	3.11
Northern Cape	0.93	0.93	1.86
Total	145 45.03	177 54.97	322 100.00

Results show no statistically significant association between patients' province of birth and hypertension control (Chi-square = 6.8898, p=0.5486, degree of freedom=8).

4.2.5. Ethnicity and control of hypertension

Results are shown in Table 4.10 below.

Table 4.10 Ethnicity and control of hypertension

First language and control			
What is your first language?	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Zulu	15.84	18.63	34.47
Sotho	5.59	3.73	9.32
Pedi	0.93	5.28	6.21
Tswana	4.04	5.28	9.32
Shangani	5.28	5.90	11.18
Xhosa	7.76	11.80	19.57
Venda	3.73	2.80	6.52
Other	1.86	1.55	3.42
Total	145 45.03	177 54.97	322 100.00

Results show that association between first spoken language and control of hypertension is not statistically significant (Chi-square 12.5197, p value 0.0847).

4.2.6 Residency in Ekurhuleni and control of hypertension

Results are displayed in Table 4.11 below.

Table 4.11 Length of residency in Ekurhuleni

Length of stay and control			
Length of stay in Ekurhuleni	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Less than 20 Years	0.00	0.31	0.31
20 -30 Years	4.66	2.80	7.45
31-40 Years	5.59	15.53	21.12
More than 40 Years	34.78	36.34	71.12
Total	145 45.03	177 54.97	322 100.00

Results show that there is a statistically significant association between the length residency in Ekurhuleni and control of hypertension. (Chi-square 14.6324, p value 0.0022)

4.2.7. Employment and control of hypertension

Table 4.12. Employment and control of hypertension

Employment and hypertension control			
Employment status	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Employed	25.16	25.78	50.93
Unemployed	19.88	29.19	49.07
Total	145 45.03	177 54.97	322 100.00

Results show that there is no statistically significant association between employment status and control of hypertension. (Chi-square 2.565, p= 0.109)

4.2.8 Level of income and control of hypertension

Table 4.13 Level of income and control of hypertension

Income and control			
Income in Rands	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Less than R1000	9.01	11.80	20.81
R1000 - R10 000	28.26	33.54	61.80
R10 000 - R100 000	7.76	9.63	17.39
Total	145 45.03	177 54.97	322 100.00

Results show that there is no statistically significant association between level of income and control of hypertension. (p=0,1252, Chi-square 0,9393).

4.2.9 Type of housing and control of hypertension

Table 4.14 shows statistical analysis of results.

Table 4.14 Type of housing and control of hypertension

Type of housing	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
I live in the streets	0.31	1.24	1.55
Hospice	4.97	3.73	8.70
RDP House	19.57	25.78	45.34
Informal Settlement	6.83	4.66	11.49
Flat	1.55	0.93	2.48
Townhouse	11.80	18.63	30.43
Total	145 45.03	177 54.97	322 100.00

Results show that association between type of housing and control of hypertension is not statistically significant (Chi-square=8, 7809, p= 0, 1181).

4.2.10. Association between adherence to medication and control of hypertension

Table 4.15 shows results of adherence to medication and control of hypertension.

Table 4.15 Adherence to medication and control of hypertension

Adherence to medication and control			
Adherence to medication	**QDQ1(Control)**		
Percent	**Not Controlled**	**Controlled**	**Total**
Always	28.57	42.55	71.12
Frequently	16.46	12.42	28.88
Total	145 45.03	177 54.97	322 100.00

Results show that the association between adherence to treatment (taking medication regularly) and control of hypertension is statistically significant (Chi-square 7.5545; p=0.0060)

4.2.11 Adherence to diet and control of hypertension

Table 4.16 shows the results of adherence to diet and control of hypertension

Table 4.16 Adherence to diet and control of hypertension

Adherence to diet and control			
Diet	**Control**		
Percent	**Not Controlled**	**Controlled**	**Total**
Yes	34.78	44.10	78.88
No	10.25	10.87	21.12
Total	145 45.03	177 54.97	322 100.00

Results show that the association between adherence to diet and control of hypertension was not statistically significant (Chi-square 0.4262; p value 0.5139).

4.2.12 Adherence to physical exercise and control of hypertension.

Table 4.17 shows the results of adherence to physical exercise and control of hypertension.

Table 4.17 Adherence to exercises and control of hypertension

Physical exercises and control			
Exercises	**QDQ1(Control)**		
Percent	**Not Controlled**	**Controlled**	**Total**
Yes	29.19	43.79	72.98
No	15.84	11.18	27.02
Total	145 45.03	177 54.97	322 100.00

Results show that there is a statistically significant association between adherence to physical exercise and control of hypertension. (Chi-square 8.8939; p value 0,029).

4.3. Summary of study results

Main findings from the study are as follows: a large proportion of patients was represented by those aged 50 years and more (72%, n= 232), and the lowest proportion by those aged between 20 and 30 years (7%, n= 6). The majority of hypertensive patients were females 58% (n=187), while male patients consisted of 42% (n=135). The majority of patients were married (44%, n=143) and the minority were engaged (1%, n=5) or divorced (6%, n=18). Results showed a statistically significant association between the following variables and control of hypertension: marital status, length of residency in Ekurhuleni (Chi-square 14.6324, p value 0.022); adherence to treatment (Chi-square 7.5545; p=0.0060); adherence to physical exercise (Chi-square 8.8939; p value= 0.0029). Findings are discussed in the following chapter.

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CHAPTER 5. DISCUSSION

This chapter examines the key findings in Chapter four. The findings of study were analysed and compared to those of other studies in South Africa and elsewhere. In this section, the following sub-sections are discussed: rate of hypertension control, socio-demographic characters and economic factors associated with control of hypertension; and lastly, adherence and control of hypertension.

5.1. Rate of controlled hypertension.

In the United States, one in three people above 20 years of age is hypertensive; of these, 54% have been on controlled medication since 2015.[18] In global contemporary history, South Africa has the highest reported rates of high blood pressure among people aged 50 and over.[31] Among these hypertensive patients, less than one person in ten has their blood pressure controlled.[31] This study's results are in line with those of a local study in which Day et al. found that in 2010, over 40% of people aged 25 years and above were hypertensive. Only 12.9% were controlled.[37] The results of this study are opposite to those of Kearney and Peltzer, as a much higher control rate was found. Among the 322 patients selected as the study sample at J Dumane Community Health Centre, 72.05% were aged 50 years and over, and the majority were controlled.

The definition of hypertension used in this study is the same used in the above-mentioned studies. The differing results are most likely due to the study setting. International studies have considered the entire South African population, including populations living in urban and rural areas. Results of those studies are based on average population. The fact that a large majority of South Africans live in rural areas contribute to high incidence reported in some studies. The justification is that several factors contribute to high rate and poor control of hypertension in rural areas. Cultural influences and perceptions of disease constitute a significant barrier to adherence. Furthermore, poor access to clinics is among factors contributing a barrier to treatment adherence. The influence of traditional medicine on the rural population also decreases adherence to treatment. Poverty is a major issue in South Africa's rural areas. People are unable to afford healthy food, thus adherence to diet is a problem. Similar reasons have been reported in the literature.[53, 54]

All these problems are encountered in the City of Ekurhuleni, but to a lesser extent. The Jabulani Dumane is located in Vosloorus, a semi-urban area within the municipality of Ekurhuleni. Ninety-two percent of the study sample had been living in Ekurhuleni for more than 20 years and hence had acquired some urban influence. Access to clinics in the municipality has been improved. Poverty and housing, including access to water and electricity have improved; half of the population is employed, increasing income levels and improving lifestyle; close to half the population live in RDP houses with water and electricity. All these factors contribute to improved lifestyle and hence better control of hypertension. All these factors have contributed to the improvement of hypertension control rate in

Ekurhuleni. All the raisons enumerated in this section aimed to provide explanation about the difference between hypertension rate in South Africa and the relatively low rate found in Ekurhuleni.

5.2. Socio-demographic characters and economic factors associated with control of hypertension

This study aimed to establish a relationship between the socio-demographic features of patients and control of hypertension. This section analyses each socio-demographic characteristic, economic feature and adherence variable, and their effect on control of hypertension.

5.2.1 Age and control of hypertension

Many studies conducted across the world have reported an association between age, hypertension and its control.[33,33,34] The ages of hypertensive patients included in this research project ranged from 18 years and above, but it was reported that the majority of patients were aged 50 and above (Figure 4.1) as only a few patients aged from 20 to 30 years were hypertensive. The study reported no statistically significant association between age and hypertension control (Chi-square = 4.3510, degree of freedom = 3, p= 0.2260).

Despite the lack of statistically significant association, findings of the study show that hypertension control increased roughly with age group. Among those aged 50 years and above, half had their blood pressure under control and only a minority was poorly controlled. The smallest proportion was made up of people aged 20 to 30 years, and a large majority of them were well controlled. Different conclusions were drawn in studies conducted in the USA and in Germany by Gillespie,[7] showing that hypertension control was significantly associated with patient's age.[7] Despite numerous young patients becoming hypertensive, control remains higher among older patients.[32]

Focusing on the largest group of hypertensive patients (50 years and above), findings showed a large proportion of controlled patients among the elderly. This was in line with results of the above-mentioned studies. The unemployment, poverty and relatively low levels of education reported in the age group 40 to 50 years contributed to poor control of hypertension. Poor control was also found in the group aged 30 to 40 years, with similar findings reported in the literature.[7, 32] Lastly, the group of 20-30 years had 17% of poor control and 83 % of control. These young patients were worried about their future, had better education levels, a better understanding of their health, and they tended to adhere to treatment. However, further studies on this young group need to be done to confirm these findings.

5.2.2 Gender and control of hypertension.

The majority of hypertensive patients at J Dumane CHC are female (58%), while male patients account for 42%. This is in line with the results of Peltzer et al. who found that in South Africa, most

of the hypertensive population is made up of females.[32] Results in this study showed that there is no statistically significant association between gender of patients and control of hypertension. (Chi-square 0.0752, p value 0.7839, degree of freedom = 1). It was found that in both the male and female groups, most patients are controlled. When comparing female to male African patients, a systematic review found that women have better control than men.[81]

Study results showed that gender does not influence control of hypertension, and this means that if a difference should be found between males and females; it would probably be due to other reasons. The difference between the study findings and the above-mentioned studies may be due to the fact that the latter considered several African countries in both rural and urban areas. Considering that a large majority of African women live in rural areas and their attendance at clinics is for several reasons such as maternity, thus more females than males are diagnosed. Another probable reason is the fact that African men consider having a disease as a weakness, hence they do not like going to clinics and are less adherent to treatment.

The setting of this study was in a semi-urban area, where the influence of occidental culture causes men and women to consider each other as equals and that the majority are employed. Both attend clinics for check-ups and consultations where they are examined by occupational therapists and referred to clinics irrespective of gender, with an obligation to bring back a report from the clinic. All these factors contribute to better hypertension control, regardless of patient gender.

5.2.3. Marital status and control of hypertension.

Several studies on marital status and hypertension control have been conducted worldwide, and have reported different findings.[39, 40] Causland et al. reported a statistically significant association between marital status and hypertension control.[34] These findings are in line with those of this study, which shows no statistically significant difference between marital status and hypertension control (chi-square = 26.0411, p = 0.002, degree of freedom = 6).

Most of the hypertensive patients at J Dumane are currently married. This can be explained by the fact that the majority are aged 50 years and above. Among those married, 66% had their blood pressure well controlled and 34% were poorly controlled. Those who were not married had their blood pressure poorly controlled. Supiyev et al. conducted a study in Kwazulu-Natal and found that there was no statistically significant association between marital status and control of hypertension.[40] Similarities between the later Supiyev study and this study could be due to the fact that the two studies were conducted in similar settings.

The study research showed that divorced patients had 39% of control and 61% had poor control, while widowed patients had 45 % of control against 55% of poor control. Among those who had never been married, 48% had their blood pressure under control, and 52% had poor control. Among patients who

were separated, most had their blood pressure well controlled, while only few were poorly controlled. This particularity among separated patients may be understood in the sense that this group had lived in a dysfunctional relationship. Separation may have been perceived as a relief for them, hence the better control of hypertension. Results on the marital status of patients suggested once more that control of hypertension does not depend only on one variable. Findings of this study were in line with those of several studies showing that despite differences in findings on control among married couples, prevalence of hypertension is higher among unmarried and single people, but the control rate is higher among married patients.[34, 39, 40]

5.2.4 Income of hypertensive patients

It has been shown in various studies that low income and poor socio-economic conditions are associated with poor control of hypertension.[20,21,48] Income is directly dependant on employment status, and employment status is shown to impact on hypertension control.[20] Data regarding levels of control of hypertension in South Africa is alarming. It has been documented that only less than 10 % in poor communities have their blood pressure under control.[10] This is in line with some studies which demonstrate that adherence is better among people with high incomes.[48]

The economic context of hypertensive patients is an important aspect to consider because it has a huge indirect influence on adherence to diet. It also has an influence on levels of emotional stress, which increase on the release of catecholamine hormones. These hormones cause vasoconstriction, and hence elevate blood pressure.[9] Hypertension prevalence is reported in low-income populations.[21] A South African study conducted in Limpopo by Ntuli et al. found that 90% of hypertensive patients are unemployed, and employees with low incomes have a high rate of hypertension.[20] Another South African study conducted among patients with poorly controlled hypertension showed that unemployment and low income are positively associated with poor control of hypertension.[37]

One of the stressors for patients is the financial burden caused by numerous family members who are financially dependent on hypertensive patients. Despite the paucity of studies on financial burden of hypertensive patients, the researcher found that this could be a real stressor for some patients. When a hypertensive patient is the breadwinner of the family, the economic burden depends on the number of dependents. However, results in this study show that association between number of dependents and control of hypertension is not statistically significant. (Chi-square 5.6517, p value 0.0593). These findings may be because the majority of patients are aged above fifty and have adult children who do not financially depend on their parents.

Most of patients aged sixty and above receive old age grants from the government. This money somewhat alleviates their financial burden. It also allows for them to pay transport to the clinic. Many patients receive money from their children and relatives either directly, or by sharing household

expenditures. This contribution is estimated to be R1 000 or less for most of the patients. Results in this study show that there is no statistically significant association between the amount of other people contributing to household and the control of hypertension. (Chi-square = 1.0780, p = 0.2992). This lack of association may be caused by the relatively small amount of contributions to households by other people. Results of this study remain in line with other similar studies[30, 35, 36] reporting that low income impairs control of hypertension.[37]

Most of the employed patients had an income between R1 000 and R10 000 because they had small (labour) jobs. Those who were unemployed received social grants and contributions to their households, which increased their income to almost the same level as those who were employed as labourers. Results of this study are in line with these observations, as they show that there is no statistically significant association between employment status and control of hypertension. (Chi-square 2.565, p = 0.109, degree of freedom = 2). Social and disability grants are received by patients aged 60 and above. Some patients totally depend on these grants, while others have more than one source of income. Despite all these differences in income, results show that association between the type of grant received and control of hypertension is not statistically significant (Chi-square = 0.1252, p = 0.9393, degree of freedom = 2), but further studies are needed to support these findings.

5.2.5 Housing and control of hypertension

In most cases, type of housing reflected the economic situation of patients. Patients living in informal settlements have poor economic situations, while those living in houses and townhouses have a relatively good economic situation. The majority of the study population live in town houses, and only a small proportion live in informal settlements. This may be because there are more RDP houses than shelters in Vosloorus. Results in this study show that association between type of housing and control of hypertension is not statistically significant (Chi-square = 8.7809, p = 0.1181, degree of freedom = 5). A large majority of patients live in the same type of houses (RDP), making it difficult to establish the impact of housing on hypertension control. Lack of marked disparity in housing within the study population may be the reason why a significant association could not be found between housing and control of hypertension. Despite the lack of significant association, the researcher noted that improvement in type of housing in Vosloorus was observed along with a relatively good rate of hypertension control.

5.2.6 Ethnicity and racial groups

Different ethnic groups have different dietary habits and hypertension prevalence.[33]Swanepoel et al. collected data from two cross-sectional studies and one ten-year prospective study in 2015. It was found that hypertension was higher among black populations.[19] Ethnicity can be assessed through province of origin, as each province has a specific spoken language. A South African study found that

there is a wide variation in hypertension prevalence across provinces.[30] The North West, Free State, and the Northern Cape had high prevalence of hypertension, while Limpopo was found to have the lowest prevalence of hypertension.[30] Findings of these South African studies are descriptive, and do not assess association between ethnicity, race and hypertension control. However, association was assessed in a study conducted in the USA,[44] where results showed no association between ethnic origin, race and hypertension control.[51]

This study reported similar findings in South Africa (Chi-square = 12.5197, p = 0.0847, degree of freedom = 7). Despite a lack of statistically significant association, Seedat et al. conducted an inter-racial study on hypertension prevalence in Durban. They described Africans (Zulus) as having the highest prevalence (25%), followed by whites (22.8%), and Indians (19%).[8] Lack of association between ethnicity/race and control of hypertension may be attributed to the similarity of socio-cultural characteristics among people living in urban and semi-urban settings.

5.2.7 Urban versus rural environment and control of hypertension

Acting on some environmental factors has been shown to improve blood pressure control. This is confirmed by Agyemang, who conducted a study on rural and urban differences in blood pressure and hypertension in Ghana, West Africa. He found that implementation of cost-effective measures such as normalising body weight, promotion of physical activity in urban areas, reduction of smoking among rural men, and reduction of salt intake may have a positive effect on hypertension control in Sub-Saharan countries.[46] Studies conducted in Africa found the same results. Ogha et al. conducted a study on blood pressure, hypertension and correlates in urbanised workers in Nigeria.[5] They found that elevated blood pressure is correlated to income and education in men, adverse living and working conditions, having numerous children, smoking, alcohol consumption, anxiety and lack of recreation.[5]

The above findings are in line with those of Seedat et al. who conducted a study on hypertension in developing nations in Sub-Saharan Africa. They found that social, economic, and cultural factors impair control of hypertension in developing countries.[8] In this study, the environment in which patients spent most of their time was assessed by asking about the length of their residency in Ekurhuleni. As in the above studies, a statistically significant association was found between duration of residency in Ekurhuleni and hypertension control (Chi-square 14.6324, p = 0.0022, degree of freedom =3). As mentioned earlier, urban living conditions offer a better environment for hypertension control.

5.3 Adherence and control of hypertension

It is known that the major cause of poor control in chronic conditions is poor adherence.[54] Although most patients in the study adhered to their doctor's medication instructions and to recommended diet and exercise regimes, the few who admitted to not being adherent to the prescribed lifestyle

(including diet), gave several reasons for their non-adherence. It must be remembered that answers given by patients are subjective, with the possibility of being given to please the examiner. The researcher believes that in reality, the number of patients who claimed adherence may be smaller than shown. If adherence were as high as indicated, the control of hypertension would also be high. This latter statement is in line with the findings of Adebolu who found that a high self-reported rate of adherence did not necessarily translate to effective blood pressure control.[48]

Adherence to physical exercise is assessed by the time patients spend walking or performing physical exercises. Most of the patients have to walk before getting to a taxi or a bus. They also walk from a taxi or bus station to work, which obliges physical exercise. Besides walking, some patients volunteer or physical exercise. These two reasons may explain the high number of patients being adherent to physical exercise. Results in this study show that there is a statistically significant association between adherence to physical exercise and control of hypertension. (Chi-square = 8.8939, p = 0, 0029). Similar findings were reported by Staffileno et al.[36] who reported a high adherence (65-98%) to physical exercise among black American female patients, and a significant association to hypertension control.[68] Physical exercise does not directly decrease blood pressure, but it prevents complications. The association probably comes from the fact that patients who make time to perform physical exercise are more likely to take their medication.

Results of this study show that association between adherence to treatment (taking medication regularly) and control of hypertension is statistically significant (Chi-square = 7.5545; p=0.0060). Adherence to treatment is verified by doing a drug count. If fewer side effects are experienced by patients taking anti-hypertensive treatment, adherence is improved. Contradictory findings are reported with regard to medication adherence and blood pressure control.[51] Daugherty et al. reported a lack of statistically significant association between adherence to medication and hypertension control.[54] Onzenoort reported similar findings,[55] while Ramli reported that in Malaysian primary health clinics, adherence was associated with hypertension control.[53] This was corroborated by Duncan who found that in Kwazulu-Natal, South Africa, adherence is significantly associated with control of hypertension.[4]

Patients cited several reasons for not taking their medication. It is established that whatever reasons patients may give for not taking their medication, their blood pressure will be poorly controlled. The most common reason given was forgetfulness (63%), followed by unrevealed reasons (21%), patients admitting lack of responsibility (11%), and those who struggle to motivate themselves (3%). Those who said they did not have enough time to exercise and take medicine accounted for 2%. Results of this study are similar to those of Okwuonu in Nigeria,[47] who reported that forgetfulness was the major cause of poor adherence to hypertension treatment.[47] Different findings were reported by Turner et al. who reported that running out of pills was the major cause of poor adherence in primary healthcare.[44]

Forgetfulness may be explained by the fact that half of this study's patients are employed. They wake up early to go to work and come home late and tired. Their social obligations usually overwhelm them, causing them to forget to take their medication.

CHAPTER 6. CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

Findings of this study show that at JDCHC, patients aged 50 years and above constitute a majority of hypertensive patients, of which the majority have their blood pressure under control. Most patients stated that they adhere to their doctor's instructions, the largest proportion adhere to their prescribed diet, followed by those who adhere to exercise regimes, then those who are adherent to their medication. In this study, a statistically significant association between adherence to physical exercise and control of hypertension was found. Association between adherence to treatment (taking medication regularly) and control of hypertension is statistically significant. These results must encourage healthcare providers to emphasise adherence to medication and physical exercise. Results show that the association between adherence to diet and control of hypertension was not statistically significant. As stated earlier, this lack of association is due to the indirect action of physical exercise in hypertension.

Economic factors did not show an association with control of hypertension. Results in the study show that there is no statistically significant association between level of income and control of hypertension; and that there is no statistically significant association between other people's financial contributions to households and control of hypertension. Association between number of dependents and control of hypertension is not statistically significant. Demographic factors such as age, gender, province of origin and language profile were not found to be associated with control of hypertension. Therefore, the efforts of healthcare providers must be directed towards adherence to medication and lifestyle.

6.2. Potential Strengths of the study

-One of strengths of this study is that variables analysed were patient-related, and their impact on hypertension control was studied.

-This research was done in the context of family medicine, and most of variables analysed were subjective.

-Selection of patients was done randomly, which decreased the possibility of sampling bias.

-Patients were from all South African provinces and all social classes, and spoke the language of their province. This diversity minimised selection bias.

6.3. Limitations of the study

-The major limitation of this study is the subjective aspect of some variables under analysis. Some aspects of adherence such as physical exercises and diet are difficult to verify.

-Data was collected by direct interview, which could influence patients' answers to please researchers.

-Language barriers excluded some patients from the study, although 60% to 80% of patients in the community are able to read and write English.

-The subjectivity of some psychosocial parameters may compromise the findings.

6.4. Recommendations

1. Healthcare workers need to encourage patients to adhere to a healthy lifestyle and all other factors which are reported to be significantly associated with hypertension control in our study.

2. Healthcare workers need to promote hypertension clubs where patients can exchange their experiences regarding hypertension.

3. District and healthcare facilities need to print pamphlets and use local newspapers and the media to promote healthy lifestyle in the general population.

4. Lessons on healthy lifestyle starting in primary school are recommended, to make children aware of the risks of unhealthy lifestyles.

7. APPENDICES

Appendix 1: Questionnaire sheet

1. Socio-demographic characteristics

1. How old are you, in years?	
2. Sex (indicate with a X)	Male Female
3. What is your marital status? (Indicate with a X)	Never married or single Currently married Live with my partner Engaged or promised Separated Divorced Widowed
4. Where were you born?	
5. What is your first language?	
6. For how long have you been living in Ekurhuleni? State the number of years or months.	Years Months
7. Do you stay in Ekurhuleni the entire time or do you go home some times?	Stay all the time Go home sometimes
8. How far did you go in school? (Mark with a X)	I did not attend school Primary school (Grade 1-7) Secondary school (Grade 8-12) College diploma University degree
9. What work do you do?	
10. I receive the following grant(s). – You can mark more than one if it applies.	Old age grant Disability grant Child grant Caregiver grant

	Forester care grant Other, please specify
11. What is your income in Rands	Per week Per month Per year (Researcher will translate into per day.)
12. What type of housing do you live in? (Mark with X)	I live in the streets Reconstruction and development programme (RDP) house Informal settlement or squatter camp Hostel Flat Townhouse Other type of housing (specify):
13. How many people are financially dependent on you?	Children (up to 13 years) Children (>13-18 years) Adults
14. Does anyone else contribute to the household?	Yes No
15. What is the amount of their contribution?	Per week: Per month: Per year:

2. Adherence questions

16. Do you regularly take your medication as prescribed? (Mark with X)	Always Frequently Only when I experience symptoms of hypertension Never
17. What do you do to solve the problem?	
18. If you don't take your medication regularly as prescribed, what is the most important reason for that? (Mark with X)	I forget I am not responsible enough I will not believe that it will help me I experience too many side effects I cannot afford to get the medication Any other reason (mention them)
19. Do you do what the doctor told you to with regard to:	Always Frequently Only when I experience symptoms of hypertension
a) Taking tablets	
b) Dieting	
C) Exercising	
20. What do you do to help with the lifestyle changes that are recommended above?	
21. If lifestyle changes were recommended to you but you do not manage to keep to them, what is the most important reason for that?	I forget I am not responsible enough I do not believe that it will help me I struggle to motivate myself I do not have enough time for that Any other reasons (mention them)

Appendix 2: **Participants Information Sheet**

Dear Sir/ Madam

I am Dr Mahamba Nyanga, a fourth-year registrar in family medicine at the University of the Witwatersrand, and am allocated to the Ekurhuleni Health District. I am conducting a research on "Patient-related factors associated with control of hypertension at Jabulani Dumane CHC".

This study is being conducted because of the high number of patients presenting with poorly controlled hypertension at J Dumane Community Health Centre.

This project is aimed at improving the care offered to poorly controlled hypertensive patients attending J Dumane CHC, by identifying patient-related modifiable factors. Current practices will be evaluated using the medical records containing your personal details. **Questions will be asked to you directly by using a questionnaire sheet. This will take approximately 15 minutes, in the consulting room. A clinical examination including eye sight, a cardio-vascular and respiratory examination, blood pressure, weight, and height will be performed on you, and the findings will be captured.**

Demographic information such as your age and gender will be extracted from your file; your kidney function and cholesterol levels will also be taken directly from your file and captured, but you may be requested to complete them verbally. You will be asked about reasons why you may find it difficult to adhere to lifestyle and treatment. **All data captured will be analysed with the help of a statistician; relationship with control of hypertension will be verified.**

Results of the study may be published but you will not be mentioned by name anywhere in the study.

Possible problems identified in this observation will be addressed, changes decided, and implemented.

The review of your medical records (files) will not expose you to any prejudice or harm; it will be done with your permission and on a voluntary basis. The findings and possible recommendations of the study will be reported to the staff working at J Dumane CHC and the Ekurhuleni district authorities in order to improve care of the poorly controlled hypertensive patients attending J Dumane CHC. In this study, confidentiality of your personal details will be strictly observed and protected.

This study has been approved by the Human Research Ethics Committee of the University of the Witwatersrand: Professor Cleaton-Jones, chairperson, (tel. 011 717 2301). Secretariat: Zanele Ndlovu and Langutani Masingi, (tel. 011 717 1252/1234). Zanele.ndlovu2wits.ac.za or Langutani.masingi@wits.ac.za

Appendix 3: Consent Form

JABULANI DUMANE COMMUNITY HEALTH CENTRE

Consent form: Use of clinical information

This document must be explained to the patient/family member/guardians by a member of the clinical staff and copy of the signed document is to be given to the patient.

Dear Patient,

You are currently attending J Dumane CHC for treatment of hypertension. This clinic not only renders treatment, but is also actively involved in conducting research aimed at improving the quality of care we deliver. From time to time, such research involves the use of patient information for research purposes. The use of such information is subject to:

Approval from the Human Research Ethics Committee (University of Witwatersrand).

Approval from the district research committee.

Anonymity i.e. the identity of the patient from whose file information is extracted is never revealed to anyone but the researcher, unless specific consent is obtained to do so.

The researcher would like to obtain your consent to use information that you will provide by answering a questionnaire, validated for the purpose of this project, titled "Patient-related factors associated with control of hypertension at Jabulani Dumane CHC", and subject to the aforementioned conditions.

HREC protocol approval number----------

I hereby confirm that I have been informed about the above research.

I have understood the nature, the benefits and risk related to this research as explained to me by the study doctor and as stated in the above participant's information.

I am aware that the reasons for this research, which includes personal details regarding my age, sex and other medical conditions, and that they will be dealt with in an anonymous way in this research.

If required, I agree that the data collected during this study may be processed in a computerised system by the study doctor.

All my concerns and questions having being fully addressed by the study doctor, I offer my consent to participate in this study.

If I choose not to give consent, this will not compromise my treatment in any way. I can choose to withdraw my consent at any time and I am free to do so without being prejudiced in any way.

I,---------- hereby give/do not give consent for my information to be used as per the above-mentioned condition for the purpose of the research.

Patient---------- Date---------- Signature.....

Witness---------- Date..... Signature.....

Witness..... Date..... Signature.....

(Should you wish to contact the researcher at any stage regarding this consent, contact the J Dumane CHC on 011 863 7797.)

Appendix 4: Consent form to answer the questionnaire

I have been explained in detail the aims and objectives of the research project on patient-related factors associated with control of hypertension at Jabulani Dumane Community Health Centre. I have read the information sheet / the information sheet has been read to me, and I have understood it and freely agree to answer the questionnaire and provide the required personal information.

Name..... Signature.....

Date.....

Appendix 5: Data collection sheet Code

Date: ...../...../..... 1= Yes 2=No

Patient Number							
Weight							
Height							
BMI							
Renal complication							
Eye complication							
Stroke							
CV Complication							
Admissions							
BP systolic 1							
BP diastolic 1							
BP systolic 2							
BP diastolic 2							
BP systolic 3							
BP diastolic 3							

Appendix 6: Clearance certificate

R14/49 Dr Mahamba Nyanga

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M150634

NAME: (Principal Investigator)	Dr Mahamba Nyanga
DEPARTMENT:	Family Medicine Jabulani Dumane Community Health Centre
PROJECT TITLE:	Patient-Related factors Associated with Control of Hypertension at Jabulani Dumane Community Health Centre, Ekurhuleni District, Gauteng Province
DATE CONSIDERED:	26/06/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr John Musonda
APPROVED BY:	Professor A Woodiwiss, Co-Chairperson, HREC (Medical)
DATE OF APPROVAL:	12/08/2015

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**.

Principal Investigator Signature

Date 30/08/2015

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix 7: Plagiarism report certificate

1/18/2017 SafeAssign Originality Report
https://safeassign.blackboard.com/B2Http/originalityReport?paperId=149371827 1/50
ROOT NICO
BAIRD
Nico Baird on Wed, Jan 18 2017, 7:53 AM
9% match
Submission ID: 128731209
Citations (13/13)
Select Sources & Resubmit Cancel Resubmit
Uncheck
any citation sources you want SafeAssign to ignore during reprocessing
PATIENT-RELATED
FACTORS ASSOCIATED WITH CONTROL OF HYPERTENSION
AT JABULANI DUMANE COMMUNITY HEALTH CENTRE, GAUTENG

PROVINCE

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