FACTORS AFFECTING COMPLIANCE WITH ANTI-HYPERTENSIVE DRUG TREATMENT AND REQUIRED LIFESTYLE MODIFICATIONS AMONG HYPERTENSIVE PATIENTS ON PRASLIN ISLAND

by

THOMAS AKPAN EDO

Submitted in part fulfilment of the requirements for the degree of

MASTER OF PUBLIC HEALTH

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF. L. DE VILLIERS

DECLARATION

I declare that ***Factors affecting compliance with anti-hypertensive drug treatment and required lifestyle modifications among hypertensive patients on Praslin Island*** is my own work and that all the sources that I have used have been indicated and acknowledged by means of complete references and that this work has not been submitted for any other degree at any other institution.

EDO TA **30. 6. 2009**

ACKNOWLEDGEMENTS

I want to thank the following persons for their respective contributions to this dissertation:

- My beloved wife, Phillipa, for her patience, unflinching love, support and encouragement.
- My two children, Uduak and Joshua, for standing by me despite my long absence.
- I am eternally grateful to my supervisor, Prof L De Villiers, for her guidance and for all she taught me during the course of this project.
- A special thank you to my brother Dr Ndarake Edo who without his help I would not be where I am today, and to other members of my family.
- Mrs Stephanie Monnaie, Mrs Dodin and Mrs Carol Gill for their assistance with data collection and interpretation.
- The statistician Mr Hennie Gerber for analysing the data.
- Mrs Adah for editing the manuscript.
- The Ministry of Health and Social Development, Seychelles for permission to conduct the research.
- Above all, I thank the Almighty God, the architect of my life who has made this to happen. To Him belongs all the glory forever. Amen.

ABSTRACT

FACTORS AFFECTING COMPLIANCE WITH ANTI-HYPERTENSIVE DRUG TREATMENT AND REQUIRED LIFESTYLE MODIFICATIONS AMONG HYPERTENSIVE PATIENTS ON PRASLIN ISLAND

Student: **Edo, Thomas Akpan**
Degree: **Master of Public Health**
Department: **Health Studies, University of South Africa**
Supervisor: **Prof. L De Villiers**

Various studies on compliance with anti-hypertensive medications and appropriate lifestyle modifications have been conducted worldwide but studies specific to the Island of Praslin are lacking. The purpose of this quantitative, descriptive-correlational study was to describe factors that affected compliance with hypertension medications and lifestyle modification strategies in a sample of 102 hypertensive persons. The comprehensive version of the Health Belief Model served as the conceptual framework directing the study. The researcher investigated whether there were any significant relationships between compliance and the Health Belief Model variables. Data was collected by means of structured interviews and document analysis, involving an interview schedule and a checklist. All respondents were diagnosed hypertension patients registered at either of the two public health centres on the Island of Praslin. Individual perception of the benefits and risks of hypertension treatment as well as cues to action were found to be significant determinants of compliance behaviour. The study highlighted the need for improved health education and follow-up measures to strengthen patients' perceptions about the benefits of treatment and compliance.

KEY TERMS

Adherence; Compliance; Hypertension; Health Belief Model; Lifestyle modification; Drug treatment; Quantitative descriptive-correlational research; Perception.

TABLE OF CONTENTS

CHAPTER 1
ORIENTATION TO THE STUDY

CHAPTER 2
LITERATURE REVIEW

CHAPTER 3
RESEARCH DESIGN AND METHOD

CHAPTER 4

PRESENTATION OF RESEARCH FINDINGS

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURES

LIST OF ABBREVIATIONS

BNF	British National Formulary
CHSR	Center for Health Services Research.
CMSA	Case Management Society of America
HBM	Health Belief Model
JNC	Joint National Committee on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure
MISD	Management and Information System Division
OECD	Organization for Economic Cooperation and Development
RCN	Royal College of Nursing
SD	Standard deviation
UNDP	United Nation Development Programme
UNISA	University of South Africa
UPCCD	Unit for Prevention and Control of Cardiovascular Diseases.
UVAHS	University of Virginia Health System
WHO	World Health Organization
WHOSIS	World Health Organization Statistical Information Service

CHAPTER 1
INTRODUCTION AND OVERVIEW

1.1 INTRODUCTION

Ensuring patients' compliance with antihypertension medications and lifestyle modifications to prevent complications of hypertension remains a major challenge to public health in many developing countries. Non-compliance with treatment is the most important single reason for uncontrolled hypertension. Several factors, which may be patient or health system related, continue to militate against compliance behaviour. Thus it is essential to identify such factors and develop strategies to improve compliance.

This quantitative, descriptive-correlational study was focused on identifying and explaining factors associated with compliance with antihypertension medications and lifestyle modifications among diagnosed hypertensive patients attending outpatient clinics on the Island of Praslin, Seychelles. This chapter outlines the research problem, the research context and the background to the study. The research purpose and specific research questions are spelt out and an indication of the significance of this study is given.

1.2 RESEARCH PROBLEM AND BACKGROUND TO THE STUDY

1.2.1 Research problem

According to Burns and Grove (2005:10), a research problem is a situation in need of a solution, improvement or alteration, a discrepancy between the way things are and the way they ought to be, which represents a knowledge gap in clinical practice.

Hypertension is a common chronic disease amenable to control by appropriate medication or adopting relevant lifestyle modifications. However, a lack of knowledge about the severity of the disease and the importance of adhering to the prescribed treatment, and a lack of motivation to make some lifestyle changes in terms of diet and physical exercise may constitute barriers to compliance behaviour. In certain circumstances, lifestyle modifications alone may be sufficient to lower blood pressure and achieve normalcy, while in others medication use is also required (Kaplan 2005:13; Lewanczuk 2006: 615).

Non-compliance with prescribed medications or adopting lifestyle modifications is associated with uncontrolled hypertension and the risks of developing complications (Campbell, Petrella & Kaczorowski 2006:599; Lahdenpera & Kyngas 2000:826). Due to increased longevity, both the incidence and the complications of the disease are simultaneously increasing thus spelling the urgent need to orchestrate increased population sensitisation to compliance with prescribed medication and lifestyle modification regimens consistent with lowering blood pressure. According to Lewanczuk (2006: 615) and Kaplan (2005:4) such population-based measures would help prevent avoidable complications and improve the quality of life of hypertensive patients.

Antihypertension medications are provided free of charge in all public health centres to all those diagnosed with hypertension in Seychelles. In addition, health care professionals routinely offer practical advice on lifestyle modifications essential for lowering blood pressure. However, compliance with antihypertension medications is generally poor in Seychelles ranging from 26% to 46% (Bovet, Burnier, Madeleine, Waeber & Paccaud 2002:33).

According to McDonald, Garg and Haynes (2002:2869), medication compliance is a complex multidimensional phenomenon involving various personal and social factors which are not clearly understood. It is therefore important that health care professionals understand what factors affect compliance in their own context in order to manage the disease effectively.

While studies have been conducted universally on the subject, specific studies to elucidate factors associated with medication and lifestyle compliance behaviour on the Island of Praslin are lacking. This current study utilised the comprehensive framework of the Health Belief Model to identify and correlate multiple factors that contribute to low compliance with antihypertension medication and lifestyle modification regimens on the island. To the researcher's knowledge no such study had been performed on the island previously.

1.2.2 Hypertension as a public health problem

Hypertension is a leading cause of death in developing countries. According to the World Health Organization, more than 80% of deaths from hypertension and associated cardiovascular diseases now occur in low and middle-income countries and this is particularly common among people of low socio-economic status (Boutayeb & Boutayeb 2005:2; WHO 2003a: 12). Such deaths occurring among economically productive age groups undermine socio-economic development of families in particular, and the country involved in general (WHO 2003a:28).

In sub-Saharan Africa, the prevalence of hypertension once thought to be low, has now assumed epidemic proportions. According to Opie and Seedat (2005:3562), about 10 to 20 million people are affected with hypertension in the region. Effects of Westernisation, urbanisation, changes in dietary patterns and sedentary lifestyles are among the factors fuelling the epidemic of hypertension in sub-Saharan Africa (Opie & Seedat 2005:3565). These factors account for the obvious disparity between the prevalence of hypertension in rural and urban areas in this region. A study by Cappucio, Micah, Emmett, Kerry, Antwi, Martin-Peprah, Phillips, Plange-Rhule and Eastwood (2004:1017) found that in rural West Africa the prevalence of hypertension among patients older than 65 years ranged from 30% to 40%, while in semi-urban areas the prevalence was estimated at 50%. In another study, Steyn, Gaziano, Bradshaw, Laubschar and Fourie (2001:1717)

reported a prevalence of 50-60% among similar age groups in South Africa. Undoubtedly, lifestyle related factors contribute significantly to a high prevalence of hypertension in many countries.

Research on hypertension in Seychelles indicates a high prevalence which is rising consistently and merits serious attention. The first population-based study on the prevalence of hypertension in the country conducted in 1989 by Bovet, Shamlaye, Kitua, Riesen, Paccaud and Darioli (1991:1730), found that the prevalence of hypertension among respondents aged 25-64 years was 28% among men (n=513) and 22% among women (n=568). In 1997, a population based knowledge, attitudes and practices survey conducted in the country by Aubert, Bovet, Gervasoni, Rwebogora, Waeber and Paccaud (1998:1136) reported an increase in the prevalence of hypertension among men and women aged 25-64 years to 35.8% and 25% respectively. Hypertension was defined as having blood pressure≥160/95 mmHg. In 2006 another study conducted by Bovet, Shamlaye, Gabriel, Riesen and Paccaud (2006:9) found a markedly increased prevalence of 43.6% among men, and 35.5% among women for the same age group. Although hypertension was defined as blood pressure≥140/90 mm Hg in the latter study, it can be concluded the prevalence shows an increase in the population. Unfortunately, no further population-based study has been conducted in the country since 2006.

The consequences of a high prevalence of hypertension and related cardiovascular diseases constitute the leading cause of morbidity, disability and mortality in Seychelles. The statistical reports of the Ministry of Health reveal that between 1995 and 2005, mortality due to hypertensive diseases alone oscillated between 14% and 19% against total mortality (Seychelles Health Statistics 2005:10). When combined with diabetes and other cardiovascular diseases, the total mortality approached 40% for the same period (Ministry of Health 2005:14).

Various factors are considered to be responsible for the high prevalence of hypertension in the country. Among these is the fact that Seychelles, a

medium income country, began to witness epidemiological transition in the early 1970's (WHO 2005:6). Like many other developing countries, as a result of increased longevity and improvement in the standard of living as well as the influence of the western lifestyle such as cigarette smoking and alcohol consumption, hypertension has assumed a major public health predicament. Risk factors for hypertension such as a sedentary lifestyle, obesity, consumption of fatty foods and resultant dyslipidemia are highly prevalent in the population and these factors contribute to the epidemic (Bovet et al 2006: 9; WHO 2003b: 38).

The high prevalence of hypertension in the country calls for concern for two major reasons. Firstly, the relatively small population size requires a healthy workforce as the driving force of the economy. The workforce should be protected from chronic debilitating illnesses, which could affect productivity. Secondly, health care is offered free of charge to all citizens at enormous cost. The cost of treating complicated hypertension and associated cardiovascular diseases is high and constitutes a significant financial burden on the state (UNDP 2003b:7). Bovet et al (2006:9) estimate that it would take US$45.6 per capita to treat a high-risk cardiovascular patient in Seychelles. A high-risk patient is defined by the said author as a hypertensive person with related co-morbidities such as dyslipidemia and diabetes. The cost was analysed as follows: hypertension US$11.2, diabetes US$3.8 and dyslipidemia US$ 30.6. The researchers noted that the cost of treatment needed to reduce these conditions in the population, exceeds the normal budget in most low- and middle-income countries.

A serious problem in the management of hypertension in the country is the phenomenon of non-compliance with antihypertension medications. It is estimated that more than 70% of patients on antihypertension medications do not take them as prescribed. During 2001, Bovet et al (2002:33-39) monitored the compliance to antihypertension medications in Seychelles over a period of one year. The researchers found that only 46% (n=1067) were compliant in the first month and this percentage decreased to 26% by the twelfth month. This low level of medication compliance is worrisome because it contributes to

an increasing level of morbidity and mortality due to hypertensive diseases in the country.

There is a lack of data estimating compliance of patients to lifestyle modification requirements, but judging by the low level of medication compliance it is conceivable that compliance with lifestyle modification regimens, which requires greater efforts to execute, would be equally low.

1.3 CONTEXTUALISING THE RESEARCH PROBLEM

1.3.1 Location

Seychelles is a tropical archipelago consisting of 116 granitic and coral islands located in the south-western part of the Indian Ocean about 1600 km east of Kenya and northeast of the islands of Madagascar and Mauritius. Its land area constitutes 445km^2, while the country's exclusive economic zone covers over 1.3 million km^2 of vast marine reserves. The entire population live on the three main islands of Mahe, Praslin and La Digue with Mahe hosting the country's capital - Victoria (Seychelles in Figure 2007:2).

Praslin Island, the second largest in Seychelles shares similar cultural and socio-economic characteristics with the other islands. Its population of over 7000 inhabitants are mainly involved in fishing and tourism related activities (Seychelles in Figures 2007: 4). The island is only 11km long and 4km, wide and is situated 40km away from the main Island of Mahe. Its land area of 38 km^2 is characterised by numerous gigantic boulders dotting the coastline while the interior is predominantly virgin forest. Praslin is home to Vallee de Mai National Park – a UNESCO World Heritage site and a popular tourist destination since 1984. The Park grows the unique palm trees that bear the world's largest seed called *Coco de Mer*, which is shaped like the female pelvis (Seychelles in Figures 2007: 4).

The two administrative districts of Baie Sainte Anne and Grand Anse lie 10km apart with Baie Sainte Anne serving as the island's headquarters. The two

public health institutions on the island are Grand Anse Health Centre, and Baie Sainte Anne Hospital and Health Centre. The latter offers some secondary health care services in addition to primary health care because of the remoteness of the island (Seychelles in Figures 2007:4).

1.3.2 Socio-economic development

Seychelles is regarded as a middle-income country with a relatively high GNP per capita, which in 2006 was estimated at US$ 16560 - the highest in Sub-Saharan Africa (WHOSIS 2008). The high level of sanitation coupled with free health care and education has resulted in a relatively high standard of living among the population (Ministry of Health 2004:2). The economic and social development of the country is remarkably impressive such that in 2002, the Human Development Index of the United Nation Development Programme placed it 36th out of 193 in the world, making it the only African country to be in the High Human Development category (UNDP 2003a:199). However, the recent UNDP report (UNDP 2007:259) places the country in the 50th position.

The degree of socio-economic development is impressive despite its small economic base and vulnerability to external shocks such as the spiralling price of crude oil, which resulted in a reduction in tourism earnings (UNDP 2003b:7). According to Rosalie and Campling (2004:7), Seychelles' vulnerabilities to external shocks are implicitly comprehended when conceptualised in the context of Small Island Developing States. The small population size and remoteness from major international markets coupled with a limited resource base (tourism & fisheries) hinder competitiveness and impede serious macroeconomic development. The economy depends heavily on imports of both consumer items and capital inputs rendering it not only highly vulnerable to these external shocks which it absorbs, but also to consistent trade deficits (National HIV and AIDS Strategic Plan 2005:14;UNDP 2003b:7).

Therefore, the country's limited financial means underscore the importance of compliance to hypertension treatment to reduce the risk of developing co-

morbidities. The added costs of non-compliance is high due to having to treat complications such as cardiovascular and neurovascular diseases (refer to section 2.5). This implies a financial burden which the country can ill afford.

1.3.3 Demography

The total population of Seychelles in 2006 was estimated at 84600. Persons younger than 15 years constituted 23.8%; Persons 15-44 years constituted 50.9%; 45-64 years 17.5%; and 65 years and above 7.8% of the population. The sex ratio (male:female) for all ages was 91:100. Currently the entire population live on the three main islands of Mahe (87.4%), Praslin (8.7%) and La Digue (3.9%) (MISD 2004:14; Seychelles in Figures 2007:9; WHO 2005:5). Fertility and mortality have been declining resulting in the reduction in population growth. For instance, between 2000 and 2008 the annual population growth rate ranged from 0.428 to 0.49. The total fertility rate declined from 7 children per woman in 1966 to 2.1 children per woman in 1997 and has remained constant since 1997. Due to declining fertility and mortality, the overall age of the population showed an increase. About 10% of the population reached the age of 60 years (MISD 2004:14; WHO 2005: 5). Between 1960 and 2002, the average life expectancy at birth for both sexes rose from 63.4 years to 70.9 years. In 2006 the average life expectancy for both sexes was 72.2 years (males 68.9 years and females 75.7 years). For men, the life expectancy increased from 58.4 years to 66.6 years from 1980 to 2002. For the same period, that of women increased from 67.8 years to 75.8 years (Seychelles in Figures 2007:9; Rosalie & Campling 2004:7; WHOSIS 2009).

The importance of an increasing ageing population is reflected in the preponderance of non-communicable diseases, particularly hypertension, diabetes and cancers as the leading causes of morbidity and disability. The virtual elimination of vaccine preventable diseases due to high national immunisation coverage has brought to the fore, non-communicable diseases as the major burden of health care (Ministry of Health 2004:2). In 2006, the mortality distribution was cardiovascular diseases 36%; neoplasms 16%;

respiratory diseases 12%; and endocrine diseases 8% (Seychelles in Figures 2007:12).

A resounding problem has been bridging the decade gap between the life expectancy of women and men in favour of the former. The Health Authority already recognised this discrepancy and in its 2005 report, the male gender was construed as a vulnerable group with urgent need for targeted intervention. This and subsequent reports highlight the observation that males in the country are more prone than the females to external injuries, less compliant with treatment for chronic diseases, have higher propensity to abuse alcohol, cigarettes and drugs and generally seek medical treatment at the eleventh hour when the health problem is in an advanced stage of progression. Targeted interventions, which should include improving compliance with drug treatment and adoption of lifestyle changes consistent with good health, remain a challenge to public health practice in Seychelles (Ministry of Health 2005: 18; Seychelles in Figures 2007:33).

1.3.4 Socio-cultural characteristics of Seychelles

Seychellois (Seychelles citizens) have a rich mixed cultural heritage drawn from Europe, Africa and Asia, synthesised into a unique harmonious hybrid - called the Creole culture. It is estimated that 65% of the population are from black African descent, 10% are Caucasian, 5% have Indian or Chinese origin and the remaining 20% are mixed (Bovet et al 1991:1730). Creole, English and French are the major languages which are widely spoken. Most Seychellois embrace the Christian faith, although adherents of other religions such as Bahai, Hindu and Islam are also present.

1.3.5 Health care system

The national health care system operates on the philosophy of *Health for all and Health by all*. Health for all implies the recognition of the fundamental human right of every citizen to achieving good health and the centrality of national health to wealth creation and social stability. Health by all implies the

recognition of peoples' responsibility for their own health. The government remains the main provider of health care in Seychelles (Ministry of Health 2005: 23). This philosophy translates to a strong political commitment to health care, a commitment stoutly supported by Seychelles Constitution. Article 29 of the 1994 Constitution states the following:

> *" The State recognizes the right of every citizen to protection of health and the enjoyment of the highest attainable standards of physical and mental health and with a view to ensuring the effective exercise of this right, the State undertakes: (a) to take steps to provide free primary health care in State health institutions for all its citizens…"* (Seychelles Constitution 1994:33).

1.3.5.1 The structure of the national health care system

The national health care system is structured on the tier system for health care delivery and is organised on the three main levels of care - primary, secondary and tertiary.

- ***Primary health care***

Primary health care is the first level of care and entry point to the national health care system. It forms the cornerstone of the country's health care delivery. This approach has been adopted and implemented since 1979 (Ministry of Health 2005: 3). Primary health care is focused on the comprehensive provision of basic preventive, curative and rehabilitative services in the community in line with the global primary health care strategy.

There are 16 geopolitical districts each with a health centre offering these services. As stated in section 1.3.5 constitutionally, access to primary care is free at all points of use while the government regulates access to other levels of care (Ministry of Health 2005: 4).

- ***Secondary health care***

At present Victoria Hospital Mahe, serves as the main referral hospital offering secondary care and to a limited extent, tertiary care. Patients are referred from the primary health care centres to the hospital according to standard protocols. The hospital offers specialist services in various fields including obstetrics and gynaecology, emergency medicine, paediatrics, internal medicine and oncology. Other specialities include general and orthopaedic surgery, ophthalmology, otolaryngology, psychiatry and pathology. Each specialty is headed by a consultant-in-charge (WHO 2005:15).

- ***Tertiary care***

Patients are usually sent abroad for tertiary care. However, local capacity is being strengthened to provide such services locally. Such overseas treatments are usually undertaken on the recommendation of a Board of Consultants instituted for such purposes by the Ministry of Health (Ministry of Health 2005: 5).

- ***Private health care***

In 1979, the government banned private health care practice but lifted the ban in 1992. At present, there are few private medical practitioners on the two major islands of Mahe and Praslin functioning as primary health care providers (WHO 2005:16).

1.3.5.2 Organisation of the Ministry of Health

The Minister, appointed by the President of the Republic heads the Ministry. The Principal Secretary, also appointed by the President, is the Chief Executive Officer of the Ministry. His responsibilities include among others the management of health resources and programmes to achieve the overall aim of improving the health status of the population. A Central Management Board

is constituted to assist the Principal Secretary in performing these tasks. To enhance service delivery, the Ministry of Health is divided into 6 divisions: Primary Health Care, Health Planning, Research and Information, Disease Prevention and Control, Health Education and Promotion, Hospital Services, and Administration and Finance (WHO 2005:7).

1.3.5.3 Health financing

Health care is financed according to the following proportions: general taxation (80%), donors (15%) and user fees (5%). User fees are requested for services regarded as non-essential and which falls outside the purview of primary health care. The government attaches high priority to health development and demonstrates very strong political commitment towards the provision of health care services in the country. For instance, in 2003, the Ministry of Health received the highest allotment of 16% in the national budget (WHO 2005: 7).

Over the years, Seychelles health sector had received enormous financial assistance from international donors and friendly countries. Unfortunately, the high ranking accorded to the country on the Human Development Index (refer to section 1.3.2) has rendered it ineligible for debt forgiveness and caused a precipitous decline in development assistance. According to the WHO (2005:19), with the rise in per capita income, many countries and donor agencies removed Seychelles from their list of countries destined for assistance. Aid flow to the country's health sector plummeted remarkably from US$ 30 million in 1997 to US$ 3 million in 2007 (OECD 2009). This is occurring against the backdrop of soaring public expectation, the emergence of new diseases, a demographic transitional shift and the double burden of communicable and non-communicable diseases.

1.4 STATEMENT OF THE RESEARCH PROBLEM

Hypertension and related complications are important health problems on Praslin Island. This is in line with the global realities. Hypertension sufferers'

non-compliance to their pharmacological regimen and required lifestyle changes result in uncontrolled hypertension and the consequent complications such as cardiovascular, renal and cerebrovascular diseases (Psaty, Lumley, Furberg, Schellenbaum, Pahor, Alderman & Weiss 2003:2534). This added burden of disease, places additional pressure on the limited health care budget of Seychelles.

In order to mitigate the effects of the disease in populations, it is essential to improve compliance amongst sufferers of the disease by identifying underlying contextual factors mitigating against compliance behaviour and developing effective interventions to overcome these factors (Thrall, Lip & Lane 2004:595). While various possible explanations for the occurrence of non-compliance have been identified through previous research, there was a lack of data on the reasons specific to the hypertension sufferers on Praslin Island when this current study was conceptualised. Factors affecting compliance behaviour are unique to individuals and are context specific, and therefore, studies done in other countries may not apply to the circumstances surrounding the Island of Praslin.

This current study was borne out of the need to identify factors affecting drug treatment and lifestyle modification compliance and to recommend strategies that could improve compliance with both drug treatment and required lifestyle modifications involving hypertension sufferers on Praslin Island. The central question, which guided the research, was:

> *What are the reasons for non-compliance with the drug and lifestyle modification regimens among hypertensive patients on Praslin Island?*

1.5 AIM OF THE STUDY

The aim of this study was to add to the existing body of knowledge about factors affecting compliance to hypertension medication and lifestyle modifications necessary to maintain hypertension control, and to propose

strategies that would assist policy makers and clinicians with hypertension management decisions.

1.5.1 Research purpose

The purpose of this study was to describe the compliance (to the drug and lifestyle modification regimens) of diagnosed hypertension patients and to identify the factors which influenced their compliance behaviour. The study further sought to investigate the relationships between compliance and the theoretical variables of the Health Belief Model.

1.5.2 Research questions

Burns and Grove (2001:171) define a research question as a "concise, interrogative statement that is worded in the present tense and includes one or more variables (or concepts)." Research questions when employed usually have three foci: To describe variables, examine relationships among variables and determine differences between two or more variables. These aspects were thoroughly considered in this study and led to the development of the following specific research questions to direct it.

- **Research question 1**
  How compliant are the respondents with their hypertension drug regimen?
- **Research question 2**
  How compliant are the respondents with their lifestyle modifications regimen?
- **Research question 3**
  What is the relationship between treatment compliance (lifestyle modification and antihypertensive drug treatment adherence) and the following variables among patients diagnosed with hypertension on the Island of Praslin: socio-demographic factors (age, gender, ethnic background; marital status, educational status, work status, household income); physiological factors (weight status); duration of illness;

number of medications prescribed; doses of medication skipped; and alcohol intake per week?

- **Research question 4**

  What is the relationship between treatment compliance (lifestyle modification and antihypertensive drug treatment adherence) and the following variables among patients diagnosed with hypertension on the Island of Praslin: perception of severity; perception of risk; perception of benefits; perception of barriers; internal factors; health care provider factors; cues to action?

- **Research question 5**

  Which of the following variables are predictor variables for treatment compliance: socio-demographic variables; perception of severity; perception of risk; perception of benefits; perception of barriers; internal factors; health care provider factors; and cues to action?

1.6 SIGNIFICANCE OF THE STUDY

This study sought to examine various factors responsible for compliance and non-compliance in the research context and elucidated relationships existing between them. Such information would assist health care professionals to manage hypertension appropriately. It would also assist policy makers in developing context specific and relevant policies capable of improving the management of hypertension in the clinics. Ultimately, it is envisioned that the implementation of effective strategies would lead to improved compliance, increased levels of controlled blood pressure and reduced occurrences of complications.

1.7 DEFINITIONS OF KEY CONCEPTS

1.7.1 Blood pressure

Blood pressure is the force exerted by blood against the walls of arteries as a result of the pumping action of the heart. The peak pressure (about 120 mm Hg in a young adult) is recordable during systole (systolic pressure) and the

minimum pressure (70 mm Hg in a young adult) is recordable during diastole (diastolic pressure) (Ganong 2003:589). Blood pressure can be measured with a standard mercury sphygmomanometer (Pocket Medical Dictionary 1987:38).

During this study, blood pressure was measured twice on the right upper arm with the respondent in a sitting position after the respondent had rested for 5 minutes in line with the WHO/MONICA Project recommendation (Kuulasmaa, Hense & Tolonen 1998). A standard mercury sphygmomanometer (ERKA 3000®) attached to an appropriate inflatable cuff size 12-13cm wide was used. The bell of the stethoscope was placed over the brachial artery at the cubital fossa of either arm to listen to the Korotkoff sounds. Phase 1 of the Korotkoff sounds was recorded as systolic blood pressure while Phase V was taken as the diastolic blood pressure (Ganong 2003:590) (refer to section 2.3.2.1).

1.7.2 Drug treatment

Drug is defined as “a substance used as medicine” (Oxford Dictionary of Current English 2001:273). Treatment is defined as “medical care for an illness or injury” (Oxford Dictionary of Current English 2001:976). In this study, drug treatment is defined as the use of an approved pharmacologically active medicinal substance for the purpose of controlling hypertension.

1.7.3 Compliance and adherence

Compliance is defined as “the extent to which a person’s behaviour (taking medicines, or executing lifestyle changes) coincides with medical or health advice” (Kaveh & Kimmel 2001:244). Bloom (2001:647) describes compliance as an act of adhering to the regimen of care recommended by the clinician and persisting with it over time.

The World Health Organization defines adherence as "the extent to which a person's behaviour - taking medications, following a diet and/or executing

lifestyle changes, corresponds with agreed recommendations from a health care provider" (WHO 2003a: 3). For the purpose of this study compliance and adherence are used interchangeably.

1.7.3.1 Compliance with prescribed antihypertensive drug treatment

Compliance with prescribed antihypertensive drugs was measured with a Compliance to Medication Regimen Instrument developed specifically for this study. The instrument contained 14 closed-ended items on a four point Likert type scale. The mean score for the 14 items was calculated. A mean score of 3 was designated as the cut-off point. Respondents with a score below 3 were categorised as non-compliant while respondents with a score of 3 and above were categorised as compliant with the medication regimen (refer to section 4.3.2).

1.7.3.2 Compliance with lifestyle modifications

Compliance with lifestyle modifications aimed at lowering blood pressure includes regular exercise (at least 30 minutes thrice per week), eating salt and fat free diets, cessation of smoking, and a reduction in the daily alcohol consumption to less than 20g of ethanol for men and less than 10g of ethanol for women (Svetkey, Erlinger, Vollmer, Feldstein, Cooper, Appel, Ard, Elmer, Harsha, & Stevens 2005:21; Xin, He, Frontini, Ogden, Motsamai & Whelton 2001:1114).

Compliance with lifestyle modifications was measured with a Compliance to Lifestyle Modification Instrument developed specifically for this study. The instrument contained 11 closed-ended items on a four point Likert type scale. The mean score for the 11 items was calculated. A mean score of 3 was designated as the cut-off point. The respondents with a score below 3 were categorised as non-compliant while respondents with a score of 3 and above were categorised as compliant with the lifestyle modification regimen.

1.7.4 Diagnose

To diagnose implies to identify the nature of an illness (Oxford Dictionary of Current English 2001:244). In this study, an individual was identified as a hypertension sufferer based on a confirmed diagnosis on the clinical record of that individual.

1.7.5 Hypertension

Hypertension is defined as abnormally high arterial blood pressure involving high systolic and/or diastolic levels (Ganong 2003:644). For the purpose of this study, hypertension is defined as the persistent systolic blood pressure equal to and greater than 140 mmHg and/or persistent diastolic blood pressure equal to and greater than 90 mmHg (WHO 2003c: 1984).

1.7.6 Lifestyle factors

The Collins Concise Dictionary and Thesaurus (1995:549) defines lifestyle as “a set of attitudes, habits and possessions regarded as typical of a particular group or an individual”. Applied to this study, lifestyle factors are those attitudes, habits and behaviours of hypertension patients that influence the development and course of the disease.

1.7.7 Modification

Modification is defined as “a small alteration, adjustment or limitation” (Free Online Dictionary 2006). In this study modification refers to a change (adjustment) in lifestyle, namely attitudes, habits and behaviours necessary for controlling hypertension.

1.7.8 Patient

A patient is defined as “a person receiving or registered to receive medical treatment” (Oxford Dictionary of Current English 2001:656). For the purpose

of this study, patient refers to a person diagnosed with hypertension as defined in section 1.7.5 and receiving medical treatment.

1.7.9 Reason

Reason is defined as “the basis or motive for an action, decision or conviction. It is a declaration made to explain or justify actions, decisions or convictions” (Free Online Dictionary 2006)**.** Applied to this study, reason refers to the motive for compliant or non-compliant behaviour with regard to drug treatment and recommended lifestyle modifications.

1.8 THEORETICAL FRAMEWORK

The Health Belief Model, which is widely used to study health behaviour, formed the theoretical framework for this study. According to Glanz, Rimer and Lewis (2002:46), the Model was first used in the Public Health Service of the United States of America (USA) to study why people refused to utilise a freely available mammogram-screening program. The core components of the Model are perceived susceptibility, perceived severity, perceived benefits and perceived barriers. The Model postulates that health behaviour towards a disease or treatment is succinctly influenced by the extent to which individuals believe they are susceptible to the disease and how severe they believe the disease is, the benefits they stand to gain by adopting the required health behaviour and the barriers standing in the way of adopting the required health behaviour. The expanded version of the Model also includes variables such as self-efficacy and cues to action. The expanded version of the Model postulates that individuals’ sense or lack of self-efficacy and external cues (such as health education campaigns) also influence their health behaviour. Socio-demographic variables such as age, gender and income are believed to influence health behaviour in addition to all the abovementioned variables. The Health Belief Model is regarded to be a suitable predictor of health behaviour. The Health Belief Model was selected as a theoretical framework for this current study because it assisted the researcher in selecting the

research variables and the development of the data collection instrument. The Model is described in detail in section 2.6.

1.9 RESEARCH DESIGN AND METHOD

A quantitative descriptive-correlational study was conducted to examine the level of compliance with the antihypertensive drug treatment and lifestyle modifications regimens of the respondents, the factors which influenced compliance or non-compliance behaviour and the relationships existing between these variables. All respondents were diagnosed hypertensive patients systematically sampled from the disease registers at Baie Sainte Hospital and Grand Anse Health Centre both situated on the Island of Praslin. Structured interviews, applying an interview schedule, were held at the homes of the respondents. In addition to this, document analysis was conducted. A checklist was used to extract data from the clinical records of the respondents. Both descriptive and inferential statistics were calculated to answer the specific research questions.

1.10 SCOPE OF THE STUDY

This research focused on diagnosed hypertensive persons on the Island of Praslin. The respondents were randomly selected from a population of patients who were treated for hypertension at the two public health institutions on the island. The findings and conclusions of this study are therefore, generalisable to the hypertension patients on the Island of Praslin and not Seychelles in general.

1.11 STRUCTURE OF THE DISSERTATION

This dissertation is structured as follows:

CHAPTER	CHAPTER TITLE	CONTENT DESCRIPTION
1	Introduction and overview	Overview of the research problem, context and the underpinning theory. Explication of the aim and significance of the study. Definition of key concepts
2	Literature review	In depth exploration of the core research concepts, namely hypertension, compliance and the Health Belief Model
3	Research design and methods	Overview of the research design and methods used in this study
4	Data presentation	Overview of the research findings
5	Discussion conclusions and recommendations	Synthesis of the research findings and recommendations stemming from the research results

1.12 CONCLUSION

This current research was designed to study the variables that affected compliance with drug treatment and lifestyle modifications and the relationships existing between these variables among diagnosed hypertensive persons on Praslin Island. The research variables were derived from the Health Belief Model. The outcome of this research could contribute to the existing body of knowledge regarding non-compliance as a behavioural phenomenon. Knowledge of factors compounding the problem would aid the development of effective policy and treatment guidelines to enhance compliance behaviour and reduce the occurrence of complications of hypertension, which has serious cost implications for a country with a limited health care budget.

CHAPTER 2
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter introduces the literature review. The literature review is an important component of research because it reveals similar studies done on a given topic and prevents unnecessary duplication of studies. It guides the choice of a sound conceptual framework suitable for the research in question while exposing the researcher to the fundamental issues concerning the topic (Burns & Grove 2005:133). This chapter is centred on hypertension and aspects related to its management and control, and the Health Belief Model.

2.2 HYPERTENSION

2.2.1 Definition

Hypertension is a chronic systemic disease characterised by an abnormally high blood pressure. The peak and lowest pressures in the cardiovascular system correspond with the systolic and diastolic blood pressures respectively (Ganong 2003:644). The normal blood pressure value is less than 120/80 mmHg.

However, the Hypertension Working Group of American Society of Hypertension (in Giles, Berk, Black, Conn, Kostis, Izzo & Weber 2005:505), argue that the definition of hypertension should be broadened and extended beyond discrete values to include a description of the risk factors and disease sequelae. Consequently the Group defines hypertension as “a progressive cardiovascular syndrome arising from complex interrelated aetiologies. Early markers of the syndrome are often present before blood pressure elevation is observed. Therefore, hypertension cannot be classified solely by discrete blood pressure thresholds. Its progression is strongly associated with

functional and structural cardiac and vascular abnormalities that damage the heart, kidneys, brain, vasculature, and other organs, and lead to premature morbidity and death" (Giles et al 2005:505).

This latter definition has been criticised for lacking a clear public health approach to the management of hypertension. According to Pickering (2005:702), the definition gives no direction on when hypertension should be diagnosed and relies heavily on words rather than numbers which had been the crux of the management of hypertension globally. Notwithstanding the controversy, the importance of this definition seems to lie in its emphasis that health care professionals must search for evidence of target organ damage and other components of the "syndrome" with each diagnosis of hypertension.

2.2.2 Hypertension types

Two types of hypertension exist, namely primary and secondary hypertension.

2.2.2.1 Primary hypertension

Primary hypertension also referred to as essential or idiopathic hypertension, is the most prevalent of the two types and constitutes 95% of cases. The cause of primary hypertension is unknown (Ganong 2003:645). Several lifestyle related risk factors are thought to contribute to hypertension. These include the following:

- ***Weight gain and obesity***

There is a strong correlation between overweight, obesity and hypertension. A sedentary lifestyle and weight gain are associated with hypertension (Wolk, Shamsuzzaman & Somers 2003:1067). A longitudinal study in the USA sampled a cohort of 4549 American Indian respondents aged 45-74 years and followed them up from 1989 to 1999. The cohorts were examined twice during the period (1992-1994 and 1996-1999). During each examination, blood was taken for cholesterol, blood glucose and urinary protein; weight was measured

while the body mass index was estimated. The researchers reported that overweight individuals were 1.46 times more likely than those with normal weight to have elevated blood pressure while obese individuals were 1.9 times more likely than those with normal weight to develop hypertension (Wang, Lee, Fabsitz, Devereux, Best, Welty & Howard 2006:403).

- ***Effects of dietary salt***

Research has shown that consumption of large quantities of dietary salt is significantly associated with high blood pressure. A study in the USA by Obarzanek, Proschan, Vollmer, Moore, Sacks, Appel, Svetkey, Most-Winhauser, and Cutler (2003:459), assessed 188 respondents at three levels of dietary sodium intake: high (140mmol/d), medium (104mmol/d) and low (62mmol/d) corresponding to 3.3g, 2.5g and 1.5g of dietary sodium intake for 30 days. The researchers reported that lowering of dietary sodium intake level was statistically associated with lowering of blood pressure in all subgroups tested - blacks, nonblacks, men and women. These findings were supported by a meta analysis by He and MacGregor (2003:1), who examined clinical trials relating salt reduction and a reduction in blood pressure. The latter researchers reported that a reduction of salt intake by 3g/day was associated with a reduction in systolic blood pressure ranging from 3.6-5.6mmHg and a reduction in diastolic blood pressure ranging from 1.9-3.2mmHg in hypertensive persons. The authors also assessed the effects in normotensives and observed a systolic blood pressure reduction from 1.8-3.5 mmHg and a diastolic blood pressure reduction from 0.8-1.8mmHg. The authors opined that the effects would be doubled with a 6g/day reduction and tripled with a 9g/day reduction in salt intake. With regards to the public health impact dietary salt reduction would make in the population, the researchers argue that "a conservative estimate indicates that a reduction of 3g/day would reduce strokes by 13% and ischemic heart disease by 10%." According to Chobanian and Hill (2000) in Kaplan (2005:67), "there is conclusive evidence that dietary salt intake is positively associated with high blood pressure and [that] blood pressure can be lowered with a reduction in sodium intake of 40 to 50 mmol (per day) in both hypertensive and nonhypertensive persons."

- ***Cigarette smoking***

The relationship between cigarette smoking and hypertension is thought to be due to the presence of nicotine in cigarettes leading to the release of noradrenaline from adrenergic fibres. Thus persistent stimulation of the sympathetic nervous system through habitual smoking is thought to be responsible for sustained elevation of blood pressure and an increased risk of cardiovascular disease in smokers (Kaplan 2005:29).

- ***Alcohol consumption***

Research has shown that excess consumption of alcohol is a risk factor in the development of hypertension. The study by Wang et al (2006:408) revealed that alcohol consumers at the time of the study were 1.22 times more likely than non-consumers to develop hypertension. Consuming more than 20g of ethanol (men) or 10g of ethanol (women) per day may be sufficient to cause sustained elevation of blood pressure (Kaplan 2005:29).

- ***Stress***

This is believed to be a risk factor for hypertension through the mechanism of the sympathetic nervous system. Persistent stress leads to the release of certain hormones notably adrenaline and cortisol resulting in a sustained elevation of blood pressure (Gianaros, Jennings, Sheu, Derbyshire & Mathews 2007:134).

- ***Age***

Hypertension is more prevalent in adults over the age of 25 than in younger persons. Advancing age is therefore thought to be a risk factor for hypertension. In their study, Wang et al (2006:404) demonstrated that the incidence of hypertension among respondents 65 years and older was about

38% higher than among adults between 45 and 54 years. Also, respondents aged 55-64 years had a higher incidence of hypertension than respondents 45-54 years. The finding supported the conclusion that the older a person is, the more likely the individual will develop hypertension.

- ***Genetic factors associated with primary hypertension***

Primary hypertension is thought to be hereditary because it clusters around families (Kaplan 2005:58). There are inconsistent findings with maternal or paternal linkage but a strong family history of hypertension is observed with most patients with the disease. In 2002, researchers reported the discovery of three variants of a kidney gene thought to be responsible for primary hypertension. The gene variants, collectively named *G protein coupled receptor kinase type 4 (GRK4)*, act individually or in association with other variant genes, and are believed to contribute to the body's inability to excrete sodium and consequently to hypertension (UVAHS 2002). The discovery has significant public health implications towards the control of hypertension. The subsequent development of a sensitive measure to detect those at risk of developing hypertension could guide clinicians to provide timely lifestyle modification advice to individuals at risk (UVAHS 2002).

2.2.2.2 Secondary hypertension

When the cause of hypertension is distinctly known, it is referred to as secondary hypertension. In contrast to primary hypertension, secondary hypertension are sometimes treatable, and they constitute about 5% of cases of hypertension. The following are known causes of secondary hypertension:

- sleep apnoea
- drugs such as contraceptive pills and anti-inflammatory pills
- chronic renal disease
- primary aldosteronism
- renovascular disease
- steroid therapy

- Cushing syndrome
- phaeochromocytoma
- coarctation of the aorta
- thyroid and parathyroid disease (Kannel 2004:396).

2.2.3 Epidemiology of hypertension

Under a threshold of 140/90 mmHg, the World Health Organization estimates that nearly 1 billion people in developed and developing countries are affected with hypertension. About 1 in 8 deaths worldwide is due to hypertension and 4 million people die annually thus making it the third largest killer in the world (Khatib 2004:778). The seriousness of hypertension as a global public health problem is evident by its high prevalence and associated increase in cardiovascular complications in virtually all countries of the world. According to Khatib (2004:778), for all hypertensive persons the risk of developing cerebrovascular disease is "continuous, consistent and independent of other risk factors". Thus, the higher the blood pressure, the higher the risk of developing complications. Furthermore, for hypertensive persons aged 40-70 years, an increase in systolic blood pressure by 20mmHg and diastolic blood pressure by 10mmHg, doubles the risk of developing cardiovascular complications (Khatib 2004:778).

In developed countries, the emergence of advanced medical technologies have contributed to a significant drop in mortality due to hypertension complications although the prevalence in these countries remains significantly high (Khatib 2004:779). However, hypertension is especially prevalent in developing countries which currently account for 70% of hypertension and cardiovascular related deaths (Stranges & Cappuccio 2007:183). The upsurge in hypertension is largely due in part to the phenomenon of epidemiological transition, occurring vis-à-vis changes in dietary habits, urbanisation and westernisation. Large-scale migration of people from rural to urban areas in search of greener pastures and consequent stress and lifestyle changes

contribute significantly to the increased prevalence of hypertension in developing countries (Opie & Seedat 2005:3562).

In Sub-Saharan Africa, hypertension has also emerged as a serious public health problem. A meta analysis of hypertension studies in the region conducted by Addo, Smeeth and Leon (2007:1012) reported that hypertension is more prevalent in urban than rural areas in all countries of the region. The researchers also reported that about 40% of research participants in various studies were ignorant of their disease state, 30% were on drug treatment and less than 20% had controlled blood pressure. The researchers concluded that contrary to widely held conception; hypertension is a major public health problem in Sub-Saharan Africa but unfortunately, most countries of the region lack the resources to detect, prevent and treat the disease (Addo et al 2007:1012).

The first population-based survey on the prevalence of hypertension conducted in Seychelles in 1989 by Bovet et al (1991:1730), reported a high prevalence of hypertension in men (28%) and women (22%). Only 21% of people diagnosed with hypertension received treatment. A second study in 1998 by Aubert et al (1998:1136) reported a remarkably increased prevalence in men (35.8%) and women (25%). Following the report of this survey, the health department initiated strategies to control hypertension and cardiovascular risk factors in the population. These included health education campaigns through the mass media and in schools. Hypertension screening in workplaces were promoted as well as the formation of heart health clubs in schools and clinics.

The above efforts have witnessed mixed results. A study in 2004 by Bovet et al (2006:6), reported a decrease in the overall prevalence of hypertension from 38.6% in 1989 to 31.6% in 2004. The number of patients on antihypertension treatment also improved from 21.6% in 1989 to 59.3% in 2004. Tobacco smoking among men witnessed a dramatic decrease from 54% in 1989 to 17.5% in 2004. However, there was an increase in the occurrence of other risk factors. Obesity increased from 21% to 25%

particularly among women and hypercholesterolemia increased from 9% to 24.2%. Indeed hypertension remains a serious public health issue in Seychelles and efforts to control the disease and the risk factors associated with it deserve urgent attention (Bovet et al 2006:6).

2.2.4 Pathophysiology of hypertension

It is essential for blood pressure to remain normal as low blood pressure leads to decreased tissue perfusion, hypoxia and cellular necrosis. High blood pressure on the other hand leads to increased afterload, and damage of functional and structural vascular components of the heart, kidneys, brain, eyes and other organs (Giles et al 2005:205). To maintain equilibrium, several interrelated mechanisms are believed to play roles to regulate blood pressure within normal limits (Beevers, Lip & O'Brien 2001:912). Three of these mechanisms namely, vascular volume and peripheral resistance, autonomic nervous system, and renin-angiotensin systems are discussed below.

2.2.4.1 Vascular volume and peripheral resistance

Normal blood pressure is maintained by equilibrium between the vascular volume and peripheral resistance. Most patients with primary hypertension are observed to have normal vascular volume but raised peripheral resistance. However, at an early stage of hypertension disease, most patients have high vascular volume but normal peripheral resistance. The reverse is believed to occur due to the compensatory mechanism of arterioles to prevent tissue injury. According to Beevers, et al (2001:913), peripheral resistance is determined by tiny arteriolar smooth muscles. The sustained contraction of the latter mediated by calcium influx results in increased resistance and consequently hypertension. The evidence in support of this hypothesis is found in the vasodilatory hypotensive effects of calcium channel blockers.

2.2.4.2 The autonomic nervous system

Baroreceptors located in the carotid sinus, the wall of the ventricle and the aortic arch are responsible for monitoring arterial circulation. Afferent nerve fibres originating from the baroreceptors are conveyed via the glossopharyngeal and vagus nerves to terminate in the nucleus of the tractus solitarius and medulla. Low levels or high levels of arterial pressure result in impulses fired to the hypothalamic brainstem. The latter processes such impulses and responds through the cholinergic or adrenergic nerve fibres to the heart and blood vessels. A low pressure stimulates the adrenergic system resulting in tachycardia, raised arteriolar resistance and raised pressure. Furthermore, a high pressure stimulates the cholinergic system resulting in bradycardia, vasodilation and consequently lowered pressure (Ganong 2003:606).

The specific nature of derangement of this mechanism in the pathogenesis of hypertension is uncertain. However, according to Gilbert (2009:13), sustained elevation of blood pressure probably results from a resetting of baroreflexes such that persistent adrenergic tone produces hypertension. The evidence in support of this hypothesis is found in certain medications such as alpha-methyldopa which acts in the brain to decrease alpha-adrenergic stimulation resulting in decreased sympathetic outflow to other organs and low blood pressure (Beevers, et al 2001:913).

2.2.4.3 Renin-angiotensin system

Renin is a glycoprotein enzyme produced by the juxtaglomerular apparatus of the kidneys. It catalyses the conversion of angiotensinogen to angiotensin I which is subsequently converted by angiotensin converting enzyme in the lungs to angiotensin II. The latter, a potent generalised vasoconstrictor, leads to increased peripheral resistance and hypertension. It also stimulates the release of aldosterone from the adrenal cortex. Aldosterone causes retention of sodium ions in the extracellular fluid compartment, leading to fluid overload and hypertension (Ganong 2003: 378).

According to Gilbert (2009:13) the kidneys are responsible for regulating blood pressure by controlling the sodium excretion rate. A distortion of this system produces impaired sodium excretion, sodium retention and hypertension. The evidence in support of this hypothesis is found in diuretic treatment such that an increase in fluid and sodium loss results in lowered blood pressure.

2.3 MANAGEMENT AND CONTROL OF HYPERTENSION

2.3.1 Diagnosis of hypertension

Uncomplicated hypertension is asymptomatic and diagnosis is made by using a standard mercury, anaeroid or electronic sphymomanometer to measure blood pressure. Quite often patients complain of headache, giddiness, tinnitus and fainting but these are thought to be psychogenic (Khatib & El-Guindy 2005:3).

2.3.2 Measurement of blood pressure

2.3.2.1 Technique of measurement

The WHO guidelines for measuring blood pressure stipulate that a sitting posture is adequate for routine measurement, preferably after the patient has rested for at least 5 minutes. Measurement can be done with a standard mercury, anaeroid or electronic sphymomanometer on both arms, while noting any difference in the readings between the two arms. Where there is a difference, the arm with a higher value should be used for future measurement. Kaplan (2005:38) cites Singer and Hollander's (1996) study in which 39% of respondents had a systolic blood pressure difference greater than 10mmHg in one arm. The higher value is usually recorded involving the right arm.

An appropriate cuff size covering at least 80% of the upper arm should be used for measuring blood pressure. The clinician inflates the cuff at least 20-30 mmHg above the point of disappearance of the Korotkoff sounds and then releases gradually by 2mmHg at a time until the cuff has been deflated. The onset of the first Korotkoff sounds (Phase1) represents the systolic blood pressure and the point of complete disappearance of the sounds (Phase V) is noted as the diastolic blood pressure (Chobanian, Bakris, Black, Cushman, Green, Izzo, Jones, Materson, Oparil, Wright & Rocella 2003:1213). Conventionally, after measurement, the clinician should document the blood pressure, the arm, the posture and the cuff used during the measurement process for future reference (Khatib & El-Guindy 2005:3). In patients younger than 30 years with hypertension in the upper limb, blood pressure should be measured in one leg to rule out coarctation of the aorta.

2.3.2.2 Variation in blood pressure

Normal blood pressure has a circadian rhythm - higher values in the day when one is awake and lower values at night during sleep. Individuals are observed to have about a 10-20% drop in blood pressure nocturnally and those without such drops are particularly at risk for cardiovascular complications. A sharp increase in blood pressure has been observed during the early hours of the morning while waking up from sleep (Chobanian et al 2003:1213). Most clinical decisions have been based on office blood pressure measurements and the latter is prone to white coat hypertension - a phenomenon characterised by a transient rise in blood pressure primarily in the hospital or health centre environment (Chobabian et al 2003:1213). Therefore, home blood pressure measurement may eliminate this apparent bias.

Ambulatory blood pressure monitoring which provides a 24 hour monitoring system is useful to identify blood pressure variations and rule out white coat hypertension. Patients with a 24 hour ambulatory blood pressure of more than 135/85 mmHg are found to have double the risk of cardiovascular complications than those with a blood pressure of less than 135/85 mmHg (Verdecchia 2000:844).

2.3.3 Classification of hypertension

According to the 7th Report of the Joint National Committee on the Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC VII) in the USA (Chobanian et al 2003:1211), blood pressure in adults over 18 years is classified as indicated in table 2.1.

Table 2.1: Classification of blood pressure

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

(Chobanian et al 2003: 1211)

Table 2.1 indicates that blood pressure is classified into 4 categories. A normotensive patient is one with systolic and diastolic blood pressures less than 120 mmHg and 80 mmHg respectively. Those with a systolic blood pressure of 120-139 or a diastolic blood pressure of 80-89 are regarded as prehypertensive, and may develop the disease as a result of advancing age or lifestyle related factors. According to the Report, pre-hypertensive persons are "individuals in whom early intervention by adoption of healthy lifestyles can reduce blood pressure, decrease the rate of progression of blood pressure to hypertensive levels with age, or prevent hypertension entirely" (Chobanian et al 2003:1210). Therefore pre-hypertensive persons require basic lifestyle modifications to stay healthy. Stage I hypertensive persons are patients with a systolic blood pressure ranging from 140-159 and a diastolic blood pressure of 90-99 respectively. Stage II hypertensive persons are patients with a systolic blood pressure of 160mmHg and above and a diastolic blood pressure of 100mmHg and above. Patients who have stage I and II hypertension require pharmacological treatment and need to modify their lifestyle.

2.3.4 Treatment of hypertension

The treatment of hypertension involves lifestyle modification and pharmacological drug intake.

2.3.4.1 Lifestyle modifications

The definition of hypertension given by the American Society of Hypertension (refer to section 2.2.1) implies that lowering blood pressure solely with medications per se may be inadequate to prevent and control complications since blood pressure elevation usually coexist with other factors such as obesity, high serum cholesterol and type 2 diabetes mellitus. Lifestyle modifications are non-pharmacological approaches necessary to lower high blood pressure. Chobanian et al (2003:1216) state that lifestyle modifications are fundamentally essential for patients with hypertension and should form an integral part of the management of those with the disease. In addition, the WHO strongly recommends lifestyle modifications since such treatment usually has no known adverse effects, do not affect the quality of life, and are usually less expensive than pharmacological treatment (WHO 2003c: 5).

A randomised controlled clinical trial conducted to test the effects of comprehensive lifestyle modifications by hypertensive patients was conducted in Turkey by Cakir and Pinar (2006:190). The researchers randomly assigned 70 patients into intervention and control groups and collected baseline data from both groups. The intervention group had health education sessions and individual counselling on lifestyle modifications while the control group had none. After six months, the authors reported that blood pressure, body weight, body mass index, waist circumference and fasting lipids reduced significantly among the intervention group compared to the control group (Cakir & Pinar 2006:190).

Similar findings were obtained in a related study in the USA. The results of the diet, exercise and weight loss intervention trial conducted in 2002 by a group of researchers showed that blood pressure could be controlled by

comprehensive lifestyle modifications (Miller, Erlinger, Young, Jehn, Charleston, Rhodes, Wasan & Appel 2002: 612-618). The study involved 44 overweight hypertensive persons who were randomly assigned to two groups. Individuals in the experimental group were placed on a hypocaloric diet low in sodium and supervised moderate exercise 3 times per week. The control group received no intervention. After 9 weeks, the researchers reported a 4.9kg mean reduction in weight, 9.5mmHg reduction in systolic blood pressure and 5.3mmHg reduction in diastolic blood pressure in the experimental group. No such observation was noticed in the control group. In addition, the researchers also reported a reduction in total low-density cholesterol levels in the experimental group.

According to Chobanian et al (2003:1217) health related actions which lower blood pressure are weight reduction, adopting the Dietary Approach to Stop Hypertension (DASH) eating plan, reducing in dietary salt intake, reducing alcohol consumption and doing regular physical exercise. These actions are summarised in table 2.2 and each would be discussed in detail in the discussions that follow.

Table 2.2: Lifestyle Modifications to Prevent and Manage Hypertension.

Modification	Recommendation	Approximate systolic blood pressure reduction (range)
1. Weight reduction	Maintain normal body weight (body mass index 18.5-24.9kg/m^2)	5-20mmHg/10kg weight reduction
2. Adopt the DASH eating plan	Consume a diet rich in fruits, vegetables, and low-fat dairy products with a reduced content of saturated and total fat.	8-14 mmHg
3. Dietary sodium reduction	Reduce dietary salt intake to < 2400mg sodium per day or < 6000mg sodium chloride per day.	2-8 mmHg
4. Moderation of alcohol consumption	Limit alcohol consumption to no more than 2 drinks (e.g. 24 oz beer, 10 oz wine or 3 oz 80-proof whiskey) per day in men and to no more than 1 drink per day in women and lighter weight persons.	2-4 mmHg
5. Physical activity	Engage in regular aerobic exercises such as brisk walking at least 30 minutes per day most days of the week.	4-9 mmHg

(Chobanian et al 2003:1217)

- ***Weight reduction***

The Body Mass Index is a measure of overweight and obesity. It is obtained by dividing body weight by the height squared. Individuals with a Body Mass Index of 18.5 – 24.9kg/m^2 are considered to have optimal weight for height, those with a Body Mass Index of 25-29.9kg/m^2 are overweight and those with a Body Mass Index greater than 30kg/m^2 are considered obese. Current estimates suggest that about 500 million people worldwide are overweight and another 250 million are obese (Harsha & Bray 2008:1420). Overweight and obesity are positively associated with hypertension, type 2 diabetes, cancers, and cardiovascular diseases.

The Nurses Health Study of 1995 by Manson, Willet, Stampfer, Colditz, Hunter and Hankinson (1995:678) supported the positive correlation of overweight, obesity and hypertension. The authors followed up 115119 women who were aged 30 to 50 years and free from any known disease for 16 years. During the period a total of 4726 died, out of which 881 died as a result of cardiovascular diseases, 2586 of cancer and 1259 of other causes. With regards to cardiovascular mortality, the authors observed a 2 to 6-fold increase in mortality among women with a Body Mass Index greater than 30kg/m^2 compared to women with a Body Mass Index less than 19kg/m^2. The public health goal of lifestyle modifications is to help individuals who are overweight or obese to achieve a normal Body Mass Index. According to He, Whelton, Appel, Charleston and Klag (2000:544) a 10kg weight reduction can lower systolic blood pressure by a range of 5-20 mmHg.

- ***Dietary changes necessary to lower hypertension***

According to Miller et al (2002: 612) dietary changes alone can effectively reduce the systolic blood pressure of a person with hypertension by a range of 8-14 mmHg. Reduced saturated fat and dietary salt consumption are important dietary factors in the prevention and control of hypertension. Various dietary measures serve to lower blood pressure as indicated below:

- ***Increased potassium and decreased saturated fats consumption***

Dietary changes necessary in hypertension management include a reduction in fatty foods intake and an increase in potassium rich foods such as fruits and vegetables (Appel, Brands, Daniels, Karanja, Elmer & Sacks 2006: 296-308). Red meat reputably rich in saturated fats should be replaced with fish.

- ***Reduced dietary salt intake***

Dietary salt reduction is an essential component of the non-pharmacological treatment of hypertension. Various studies have confirmed strong associations between salt intake and hypertension (Appel et al 2006:298; He & MacGregor 2003:1; Obarzanek et al 2003:459). Most family diets are generally high in sodium chloride. Hypertensive and non-hypertensive persons are advised to limit their dietary salt intake to 100mmol per day (2.4g of sodium) or 6g of sodium chloride per day (Appel et al 2006:298; Chobanian et al 2003:1217).

- ***Reduced alcohol intake***

A meta-analysis of 15 randomised controlled trials examining the relationship between alcohol consumption and hypertension conducted in the USA by Xin et al (2001:1112-1117), suggests that limiting the quantity of alcohol-consumed daily can lead to a significant reduction in both systolic and diastolic blood pressure by between 2-4 mmHg. The researchers reported a dose-response relationship between the mean alcohol reduction and mean blood pressure reduction. According to the researchers, men should limit daily alcohol consumption to about 20g of ethanol and women 10g of ethanol. Apart from blood pressure reduction, minimising alcohol intake also reduces the risk for heart attacks, heart failure and cerebrovascular accidents (Greeff 2006: 20).

- ***Physical activity***

Research has shown that regular moderate exercise such as walking briskly or performing aerobics (lasting at least 30 minutes three times per week) can lower systolic and diastolic blood pressure considerably (Miller et al 2002: 612; Whelton, Chin, Xin & He 2002:493). The reductive effect is synergistic with other modifiable factors such as dietary modification and a reduction in alcohol consumption. Whelton et al (2002:493) found that regular physical exercise alone can lead to a reduction in systolic blood pressure by 4-9mmHg.

2.3.4.2 Drug treatment of hypertension

Drug treatment of hypertension is effective in controlling the disease and preventing the development of complications. The goal of drug treatment is to maintain the systolic blood pressure below 140 mmHg and the diastolic blood pressure below 90 mmHg. The efficacy of drug treatment in hypertension was demonstrated in the Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial reported in Geraci and Geraci (2003:389). The researchers conducted a randomised double blind controlled trial involving 42448 patients with mild to moderate hypertension and having one or more coronary risk factor, who were drawn from multicultural backgrounds. All patients were randomised to each of three different classes of antihypertension medications - diuretics (chlorthalidone), calcium channel blockers (amlodipine) and angiotensin converting enzyme inhibitors (lisinopril). After 5 years of follow up, the researchers found that nearly two-third of all the patients had achieved a normal blood pressure of less than 140/90 mmHg (Geraci & Geraci 2003:381). The average systolic and diastolic blood pressure readings of patients on the three drugs were chlorthalidone 133.9/75.4, amlodipine 134.7/74.6 and lisinopril 135.9/75.4 respectively. The importance of the findings is that compliance with drug treatment is effective in controlling hypertension.

Various commonly used classes of drugs, their mechanisms of action and common adverse effects are listed in table 2.3. These are diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors, Beta/Alpha adrenergic blockers, angiotensin II receptor blockers and centrally acting drugs.

Table 2.3: Classes of antihypertensive drugs

Antihypertensive	Mechanism of action	Side-effects
Angiotensin Converting Enzyme inhibitors e.g. Lisinopril	Blocking the conversion of angiotensin-1 to angiotensin-11, a potent vasoconstrictor and thereby leading to reduced vascular resistance	Hypotension Persistent dry cough Angioedema Impotence Alopecia
Diuretics:	Increasing fluid loss from the body.	
Thiazides e.g. Bendrofluazide	Inhibiting sodium reabsorption at the distal convoluted tubules.	Hyperuricemia (gout) Hyponatraemia Postural hypotension Impotence
Loop Diuretics e.g Frusemide	Inhibiting potassium reabsorption at the ascending limb of the loop of Henle in the renal tubule.	Hypokalemia Hyponatraemia Hypomagnesaemia Hypochloraemic alkalosis
Potassium Sparers e.g. Spironolactone	Antagonising aldosterone and sparing potassium diuresis.	Hyponatremia Hyperkalemia Gastro-intestinal tract disturbances Impotence Menstrual irregularities
Beta adrenoceptor blockers e.g. Atenolol	Blocking beta-adrenoceptors in the heart, peripheral vasculature, pancreas, liver, bronchi.	Gastro-intestinal tract disturbances Bradycardia Hypotension Bronchospasm
Calcium channel blockers e.g. Amlodipine	Blocking the inward flow of Ca+ ions through active cell membranes	Bradycardia A-V block Hypotension Sleep disturbances Pedal oedema
Angiotensin II receptor antagonists e,g. Valsartan	Blocking angiotensin-II receptors	Anemia Neutropenia Cough Headache
Alpha adrenergic blockers e.g. Prazosin	Blocking post-synaptic adrenoceptors producing vasodilation.	Postural hypotension Drowsiness Palpitations Priapism Urinary incontinence

Antihypertensive	Mechanism of action	Side-effects
Centrally acting drugs e.g. Methyldopa	Stimulating alpha-adrenergic receptors in the brain thus inhibiting the sympathetic nervous system.	Gastro-intestinal tract disturbances Stomatitis Hypersensitivity reactions Impotence Failure of ejaculation Decreased libido

(BNF 2006:90 -114).

2.4 COMPLIANCE

2.4.1 Definition of compliance

Compliance has been defined in section 1.7.3. The term adherence is often used synonymously with compliance. However, some researchers prefer to use the term “adherence." These researchers express their concerns that compliance signifies a judgemental point of view. According to Higgins (2006:28), compliance signifies a stance according to which "a patient is merely told what to do with regard to treatment and expected to follow the recommendations unquestionably," whereas "adherence assumes a collaboration between the patient and the treatment provider." However, Ren, Kazis, Lee, Zhang and Miller (2002:48) believe the two terms are synonymous and defines compliance as "adherence to provider directions by the patient about prescribed medication regimens."

According to Garfield and Caro (2000:13) compliance consists of three components namely, acceptance of medication prescribed, adhering to it and continuing with it. Thus compliance is a complex and dynamic health enhancing behaviour that involves acts of appointment keeping, obtaining and ingesting medications and persisting with health provider recommendations such as lifestyle changes. Non-compliance on the other hand represents the opposite of compliance behaviour and is defined as a constant neglect of treatment or advice rather than mere temporary forgetfulness (Lahdenpera & Kyngas 2000: 826).

2.4.2 Compliance to hypertension treatment

Hypertension has no cure therefore; patients are expected to take medications for life. Drug treatment of hypertension demands that patients comply with their medications as prescribed and they should return for a refill when medications are exhausted. They should honour their appointments for follow up visits with their clinician and adopt health actions that are recommended to lower their blood pressure (Appel et al 2006:298; Greeff 2006:20; Xin et al 2001:1117). Compliance with pharmacological and non-pharmacological treatment of hypertension has various benefits for the individual, the health care system and the society at large.

Compliance with treatment at the individual level improves the quality of life by preventing complications and thereby premature death. To the immediate family, it prevents the negative psychological impact associated with sudden death or living with a family member suffering from a chronic debilitating disease such as a stroke. It also conserves family resources that would have been utilised to obtain health care.

To the larger society, compliance with drug treatment is a cost saving measure since it decreases the incidence of complications and the need for additional medications (WHO 2003a:20). This is particularly crucial in a public financed health care system such as Seychelles. The dwindling economic fortunes of the country, which in 2003 necessitated the introduction of the Macro Economic Reform Programme signals the compelling need to maximise treatment outcomes by utilising resources effectively and efficiently (WHO 2005:11). To the health care system, compliance reduces the need for hospitalisations and decreased workload on staff. Moreover, satisfactory outcomes of treatment could help boost the morale of the attending clinician whereas treatment failure could be a source of frustration.

Various factors affect patients' compliance with antihypertension medications. The study by Bovet et al (2002:33-34) found that compliance was relatively high in patients with skilled occupations, those who were health conscious

and those who regularly honoured their clinic appointments. Patients with skilled occupations are most likely to understand the need to comply with medication whereas patients who are health conscious would be likely to honour clinic appointments and comply with treatment.

Patients' attitudes also influence their disposition to compliance behaviour. Jokisalo, Kampusalo, Enlund, Halonen and Takala (2002:577-583) found that attitudes such as carelessness, hopelessness and denial contributed significantly to medication non-compliance. Careless patients are likely to skip medications for several days while patients who have a sense of hopelessness would certainly not perceive any benefit of taking their medications. A patient who denies being hypertensive would certainly not bother to take medications. Wang, Bohn, Knight, Glynn, Mogun and Avorn (2002: 504) report that psychosocial factors such as depression and level of social support influence compliance behaviour. Depressed patients may lose interest in life itself and the appetite for food or medicine would consequently be suppressed. Social support such as financial or logistical support would be expected to enhance compliance particularly in elderly and invalid patients. Other factors such as socio-demographic factors, health care related factors, self-efficacy and cues to action also influence compliance behaviour. These factors are discussed in detail in section 2.6.2.2.

2.4.3 Consequences of non-compliance

Complying with daily medication taking, smoking cessation, and dietary and alcohol restrictions require a change in behaviour which may be extremely difficult. Patients often do not comply with their treatment in spite of professional advice even when negating such advice is at their own risk. According to Ashford, Eccles, Bond, Hall and Bond (1999:15), introducing individual behavioural change is often met with some difficulty and scepticism which are attributable to personal characteristics such as beliefs, attitudes, knowledge and motivation regarding the behaviour.

Kim, Hill, Bone and Levine (2000:90) report that non-compliance with antihypertension treatment has grave implications for the individual and the society. The consequences of non-compliance with antihypertension medications are threefold; first, it leads to resistant or uncontrolled hypertension; secondly it leads to unnecessary hospitalisations and increased workload for health workers and lastly, it results in wastage of resources (Garfield & Caro 2000:15; Ren et al 2002:47).

2.4.3.1 Consequences for the individual

At the individual level, non-compliance leads to resistant or uncontrolled hypertension, which when not detected results in the development of complications such as congestive heart failure, coronary heart disease, renal failure and cerebrovascular accidents (Munger, Tassell & Lafleur 2007:58). Apart from jeopardising the health and well being of the patient, these complications also lead to premature deaths (Kim et al 2000:94), or the victim may survive with lifelong disabilities resulting in a life of dependence on others. The absolute effects of the complications of hypertension on individuals are enormous and may be difficult to quantify, particularly the physical and psychological suffering inflicted on the victim and the immediate family.

2.4.3.2 Consequences for society

At the societal level, high rates of non-compliance increases the cost of treatment, induces inefficient use of health resources and compromises treatment outcomes (Kim et al 2000:93). Money expended on drugs given to patients and time spent on consultations are wasteful when patients fail to take medications as prescribed. This produces treatment failure and disease deterioration, resulting in “preventable hospital admissions and loss of productivity" (Thrall, et al 2004:595). In addition, unnecessary regimen changes may occur in an attempt to effect adequate control. Therefore the phenomenon of non-compliance represents a waste of scarce resources for

the society because money expended does not produce the desired effects and complications are treated at higher cost to the society.

This is of particular concern in Seychelles since the cost of hypertension treatment is completely borne by the state. The economic cost of non-compliance to the society in fiscal terms is enormous. For instance, in the USA alone, Flack, Casciano, Casciano, Doyle, Arikian, Tang and Arocho (2002:28), estimate that non-compliance and "failure to control blood pressure among the total USA hypertensive population was estimated to cost US$964 million, and among the treated hypertensive population, US$467 million" (Flack et al 2002:28). This excludes the loss of productivity from work absence. Similar estimates are reported from the United Kingdom (UK) (Thrall et al 2004:594).

2.4.4 Measurement of compliance

Various methods could be employed to measure compliance but there is no gold standard. Eight different methods mentioned in the literature are discussed in this study and each approach has its advantages and disadvantages.

2.4.4.1 Subjective assessment

Various methods are utilised to conduct subjective assessments of compliance.

- ***Monitoring clinic attendance***

Adherence to outpatient clinic appointments is a subjective approach to assessing compliance. Noncompliant persons may not honour their appointments. A study in Seychelles by Bovet et al (2002:33) showed that hypertensive persons who regularly honoured their appointments during a one-year period were more compliant than those who did not do so. The major attraction of this method is that it is easy and inexpensive to perform.

However, the major drawback with this method is that clinic attendance does not necessarily correlate with taking medication or maintaining the recommended lifestyle.

- ***Self-report***

Self-report involves measurement of compliance through questionnaires or by interviewing patients directly about drug taking and lifestyle habits. A major advantage of self-report is the ease of application. It is cheap and easy to perform. Furthermore, most non-compliant persons usually would admit not taking medication on certain days. The major drawback with the self-report method is that patients may overestimate their medication taking habit. However, combining self-report with assessment of clinical records can increase the reliability of this method. (Garfield & Caro 2000:13; Hadi & Gooran 2004: 292). For these reasons, the researcher considered this method appropriate for use in this study.

2.4.4.2 Objective assessment

Various methods are utilised to conduct subjective assessments of compliance.

- ***Pill counts***

Pill counts is an objective approach of assessing compliance which may involve paying patients surprise visits to count the number of unused pills remaining in the container. The major drawback of this method is the resources that would be required to visit every home. Also paying unannounced visits may be regarded as intrusive on an individual's privacy. According to Garfield and Caro (2000:14), unless researchers have the resources to visit every home the outcome measures would not be credible.

- ***Pharmacy refill records***

The number of refills obtained by a patient may be used to assess compliance. According to Wetzels, Nelemans, Schouten, van Wijk and Prins (2006:8), this method is objective, relatively inexpensive and does not involve invading a patient's privacy. The initial dates the individual collected the medications from the pharmacy and when he/she returned for refill are noted. However, the major drawback with the method is that it does not necessarily correlate with actual medication ingestion as other factors such as forgetfulness or carelessness may contribute significantly to non-compliance (Wetzels et al 2006:8).

- ***Biological markers***

This method involves using a urinary marker such as riboflavin to measure compliance. The drawback with this method is that noncompliant patients may be wrongly identified as compliant patients (Garfield & Caro 2000:14). In addition it is relatively expensive and time consuming and not suitable in outpatient clinical settings.

- ***Measurement of drug metabolites***

An ideal objective method of assessing patients' compliance would be to measure the drug metabolites in the blood or urine, as this would provide convincing evidence of drug ingestion. However, such measurements are problematic in hypertension treatment because many patients are on several drug combinations (Garfield & Caro 2000:14).

- ***Medication Events Monitoring System (MEMS®)***

The medication events monitoring system (MEMS®) is an electronic pill bottle that contains a microprocessor embedded in the bottle cap. The processor records the time and date the bottle is opened and thereby provides an

objective method of assessing compliance (Mengden, Vetter, Tousset & Uen 2006:36). Some MEMS caps have a screen display that reminds the patient of the number of tablets taken out in a day, while the information collected by the equipment can be transferred to a personal computer for analysis (Mengden et al 2006:36). This measure is sometimes referred to as the gold standard for the measurement of compliance. The MEMS device operates on 4 basic assumptions which are outlined by Denhaerynck, Schafer-Keller, Young, Steiger, Bock, and De Geest (2008:5) as follows: the electronic monitoring equipment must function correctly; all bottle openings should correspond to the actual intake of medication; the use of the equipment should not influence a change in behaviour; and, finally the equipment should not lead to sample bias.

However, a study of adherence of 250 renal transplant patients with the MEMS by Denhaerynck et al (2008:5), revealed that in 0.4% of patients the equipment malfunctioned, in 62% of patients there was a mismatch between bottle openings and actual intake of medication and furthermore, adherence effects waned after the first five weeks of using the equipment. This indicates that the equipment has a waning intervention effect (Denhaerynck et al 2008:5).

2.5 COMPLICATIONS OF HYPERTENSION

Hypertension sufferers can develop complications involving the cardiovascular, cerebrovascular, renal, and the ocular systems.

2.5.1 Cardiovascular complications

Sustained elevation of high blood pressure results in an overburdened heart. First to face the burden is the myocardial fibres of the left ventricle, which become hypertrophied. Over 30% of patients with sustained elevation of blood pressure have left ventricular hypertrophy (Weinberger 1999:5). This complication can lead to heart failure. Furthermore, hypertension promotes the development of atherosclerosis in the coronary artery supplying the heart.

A narrowing or complete occlusion leads to myocardial ischemia or infarction and sometimes death (Kaplan 2005: 145; Riaz 2007).

2.5.2 Renal complications

Hypertension leads to renal damage by promoting obstructive atherosclerotic plagues in the arteries supplying the kidneys. The vascular damage results in progressive deterioration of renal function and eventually renal failure (Kaplan 2005:146; Sharma & Kortas 2007).

2.5.3 Cerebrovascular complications

Hypertension promotes the development of atherosclerotic plaques in the cerebral vasculature. Narrowing or complete vascular occlusion of such vessels produces ischemic stroke. Furthermore, hypertension aids the development of aneurysms, the rupture of which results in haemorrhagic stroke (Kaplan 2005:152).

2.5.4 Ocular complications

Uncontrolled hypertension damages the tiny ocular vascular supply resulting in retinopathy, which may lead to blindness (Kaplan 2005:164).

2.6 THEORETICAL FRAMEWORK: THE HEALTH BELIEF MODEL

The Health Belief Model served as the theoretical framework for this current study. The Model formed the basis for the development of the research questions. In addition to this, the Model also served as a conceptual framework for the development of the interview schedule, and the interpretation and discussions of the research results.

2.6.1 Origins and purpose of the Model

Historically, the Health Belief Model was developed by a group of social psychologists working in the United States Public Health Service led by Godfrey Hochbaum in the 1950s. Becker later modified it in 1974. The researchers were driven by the need to explain the surprising failure of public participation in free health screening programmes at that time. The development of the Model spawned out of the major concern of the United States Public Health Service programme implementers to identify factors which inhibited or motivated individuals to utilise free health screening services (Rosenstock, Strecher & Becker 1988: 175-176)

Glanz, et al (2002:47) studied the relationship between perceived susceptibility to tuberculosis and perceived benefits from obtaining a mobile X-ray screening. They discovered that among those who reported a belief in their own susceptibility to develop tuberculosis and the benefits of X-ray screening, 82% had X-rays taken whereas, among those who did not hold this belief only 20% had undergone the X-ray screening test. The Model was subsequently applied by other researchers to study patients' reactions to symptoms and compliance with prescribed medications (Finfgeld, Wongvatunyu, Conn, Grando & Russell 2003: 288; Naidoo & Wills 2003: 222; Rosenstock et al 1988: 177).

2.6.2 Basic components of the Health Belief Model

Historically, that the basic components of the Health Belief Model (perceived susceptibility, perceived severity, perceived benefits and perceived barriers) were derived from various models of psychological and behavioural theories of cognition. Cognitive theorists propose that health behaviour is volitional and largely dependent on the subjective value placed by an individual on an expected outcome of the action and the likelihood that such an action would achieve that outcome. This is referred to as value expectancy theory (Finfgeld et al 2003: 288; Glanz et al 2002:47).

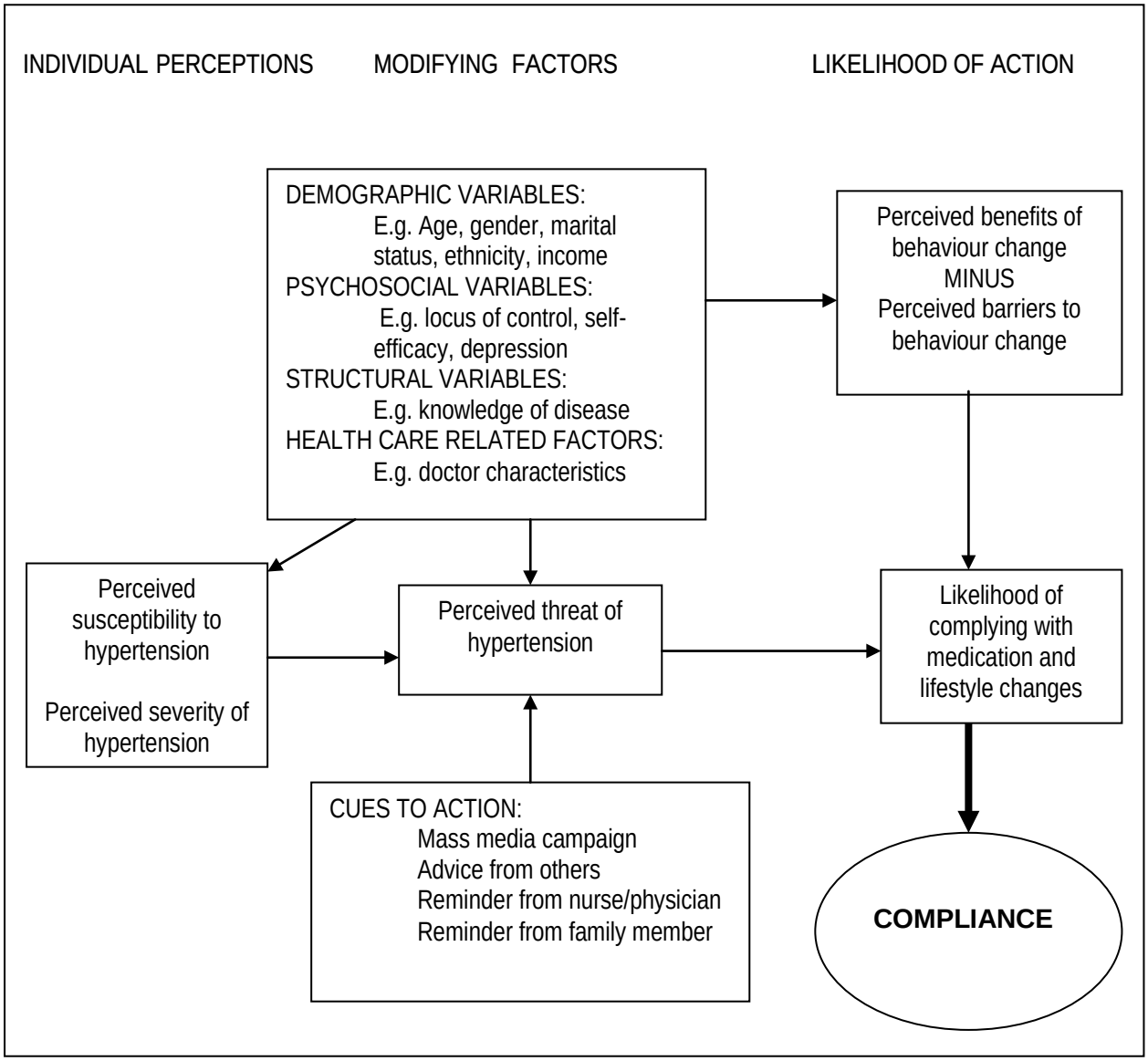
As a value expectancy theory, the model conceptualises that preventive health actions is dependent upon values placed on proposed actions and the innate belief that the ultimate outcome would be what was anticipated. On the strength of the Model, a patient diagnosed with hypertension would have to consider his or her vulnerability to hypertension and its consequences before making "the judgement as to whether the benefit to be gained from a particular [compliance] behaviour is worth the cost" (Stewart & Eales 2002:13).

The behaviour examined in this research is compliance with lifestyle modifications (refer to section 2.3.4.1) and prescribed antihypertension medications (refer to section 2.3.4.2). This is based on the understanding that blood pressure control involves both drug treatment and lifestyle changes. Compliance behaviour is a complex and multidimensional phenomenon and various possible factors that could influence the behaviour have been studied and reported in the literature (WHO 2003b:29). These factors include socio-demographic factors (such as age, gender, occupation and educational status); psychosocial factors (such as social class and personality); structural factors (such as knowledge about the disease); and prior contact with the disease. Other factors that influence compliance behaviour are cues to action (such as mass media campaigns, advice from friends, reminder messages from physicians or nurses, newspaper and magazine articles, or being in contact with family members or friends with a similar illness) and a sense of self-efficacy (Winfield & Whaley 2002:330). The variables of the Health Belief Model are described in detail and applied to this current study in the next sections.

2.6.2.1 Individual perceptions

The Health Belief Model incorporates perception as a core concept in its framework. The Oxford Dictionary of Current English (2001:663) defines perception as "a way of understanding or regarding something." The Model (figure 2.1) posits that individuals' overall perception of the degree of severity

of the disease and their susceptibility to the consequences of the disease in one hand, and the benefits of or barriers to taking a recommended health action on the other hand, determine their behaviour towards the disease. People perceive phenomena in different ways depending on a myriad of factors including cultural, religious, social or psychological experiences. Perception of disease and treatment are largely influenced by these factors. It stands to reason that the perception of persons suffering from hypertension would invariably influence their acceptance or rejection of treatment.



(Naidoo & Wills 2003: 222).

Figure 2.1
Structure of the Health Belief Model adapted from Becker (1974)

- ***Perceived susceptibility to uncontrolled hypertension***

Perceived susceptibility refers to patients' views of the risk of having a disease such as hypertension or the complications of uncontrolled hypertension such as heart attack, kidney failure, or stroke (Glanz et al 2002:48). Since hypertension usually presents as an asymptomatic disease, patients must believe they are susceptible to develop complications with or without experiencing specific symptoms. Such a perception is based on sound knowledge of the disease. Patients with knowledge about the nature and course of hypertension as well as possible risks associated with non-compliance with treatment would likely perceive themselves susceptible to the disease and its complications. According to the Health Belief Model a patient who feels susceptible to hypertension and its sequelae would more likely comply with treatment than those who do not hold this belief.

- ***Perceived severity of hypertension***

Perceived severity refers to the extent to which persons judge a condition such as hypertension to be a serious disease. Perceived severity is the judgement of the ability of a disease to cause morbidity, disability or mortality. According to the Health Belief Model, persons who perceive hypertension to be a serious disease would be more compliant with medication and lifestyle modifications than those who do not hold this perception (Glanz et al 2002: 48).

- ***Perception of hypertension as a threat***

Carpenter (2005:194) defines perceived threat as "the anticipation of harm that is based on the cognitive appraisal of an event or cue that is capable of eliciting the individual's stress response". The definition highlights three themes - first, the anticipation of harm, which implies that individuals have needs, and goals they aspire to achieve in life and whatever could jeopardise those needs and goals constitutes a threat. Secondly, the anticipated threat

results in cognitive appraisal of the relevance or irrelevance of the threat and thirdly, an action is taken which involves evaluation of the resources available to deal with the threat and the method(s) of doing so (Carpenter 2005:193). Thus perception of threat is a cognitive phenomenon that can be influenced by the social and cultural environment in which the individual lives.

Perceived threat represents the hallmark of the Health Belief Model, which postulates that perception of threat determines an individual's response to the threat. Various socio-demographic, socio-psychological or structural variables could jointly influence patients' decision outcomes. Perceived susceptibility and perceived severity combined influence their perception of hypertension as a threat. For patients suffering from uncomplicated asymptomatic hypertension, a combination of these factors would invariably determine their response to the prescribed treatment and advice given by health care professionals on lifestyle modifications.

Persons who believe that they are not susceptible to hypertension or deny the existence of hypertension may not see the need for ingesting their medications as prescribed or change their lifestyle. A study in Finland by Jokisalo, Kumpusalo, Enlund and Takala (2001:756) reported that 66% of respondents denied being hypertensive and did not follow through with their treatment.

2.6.2.2 Modifying factors influencing individuals' perceptions and compliance behaviour

Various modifying factors including socio-demographic, socio-psychological and structural factors are known to have significant influences on health behaviour. Some of these factors are discussed below.

- ***Demographic factors***

The health belief Model stipulates that demographic factors influence health behaviour as indicated in this section.

Age

A patient's age could influence the decision to comply with antihypertension medications. Elderly patients tend to have poor compliance owing to the presence of cognitive impairment (memory loss) and a reduction in functional capabilities such as failing eyesight, and decreased dexterity with hands that could affect activities such as bottle opening (WHO 2003a: 29). Furthermore, elderly patients require family support that might not be available particularly if they live alone. In addition, elderly patients tend to have multiple morbidities that necessitate various drug regimens thus further compounding the problem. It follows therefore, that compliance may be poor in the elderly owing to the above stated reasons. Similarly, compliance may be poor in younger patients due to ignorance of the true nature of hypertension or denial of the existence of the disease. However, there has been no consistency in findings relating age with medication compliance. Age-compliance behaviour relationship is a complex phenomenon that may involve various other variables not fully understood (Hadi & Rostami-Gooran 2004: 293).

Gender

There is inconclusive evidence about the implications of a person's gender on compliance behaviour. As far back as 1992, Shea, Misra, Ehrlich, Field and Francis (1992:1607) found in their study in New York that women were more compliant with antihypertension medications than men. A cross-sectional study involving Chinese immigrants was conducted between 2002 and 2003 in the USA. The study revealed that women were slightly more compliant than men with their medication regimens (75% versus 69% P= 0.42). Being male and a prolonged length of stay in the USA were statistically associated with non-adherence among the Chinese immigrants surveyed (Li, Wallhagen and Froelicher 2008:326).

However, the study in Netherlands by Van Wijk, Klungel, Heerdink, and De Boer (2004:1832) found that men were more compliant than women. The

researchers had examined the association between compliance and change in antihypertension medication regimen in a nested case-control study of new antihypertensive drug users. They reported that non-compliance was more statistically associated with the female gender (OR=1.64 95% CI 1.37-1.94) compared to the male gender (OR= 1.14 95% CI 0.94-1.40). Knight, Bohn, Wang, Glynn, Mogun and Avorn (2001:810), have reported similar findings from a study conducted in Boston, USA. The researchers found that the female gender and widowhood were associated with non-compliance behaviour.

On the other hand, some studies have found no significant relationship between gender and compliance behaviour (Bovet et al 2002:35; Hadi & Rostami-Gooran 2004:293). The inconsistency of findings reflects the complexity of compliance behaviour and the need to contextualise study findings for the effective implementation of interventions to improve compliance amongst patients.

Educational status

A study in Finland (Kyngas & Lahdenpera 1999: 832) reported that the female gender in combination with a high level of education was significantly associated with medication compliance. In contrast to this, the study by Bovet et al (2002:35) found that the respondents' level of education was not associated with their medication compliance.

The inconsistencies in findings may be attributable to the complex nature of compliance behaviour and because it involves several underpinning personal and social factors. Education may lead to better understanding of the risks involved in non-compliance behaviour. Literate persons and those who are motivated to know more about their illness are more susceptible to health education than illiterate persons. However, according to Carlberg (1993) in Kyngas and Lahdenpera (1999:833) one’s level of education does not automatically produce and sustain a healthy behaviour. Other factors such as

cultural beliefs may assume eminence over education and affect individual capacity to adhere to medical advice.

Occupation

Bovet et al (2002:36) found in Seychelles that patients with highly skilled occupations were more compliant than those with lesser skills. The link between skilled occupation and compliance in the Seychelles context is not clear, but it is possible to argue that patients with skilled occupations would be of higher socio-economic status which, in turn, has been reported to be associated with compliance (WHO 2003a: 35).

Alcohol abuse

The World Health Organization report asserts that alcohol abuse and tobacco smoking are important modifiers of compliance behaviour (WHO 2003a:30). Studies by Bovet et al (2002:37) in Seychelles and Kyngas and Lahdenpera (1999:834) in Finland found that heavy alcohol drinkers were less compliant with their antihypertension medications than moderate drinkers. This is not surprising since the fear of drug interaction with alcohol could dissuade a patient from taking the medications. Non-adherence may also be largely due to forgetfulness in heavy drinkers. Heavy drinking and non-adherence affect patients suffering from other types of chronic diseases. For example, researchers examining the relationship between heavy alcohol consumption and adherence to antiretroviral drugs also report high levels of non-adherence (Parsons, Rosof & Mustanski 2007:357).

- ***Psychosocial factors***

The health belief Model stipulates that psychological factors influence health behaviour as indicated in this section.

Socio-economic status

The World Health Organization considers socio-economic status of patients as an important factor influencing compliance behaviour (WHO 2003b:28). Patients of low socio-economic status are often poor and cannot afford the cost of medications and transport costs to health centres. They often have to barter the pressing need to provide food for the family rather than procure medications. In a largely asymptomatic disease such as hypertension, it is not surprising that many would not consider medication compliance as a primary priority. However, low socio-economic status has not been consistently found to be an important and independent modifier of compliance behaviour (WHO 2003b:28).

Health locus of control

Health locus of control is a socio-psychological variable in the social learning theory of personality that categorises patients' health seeking behaviour into two broad groups as either internalists or externalists. Internalists are persons who believe they are responsible for their health or illness and take actions to prevent or protect their health. They believe that "certain events and happenings are due to their own actions and behaviours, that is, their own actions are directly responsible for the events in their lives" (Moshki, Ghofranipour, Hajizadeh & Azadfallah 2007:295). Internalists are likely to comply with their medications or take advice about their health.

In contrast, externalists believe other people such as doctors, an evil power or God are responsible for their health. Consequently, such persons are less likely to be compliant with treatment than internalists (Higgins 2006:28). Hong, Oddone, Dudley and Bosworth (2006:20) investigated the relationship between locus of control and medication adherence among 588 hypertensive veterans in the USA. The researchers found that the respondents with a high internal locus of control and low external locus of control were more compliant with medications than patients with low internal locus of control and high external locus of control. A study by Rose, Walker and Macleod (2004:607), in

the UK revealed that a strong emotional response to sickness and an internal locus of control were significantly associated with compliance behaviour.

In the Seychelles context, Bovet et al (2002:37) found that respondents who regularly kept their appointments in the health centres were more compliant with medications than those who do not regularly honour their appointments. The researchers inferred that those respondents who honour their appointments comparatively have a higher internal locus of control with regards to health seeking behaviour than patients who do not honour their appointments. Failure to honour clinic appointments in itself is a noncompliant behaviour.

Self-Efficacy

Lifestyle modifications have been shown to lower blood pressure and for patients with mild hypertension such measures alone could be adequate to maintain a normal blood pressure. However, lifestyle modifications require considerable levels of ability or self-confidence to adhere. It was Rosenstock et al (1988:175-183) who suggested that Bandura's (1986) concept of self-efficacy be included in the Health Belief Model to improve its ability to predict compliance behaviour. Initial application of the Model concerned simple preventive behaviour such as immunisation or screening tests. The authors proposed that behaviour change requiring greater efforts to execute would require a significant degree of confidence in one's ability to effectively perform the behaviour. Kroll, Kehn, Ho and Groah (2007:34) cite Bandura's (1997) definition of perceived self-efficacy as "beliefs in one's capabilities to organise and execute the courses of action required for producing given attainments".

The Health Belief Model proposes that hypertensive patients with higher levels of perceived self-efficacy would be more compliant with medications and particular lifestyle modifications than those with lower levels of self-efficacy. A recent clinical review by Cochrane (2008:543) identifies self-efficacy as a unique universal concept that positively influences behaviour and is associated with successful actions. Most hypertension patients already

know what actions they should take, such as weight loss, smoking cessation or participating in exercise activities, but knowledge is insufficient to stimulate actions. Patients need to believe in their capability and have confidence to perform the expected behaviour. Health professionals could use verbal persuasion and expressive encouragement to stimulate self-efficacy in their patients to comply with medications or lifestyle modifications.

- ***Structural factors***

Patients' knowledge of hypertension is important in the management of the disease. Research has shown that a high level of knowledge is important to achieve adequate control of blood pressure and lack of knowledge is a significant predictor of poor blood pressure control. This view was supported by a study in the USA by Knight et al (2001:809). The researchers also found that among diagnosed hypertensive persons' awareness and knowledge of the disease was strongly related to good blood pressure control. Patients, who indicated lack of knowledge of what a normal systolic blood pressure value of ≤140mmHg signifies, had significantly higher blood pressures than those who knew. However, the relationship between knowledge of hypertension and medication compliance have been inconsistent. Wang et al (2002:509) found no significant effect between prior knowledge of hypertension and compliance with medication but reported depression was a significant predictor of non-compliance in their study.

Knowledge of the disease is also an important factor that influences perceptions and ultimately compliance behaviour. In a population-based study of knowledge, attitudes and practices regarding hypertension in Seychelles in 1998, Aubert et al (1998:1138) reported that a significant proportion of the Seychelles population had good knowledge about hypertension. More than 96% of the respondents knew there is a relationship between obesity, salt intake and hypertension. About 79% knew the benefits of physical exercise and a significant number believed smoking can cause hypertension. However, only 28% believed hypertension has no symptoms, 10% knew their blood pressure values and 14% knew what a normal blood pressure value is (Aubert

et al 1998: 1139). By implication persons who believe that hypertension is symptomatic would most probably not seek treatment or comply with their prescribed drug regimen unless they develop the symptoms of hypertension. It is also important for patients to know what represents optimal blood pressure to enable them to strive to remain normotensive. Unfortunately no new population-based study has been conducted in the country to compare these findings.

- ***Health care provider factors***

Health care professionals influence the compliance behaviour of persons suffering from hypertension. The study by Benson and Britten (2002:874) revealed that compliance with antihypertension medication treatment is promoted if patients experience their encounters with their doctors positively, receive adequate advice, trust the doctor and experience improvement in blood pressure control. Thus physicians play an important role in enhancing medication compliance by their patients.

The qualitative study in 2000 by Benson and Britten (2002: 873) in the UK indicated that certain physicians' characteristics might enhance medication compliance of their patients. The study listed such characteristics as empathy on the part of the physician, willingness to explain the disease and medications to the patient and patience during consultation. The study revealed that patients' compliance is enhanced when they have confidence in the physician and communicate effectively (Ren et al 2002: 49).

Patients who comply with treatment anticipate that it would lead to controlled blood pressure as a benefit and that implies clinicians must use appropriate and effective antihypertension medications. Patients may experience distress if their hypertension remains uncontrolled despite satisfactory compliance and this may result in their refusal to persist with the treatment. A study in the USA by Berlowitz, Ash, Hickey, Friedman, Glickman, Kader and Moskowitz (1998:1957) assessed doctors' decisions to alter medication during routine visits. The researchers reported that the doctors altered the medication

prescription only in 21.6% cases of elevated blood pressure (defined as systolic blood pressure greater than 160mmHg or diastolic blood pressure greater than 90mmHg). This was a cross sectional study and there was a possibility that the doctors did alter the medication on subsequent visits. However, this finding could be a pointer to the fact that despite absolute compliance by patients, blood pressure may still remain uncontrolled due to clinical inertia on the part of the doctor (Wang & Vasan 2005:1652). Clinical inertia is described as the "wait and see and it will be okay" attitude. This attitude may be responsible for the reluctance to increase the current dose or introduce a new drug to the patient's regimen even when hypertension is not controlled.

A clinician's knowledge and background experience of hypertension could influence patients' compliance. A study conducted in the USA between 1996 and 1998 by Ren et al (2002:47) reported that health care providers who were older and physicians who were non-specialists had patients who were less compliant with their treatment than patients seen by younger health care providers and specialist physicians. Therefore, patients' perceptions of the professional competence of the clinicians could play a role in their compliance behaviour.

- ***Cues to action***

Cues to action (motivators) refer to factors that could instigate or prompt an individual to take an action. Green and Kreuter (2000:162) refer to a cue as a "precipitating force that makes the person feel the need to take action." Cues to action may be internal or external.

Internal factors may be the manifestation of the symptoms of the disease (Glanz et al 2002:48). Peoples' beliefs about disease and the manifestations of disease symptoms act as internal cues to compliance behaviour (Winfield & Whaley 2002: 332). According to Stewart and Eales (2002:13) many people perceive health as "being able to cope, feeling fit and being symptom free." Patients suffering from uncomplicated hypertension are usually fit and

symptom free and such a disposition would influence their perception of hypertension differently from, say, persons suffering from diabetes. The symptoms of hyperglycemia could stimulate a diabetic to take their medications and adhere to their diet while a hypertensive patient without any symptoms may not deem it necessary to comply with their treatment (Siegel 2005:11).

External factors could be media publicity or effective health education directed at a target audience (Glanz et al 2002:48). Cues such as reminder cards, telephone calls or e-mail messages can play an important role in compliance behaviour by reminding patients to take their medications. In this study, the influence of health education as an external cue would be assessed.

2.6.2.3 Likelihood of compliance behaviour

On the basis of the Health Belief Model, the likelihood of patients complying with their treatment depends on the degree to which they perceive themselves to be susceptible to the disease or its complications and their perceptions of the severity of the condition. This perceived threat of the disease is weighed against the benefits to be derived from compliance with the prescribed treatment and the barriers they need to overcome. The Health Belief Model postulates that a high perceived threat; low perceived barriers and a high-perceived benefit would result in the likelihood of exhibiting compliance behaviour. However, the eventual outcome decision would be determined by an interplay of various demographic, psychosocial and structural factors surrounding the individual and the cues to action to which they are exposed (Munro, Lewin, Swart & Volmink 2007:5).

- ***Perceived benefits of antihypertension treatment***

Perceived benefits relates to the belief which patients hold that a proposed course of action would be effective in eliminating the potential threat. The Health Belief Model hypothesises that patients who perceive benefits from adopting particular health behaviour are more likely to demonstrate the

required health behaviour than those who do not hold such a perception (Green & Kreuter 2000:162). Applied to this current study those persons who perceive that taking antihypertension medications and adopting lifestyle changes would benefit them, would be more likely to be compliant than those who do not hold such as a perception. Such perceptions are based on knowledge of the disease and its progression.

The study by Benson and Britten (2002: 874) revealed that compliant respondents reported the perceived benefits they derived from taking medication as one of the reasons for their compliance. The anticipation of good outcomes such as feeling better and having peace of mind contributed towards their compliance (Benson & Britten 2002:874).

- ***Perceived barriers to taking antihypertension medications***

Perceived barriers relate to the perception that there are obstacles standing in the way of executing the required health behaviour, such as compliance behaviour. Various perceived barriers to taking antihypertension medications identified in the literature include problems associated with medication side effects, complex dosing, frequent changes of medications and high costs involved. It is hypothesised that patients with greater perception of barriers are expected to be less likely to demonstrate compliance behaviour than those who believe that the benefits outweigh the barriers (Green & Kreuter 2000:162).

Medication side effects may be a reason for non-compliance. In Finland, a study by Jokisalo et al (2002:577) confirmed that serious side-effects of medications led to non-compliance. The study also confirmed that simplicity of dosing improved compliance particularly among the elderly respondents who had cognitive impairment. In the UK, Benson and Britten (2003:1314) noted increased compliance with a single daily dose compared with multiple daily doses. A meta analysis of eight studies on adherence by Isikedjian, Einarson, Mackeigan, Shear, Addis, Mittmann and Hersich (2002:303) reported that

patients on single daily doses (91.4%) were more compliant with treatment than patients with multiple daily doses (83.2%, P <0.001).

In contrast, Hashmi, Afridi, Abbas, Sajwani and Salaheen (2007: 5) conducted a study in Pakistan and found that respondents on multiple drugs (3 or more) were more compliant than those who were on a single daily drug regimen. The authors argued that this finding could have been due to the possibility that patients on multiple drugs considered their disease to be more severe compared to those on a single drug treatment.

The qualitative study in the UK by Benson and Britten (2002:874) identified various reservations patients hold regarding antihypertension medications. Some of the respondents expressed the desire to discontinue taking medication in order not to become addicted while others indicated they would prefer alternatives to drugs. Some of the patients expressed a fear of the hidden danger associated with lifelong medication consumption while others questioned the rationale behind taking antihypertension medications even when there are no symptoms. If patients deny the existence of the disease or believe there is a hidden danger associated with taking medications, chances are that they would not adhere to the treatment (Jokisalo et al 2001:756). On the basis of the Health Belief Model, patients need to understand clearly the nature of hypertension and their susceptibility to the risks involved in not taking medications (Stewart & Eales 2002:13).

2.7 SUMMARY

The literature review provided an overview of the nature of hypertension, its complications and management. The importance of compliance with treatment was stressed. The researcher then discussed the concept of compliance, factors affecting compliance and the ways in which compliance are measured. Finally the Health Belief Model, which served as the theoretical framework for the study was discussed and applied to the current study.

CHAPTER 3
RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

Quantitative descriptive-correlational research was conducted to examine the relationships between compliance with the antihypertension drug treatment and lifestyle modification regimens and the variables of the Health Belief Model in a sample of diagnosed hypertension patients and to establish what factors influence compliance in this population. This chapter describes the research design and methods used, as well as measures to ensure scientific rigour and ethical research.

3.2 PHILOSOPHICAL FOUNDATION

Philosophy refers to the logical and rational manner of examining world phenomena. It offers the framework through which such reasoning occurs (Unisa 2006: 2). According to Burns and Grove (2005:12), perceptions of phenomena are influenced by an individual's philosophy and knowledge about the phenomena. A research study serves as a logical and systematic approach to unravelling phenomena and should be guided by philosophical principles.

The philosophical foundation utilised in this study is logical positivist tradition. Logical positivists opine that natural phenomena can be understood through the principle of *determinism.* According to Babbie and Mouton (2001:20), determinism refers to the attribution of the occurrence of universal phenomena to consequences of cause and effect relationships. Thus each behaviour or disease is deemed to be a by-product of a cause and effect relationship, which could be investigated, identified, and manipulated. Furthermore, by applying the scientific method of inquiry into natural phenomena, authentic knowledge can be generated and utilised for human

benefit. For example, if the causes of inappropriate behaviour are identified, strategies could be developed and measures adopted to prevent individuals from engaging in such behaviour (Unisa 2006:2). This current study was not focussed on establishing cause and effect relationships. However, the researcher did establish correlations between compliance behaviour and the other variables of the Health Belief Model.

Drawing comparison between the human body and a machine can elucidate the principles of mechanism and reductionism. Just as a machine could be decomposed into component parts and then re-synthesised, the human body and human functioning can be broken down into its various component parts and studied (Brown, Crawford & Hicks 2003:4). Although compliance behaviour is complex and is determined by various interacting factors, the researcher used the Health Belief Model to identify the distinct research variables. Each variable represent a specific aspect related to compliance behaviour. Each variable was studied individually after which statistical evidence was obtained about the interrelationships of the variables. The researcher argued that the understanding gained through this process would enable clinicians to implement strategies to improve hypertensive patients' compliance with their treatment.

According to Unisa (2006:3), there are five characteristics of the epistemology of logical positivism, which are quantification of data, deductive reasoning, objectivity, empiricism and verifiability.

3.2.1 Quantification of data

Research which is based on logical positivism involves adopting structured data collection methods and subjecting such data to statistical analysis. Inferences are thereafter made about the universe (Unisa 2006:3). In this study, the researcher developed an interview schedule and a checklist to collect structured data which was subsequently subjected to statistical analysis.

3.2.2 Deductive reasoning

Positivism involves deductive reasoning, which implies generating a hypothesis from an existing theory and testing the hypothesis in order to make generalisations (Burns & Grove 2005:26, Unisa 2006: 3). In this study, the researcher utilised the Health Belief Model as the theoretical framework. The Model hypothesises that perception modifying factors and likelihood factors are determinant factors in health behaviour such as compliance (refer to figure 2.1). In this current study the Model was used to specify the research variables for investigation, develop the items which were incorporated into the data collection instruments and determine how the relationships between the variables would be investigated. This was not a hypothesis testing study.

3.2.3 Objectivity

According to Burns and Grove (2005:27), the researcher applying the positivist tradition must "adopt a distant and non-interactive posture with the research respondents to prevent bias." In this current study, the researcher maintained an independent stance with respondents while conducting structured data collection.

3.2.4 Empiricism

A research utilising the positivist tradition examines the real world. Information obtained in a systematic manner is used to expound natural phenomena for which causes may be determined (Burns & Grove 2005: 27). In this study, the researcher followed a structured systematic research process aimed at in-depth analysis of various factors associated with the complex human behaviour of compliance with treatment in consonant with the positivist tradition. Non-causal relationships were investigated while drawing comparisons between compliant and non-compliant patients and identifying correlates of study variables that significantly influence compliance behaviour. Identified relationships were quantified and analysed statistically to generate useful information that would guide the development of intervention measures

to increase compliance and reduce the consequences of non-compliance in this population.

3.2.5 Verifiability

Logical positivism demands that studies conducted under the principle should generate verifiable results and not result in mere speculation (Unisa 2006:3). In this current study the researcher provided statistical evidence of the relationships between the various variables of the Health Belief Model.

3.3 RESEARCH DESIGN

Burns and Grove (2005:40) describe a research design as a blue print developed to tackle a research problem. According to the authors, the main purpose of a research design is to maximise control over factors that could interfere with the validity of the study findings. This current quantitative study employed a descriptive-correlational design.

Quantitative research is defined as a "formal, objective, systematic process in which numerical data are used to obtain information about the world" (Burns & Grove 2005:23). A quantitative study utilises a representative sample obtained by applying a probability sampling method. This enhances the generalisability of the study findings to the target population. Reliable and valid data collection instruments are necessary to ensure the credibility of the study findings. A structured data collection method is preferable to unstructured methods because it eliminates researcher and respondent biases. Quantitative research techniques enable the collection of numerical data, which are analysed statistically to draw inferences about the universe (Burns & Grove 2005:37-42).

Correlational designs involve an investigation of the degree of relationships between two or more identified variables (Brink, Van der Walt & Van Rensburg 2006:201; Burns & Grove 2005:30). Correlation occurs when two variables change simultaneously in a particular direction and is measured with

a coefficient r. If a decrease in one variable produces an increase in the other variable, the correlation is regarded as negative and is represented with minus sign. If an increase in one variable produces a corresponding increase in another variable, the correlation is regarded as positive and is represented with plus sign. If one variable changes without any corresponding change in the other variable, it is regarded as no relationship and “r” is represented with a zero. By implication if two variables are known to correlate strongly, then one can be used to predict the other. Correlational studies may be descriptive or predictive but their main weakness is that causality cannot be established since all study variables occurred before the study began. However, a strong correlation between variables may provide impetus for such relationships to be further subjected to experimental approaches that ascertain causality (Burns & Grove 2005:240). In this current study the researcher investigated the relationships between compliance and the other variables of the Health Belief Model.

3.4 RESEARCH METHOD

3.4.1 Sample selection

Sample selection involves identifying the population with the characteristics of interest and selecting the specific elements to be included in the study (Polit & Beck 2008:290).

3.4.1.1 Population

Polit and Beck (2008:337), define a study population as the “entire aggregation of cases in which a researcher is interested.” A study population can further be subdivided into an accessible and target population. An accessible population is the pool of subjects with designated criteria accessible to the researcher for the study, whereas, a target population refers to subjects with similar attributes to that of the research subjects to whom the researcher may generalise his findings (Polit & Beck 2008: 338).

In this current study, the target population consisted of all adult sufferers of hypertension residing in Seychelles. The accessible population consisted of all persons who suffered from hypertension and received treatment at the Grand Anse Health Centre and Baie Sainte Anne Hospital both situated on Praslin Island.

3.4.1.2 Eligibility criteria

These are criteria that specify the characteristics of the study population (Polit & Beck 2008: 338). They help determine whether a specific case should be included in the study and offer reasons for generalisability of the study findings (Webb, Bain & Pirozzo 2005:164).

To be eligible for inclusion in this study, members of the population were:

- diagnosed with hypertension
- placed on treatment for at least one year prior to data collection
- aged between 18 and 80 years
- residents of Praslin island
- mentally sound
- registered outpatients at the relevant health care institutions.

Patients were excluded from this study if they:

- were too sick to be interviewed
- could not give informed consent
- were mentally unstable.

3.4.1.3 Sampling technique

Polit and Beck (2008:339) define sampling as the “process of selecting a portion of the population to represent the entire population so that inferences about the population can be made.” The portion selected forms the sample. According to Polit and Beck (2008:344), probability sampling involves random selection of study elements in such a way that each member of the study

population has an equal chance of being selected into the study. This approach confers a degree of confidence on the representative nature of the chosen sample by minimising researcher bias. For the purpose of this study, systematic probability sampling was chosen for sample selection.

The systematic probability sampling technique involves establishing a sampling frame, which is a list of potential elements with desirable characteristics to participate in a study. From the list, the researcher then chooses a p^{th} element at random in the total list and continues systematically till the required elements in the study are selected. Suppose the p^{th} element is the number 5, the researcher selects every 5^{th} element in the list (Polit & Beck 2008:347-348).

In this current study, the researcher utilised the two chronic case registers maintained at Baie Sainte Anne Hospital and Grand Anse Health Centre on Praslin Island as the sampling frame. The registers consisted of identified hypertensive patients in these centres and were a random heterogeneous aggregation of subjects of varying demographic and social backgrounds. Codes rather than real names were assigned to 660 identified sufferers of hypertension registered in these centres to form a single list. From this list, the researcher (blindfolded) randomly selected the starting point and followed systematically upwards and downwards picking every 6th subject until 110 subjects were selected. These steps were adopted to minimise the likelihood of selection bias.

3.4.1.4 Sample size

A sample is defined as a subset of the population selected for a study (Burns & Grove 2005: 750). Originally 110 persons were selected for this study as described in section 3.4.1.3. However, a total of 8 persons either refused to participate or did not meet the eligibility criteria for inclusion in the study. Following the advice of a statistician, and in view of the limited scope of this study, the final sample consisted of 102 persons with 58 females and 44 males.

3.4.2 Data collection

Burns and Grove (2005:470) describe data collection as the process of systematically gathering data from research subjects to answer research questions and achieve the research purpose and aim. The method and instrument employed depend on the research paradigm. Since this was a quantitative study, the researcher conducted structured interviews utilising a structured interview schedule to collect data. This section describes the data collection methods, research instruments and setting utilised in this study. These are outlined in Table 3.1.

Table 3.1: Overview of the data collection strategy

Data collection methods	Data collection instrument	Setting
Structured interview	Structured interview schedule	Respondents' home
Document analysis	Checklist	Health centre
Physiological parameters: Blood pressure Height Weight	 Sphygmomanometer Measuring scale Weighing scale	Respondents' home or health centre

3.4.2.1 Data collection methods

Data collection was conducted over a three months period extending between November 2008 and January 2009.

- ***Structured interview***

Structured interview is a method through which a researcher gathers data from respondents by personal interaction with them. A structured interview often involves the use of a structured interview schedule through which the researcher asks similar questions containing pre-determined response options to all respondents. Burns and Grove (2005:396-397) state that a

structured interview offers researchers some degree of research control. An interview allows the researcher to clarify items which respondents do not understand. Since the researchers actually interact with the respondents face to face, the response rate is usually higher than in self-administered questionnaires. However, structured interview are self-report and are therefore subject to respondent bias (Polit & Beck 2008: 336).

In this current study, interviews were conducted in the homes of the respondents on an agreed date and time. This approach facilitated the involvement of those who followed their treatment regimen as well as defaulters. Kyngas and Lahdenpera (1999:838) reported in their study of medication compliance that the least non-compliant patients did not attend the clinic; therefore such patients would be better interviewed at home. During the interviews, the researcher noted that most respondents felt at ease in their homes and willingly participated in the interviews. Each interview was conducted on one-on-one basis and lasted about 30 minutes.

- ***Document analysis***

Document analysis is defined as "the collection, review, interrogation and analysis of various forms of texts as a primary source of research data" (O'Leary 2004:38). This implies that researchers utilise data in their research to corroborate their argument concerning a phenomenon of interest. According to O'Leary (2004:39), document analysis can take two approaches. One approach involves the use of a structured instrument. The items are formulated in a manner that elicits the required data from the documents. It also contains a scale on which the researcher records the data which is subsequently quantified. In the second approach, the researcher notes the frequency of occurrences numerically. Such occurrences could be words, phrases, readings and concepts related to the phenomenon of interest. These are noted down and then reduced to statistical analysis.

The former approach was adopted in this current study. The researcher developed a checklist with the assistance of the research supervisor to extract

information from respondents' clinical notes (refer to annexure F). The decision to use the clinical records of the respondents as data sources was based on the assumption that clinical records contain unbiased clinical data with a high degree of trustworthiness. The respondents' clinical records were explored to crosscheck physiological measures, appointment keeping and prescribed treatment.

3.4.2.2 Data collection instruments

The researcher utilised a structured interview schedule and a checklist as data collection instruments in this study.

- ***The interview schedule***

An interview schedule was used to collect structured data (refer to annexure G). This structured data collection instrument mandated the researcher to ask similar questions to all respondents and mark their responses using predetermined response options. According to Burns and Grove (2005:427), advantages of a structured data collection instrument include the ease of administering to respondents, the ease of statistical analysis and the possibility of assessing multiple variables simultaneously with minimal risks of researcher and respondent biases. However, major drawbacks with structured interview schedule include the fact they are time consuming and costly (Polit & Beck 2008: 336).

The structured interview schedule with closed-ended questions and predetermined response options was developed specifically for the study. The items were derived from the expanded version of the Health Belief Model and incorporated the variables which are contained in the Model. The schedule had 10 sections and each measured different aspects of the compliance phenomenon. All sections with corresponding levels of measurement are indicated in table 3.2.

Table 3.2: The structure of the interview schedule

Section	Variable	Level of measurement	**Cronbach (α)** coefficient
A	Biographical	Nominal, interval and ratio	-
B	Compliance with medication regimen	Ordinal	0.86
C	Compliance with lifestyle modification regimen	Ordinal	0.73
D	Perception of severity	Ordinal	0.38
E	Perception of risk	Ordinal	0.98
F	Perception of benefits	Ordinal	0.95
G	Perception of barriers	Ordinal	0.85
H	Internal factors	Ordinal	0.89
I	Health care provider factors	Ordinal	0.91
J	Cues to action	Ordinal	0.88

Section A: Biographical data

Section A comprised of 17 items which elicited demographic data such as age, gender, marital status, ethnic background, monthly income, duration of illness and the number of medication used per day. The respondents' physiological measures such as blood pressure, height and weight were also measured.

Section B: Compliance with the medication regimen

A 14-item scale was developed to measure compliance with the medication regimen. A typical question asked was "how often do you take your medicine as prescribed?" The responses were noted on a 4-point Likert scale. The response options were: daily (4), frequently (3), rarely (2), never (1). Some questions were formulated in a negative format and the scoring was coded in the reversed order. For example the item, "how often are you careless about taking your medicine?" was coded as follows: daily (1), frequently (2), rarely (3), never (4). A higher total score reflected a higher level of compliance. The compliance score for each item was obtained by calculating the mean. A cut-off point was set at 3 and respondents were categorised into compliant and noncompliant groups. Respondents with a score of 3 and above were considered as compliant and respondents with a score of below 3 were considered as non-compliant. In addition to this, the responses in this section

were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 14 to 56. The Cronbach's alpha coefficient for this scale was 0.86.

Section C: Compliance with the lifestyle modification regimen

An 11-item scale was developed to measure compliance with the lifestyle modification regimen. The items were related to lifestyle factors which increase or decrease hypertension. A typical question asked was: "How often do you eat vegetables?" The responses were noted on a 4-point Likert scale. The response options were: daily (4), frequently (3), rarely (2), never (1). Some questions were formulated in a negative format and the scoring was coded in the reversed order. For instance, the question "how often do you smoke?" was coded as follows: daily (1), frequently (2), rarely (3) and never (4). The compliance score for each item was obtained by calculating the mean. A cut-off point was set at 3 and respondents were categorised into compliant and non-compliant groups. Respondents with a score of 3 and above were considered as compliant and respondents with a score of below 3 were considered as non-compliant. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 11 to 44. The Cronbach's alpha coefficient for scale was 0.73.

Section D: Perception of severity

A 4-item scale was developed to measure perception of severity of hypertension. Severity of hypertension in this sense connotes the capacity to cause complications, disability or death. Respondents were asked to rate their degree of agreement that hypertension is a severe disease. A typical statement to which they responded was: "My blood pressure condition is serious." The responses were noted on a 4-point Likert scale. The response options were: strongly agree (4), agree (3), disagree (2), strongly disagree (1).

Some questions were formulated in a negative format and the scoring was coded in the reversed order. The perception score for each item was obtained by calculating the mean. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a high perception and those with scores of below 3 as having a low perception of severity. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 4 to 16. The Cronbach's alpha coefficient for the scale was 0.38. The low Cronbach's alpha for this scale is attributable to the few number of items on the scale.

Section E: Perception of risk

Perception of risk was measured with a 9-item scale that assessed respondents' perceived probability of developing complications from hypertension. The researcher inquired about the extent to which the respondents perceived their risk for developing complications of hypertension. The responses were noted on a 4-point Likert scale. The response options were: 75-100% chance (4), 50-74% chance (3), 25-49% chance (2), 0-24% chance (1). The perceptions score for each item was obtained by calculating the mean. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a high perception of risk and those with scores of below 3 as having a low perception of risk. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 9 to 36. The Cronbach's alpha coefficient for this scale was 0.98.

Section F: Perception of benefits

A 7-item scale was developed to measure respondents' perception of benefits with antihypertension drug treatment. It was conceptualised that respondents with high perception of benefits of antihypertensive therapy would be more likely to comply with their treatment than those with a low perception of

benefits. The researcher inquired about the respondents' perceptions by listing possible benefits of compliance such as: "keeping my blood pressure under control." The respondents indicated their degree of agreement or disagreement on a 4-point Likert scale. The response options were: extremely beneficial (4), beneficial (3), somewhat beneficial (2), not at all beneficial (1). The perception score for each item was obtained by calculating the mean. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a positive perception of benefits and those with scores of below 3 a negative perception of benefits. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 7-28. The Cronbach's alpha coefficient for this scale was 0.95.

Section G: Perception of barriers

Perception of barriers to antihypertension treatment was measured with a 7-item scale developed for this study. The researcher inquired about the aspects that were problematic and hindered them from complying with their treatment such as: "not having enough time to exercise." The respondents indicated their level of agreement to the mentioned barriers on a 4-point Likert scale. The response options were: extremely problematic (4), problematic (3), somewhat problematic (2), not at all problematic (1). The barriers score for each item was obtained by calculating the mean. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a high perception of barriers and those with scores of below 3 as having a low perception of barriers. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 7-28. The Cronbach's alpha coefficient for this scale was 0.85.

Section H: Internal factors

Three groups of internal factors believed to affect compliance with antihypertension treatment were measured with a 14-item scale. The factors were self-efficacy, knowledge of hypertension and locus of control. The researcher inquired about the extent to which the respondents agreed with statements such as: "I understand the nature of my condition." The respondents indicated their level of agreement to the mentioned factors on a 4-point Likert scale. The response options were: strongly agree (4), agree (3), disagree (2) strongly disagree (1). Some questions were formulated in a negative format and the scoring was coded in the reversed order. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a high internal factor score and those with a score of below 3 as having a low internal factor score. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 14 to 56. The Cronbach's alpha coefficient was 0.89.

Section I: Health care provider factors

A 13-item scale was developed to measure certain health care provider factors capable of having an influence on the respondents' compliance with the medication and lifestyle modification regimens. The researcher inquired about aspects such as waiting time in the clinic, having confidence in the doctor and other health care professionals and availability of medications. The respondents indicated their level of agreement to the mentioned factors on a 4-point Likert scale. The response options were: strongly agree (4), agree (3), disagree (2) strongly disagree (1). Some questions were formulated in a negative format and the scoring was coded in the reversed order. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a positive perception on the health care provider factors and those with a score of below 3 as having a negative perception. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The

scale had a total score ranging from 13 to 52. The Cronbach's alpha coefficient was 0.91.

Section J: Cues to action

A 12-item scale was developed to measure cues or factors that could motivate the respondents to demonstrate compliance behaviour. The researcher inquired about cues such as advice from the doctor or reading internet articles. The respondents indicated their level of agreement to the mentioned factors on a 4-point Likert scale. The response options were: strongly agree (4), agree (3), disagree (2) strongly disagree (1). Some questions were formulated in a negative format and the scoring was coded in the reversed order. A cut off point was set at 3. Respondents with a score of 3 and above were regarded as having a high cues to action score and those with a score of below 3 as having a low cues to action score. Higher scores reflected stronger agreement with the scale cues as motivators of compliance behaviour while lower scores reflected the opposite. In addition to this, the responses in this section were summed and the mean was calculated to pave the way for the calculation of correlational and inferential statistics. The scale had a total score ranging from 12 to 48. The Cronbach's alpha coefficient was 0.88.

Prior to conducting the main study, the researcher pre-tested the interview schedule on five patients diagnosed with hypertension at Grand Anse Health Centre. These patients were excluded from the main study and the results did not form part of the main study analysis. The main reason for pre-testing the instruments was to clarify the items and avoid ambiguity. It also enabled the researcher to estimate the duration of each interview which, at 25 to 30 minutes, was considered appropriate. The items that were not clear were either modified or excluded from the interview schedule.

- ***The checklist***

A checklist was developed to extract quantitative information from the respondents' medical and pharmacy records. Permission was received from the Ministry of Health to extract such information to supplement the data obtained during interviews. A systematic extraction of information bordered on evidence of medical diagnosis of hypertension, evidence of co-morbidity, types of medications and dosages prescribed, evidence of medication side-effects, evidence of non-compliance with follow up appointments, medications intake or lifestyle modifications and evidence of uncontrolled hypertension. The variables were measured on the nominal level.

3.4.2.3 Reliability and validity of the data collection instruments

- ***Reliability of the interview schedule***

Reliability of a research instrument refers to the consistency with which it measures a particular attribute (Burns & Grove 2005:374). A reliable instrument should produce little variation with repeated measurements. Reliability testing is therefore a measurement of random error inherent in the instrument. Reliable instruments are necessary in a quantitative study to enhance the power of detecting significant differences or relationships that may exist in a study. According to Polit, Beck and Hungler (2001:242), there are six characteristics related with reliability. They are: internal consistency, quality, stability, clarity, adequacy and accuracy. There are also various methods of testing reliability but two commonly used methods involve evaluation of stability and internal consistency. In this current study the researcher calculated and reported on the Cronbach's alpha coefficient (refer to table 3.2)

Internal consistency of an instrument refers to the extent in which all items on the instrument consistently measure the variables they are supposed to measure. Internal consistency is assessed with the Cronbach's alpha

coefficient. Cronbach's alpha coefficient of 0.00 indicates no reliability and a coefficient of 1.00 indicates perfect reliability (Burns & Grove 2005:365). However, for a newly developed instrument, a reliability coefficient of 0.70 is acceptable (Burns & Grove 2007:365). Reliability testing was performed on the interview schedule and Cronbach's alpha coefficient for each section is discussed in section 3.4.2.2.

- ***Reliability of the sphygmomanometer***

A standardised mercury sphygmomanometer was used in this study. The blood pressure of each respondent was taken with the same sphygmomanometer. The device consists of inflatable bladder and a compressible bulb connected through rubber tubing to a mercury column. Inflation and deflation of the bladder is operated manually by means of a control valve. Prior to measurement, the researcher checked the instrument to ensure that no leakage occurred either at the control valve or rubber tubing that could give inaccurate measurements.

- ***Validity of the data collection instruments***

The validity of a quantitative instrument refers to the degree to which that instrument measures what it is intended to measure in the context of the phenomenon of interest (Polit & Beck 2008: 457-458). A research instrument must be capable of accurately measuring the variables underlying a research phenomenon. Three components of instrument validity, which should be assessed are face validity, content validity and construct validity.

According to Burns and Grove (2005:377-378), face validity assessment is the subjective appraisal of the research instrument by experts in the field to ascertain its "appearance of measuring the content." To ensure face validity of the interview schedule and checklist, the research supervisor, a statistician and a practicing public health professional evaluated the instruments.

Content validity refers to the adequacy of representation of the variables under study being reflected by the instrument. Content validity demand an elaborate literature review on the part of the researcher as a crucial step to develop an instrument that incorporates all relevant aspects of the phenomenon under study (Burns & Grove 2005:377-378). In this study, the researcher performed a thorough and comprehensive literature review on hypertension, compliance and the Health Belief Model. The interview schedule was developed under the supervision of the supervisor. The items were derived from the Health Belief Model and the literature review on the treatment of hypertension and compliance. The sections of the interview schedule agreed with the structure of the Health Belief Model.

According to Burns and Grove (2005:230), construct validity "examines the fit between the conceptual definitions and operational definitions of variables." It ensures that constructs and concepts are well defined and measured within the framework of the theory guiding the study. To examine construct validity implies to assess whether the instrument indeed measures the concepts or constructs it claims to measure (Burns & Grove 2005:230). Operational definitions were developed for this current study and measurements were done in accordance with these definitions.

3.5 DESIGN VALIDITY

Burns and Grove (2005:214) define what they term as study validity as “a measure of the truth or accuracy of a claim.” Design validity of a study is concerned with the accuracy of the study findings reported by the researcher within the study context. In a quantitative study such validity is determined by examining internal and external validity, and by addressing threats to each of these concepts (Burns & Grove 2005:814). External validity is of particular importance in descriptive-correlational studies.

External validity refers to the extent to which the research results can be generalised beyond the sample used for the study (Burns & Grove 2005:218-219). Generalisation of study findings can only be done if the sample was

representative of study population. In this study, a probability sampling method was employed to generate a representative sample and the researcher followed a statistician's advice with regard to the sample size. Generalising the study findings to the study population would therefore be justifiable. By conducting interviews and visiting respondents' homes, the researcher achieved a high response rate. Refusal to participate by substantial number of eligible respondents selected to participate in a study decreases its external validity. However, in this study out of 110 eligible respondents only 8 (7%) could not participate.

3.6 DATA ANALYSIS

Data analysis is "the systematic organization and synthesis of research data, and the testing of a research hypothesis using these data" (Polit & Beck 2008:751). This current study employed descriptive and inferential statistics. A statistician analysed the data using the SAS JMP version 8.0.

3.6.1 Descriptive analysis

3.6.1.1 Frequencies, measures of central tendency and measures of dispersion

Frequency distributions were used to organise the data and present the responses obtained. Measures of central tendency (mean, median, mode) and dispersion (standard deviation and distribution) were calculated and utilised to describe the data.

3.6.1.2 Correlational analysis

According to Burns and Grove (2005:484), correlational data analysis indicates the nature of a relationship between two variables and the magnitude of that relationship. The relationship could be positive or negative. In a positive relationship, a high score of one variable correlates with a high

score of the other. In a negative relationship, a high score of one variable correlates with a low score with the other.

One method of performing correlational analysis is by using the Pearson's coefficient. This is a parametric test used to analyse relationships between two variables (Burns & Grove 2005:484). Pearson's r-coefficient is based on the assumption that variables relate in a linear fashion (Argyrous 2000:210). The coefficient is represented by r. An r = 1 indicates a perfect positive relationship, r = -1 indicates a perfect negative relationship, and r = 0 indicates no relationship (Burns & Grove 2005:528).

In this current study, the responses to several Likert items were summed and treated as interval data. Assumptions were made that the data was normally distributed and therefore Pearson's correlation analysis was considered to be an appropriate test. The significance level was pegged a priori at $P<0.05$.

3.6.1.3 Regression analysis

Stepwise multiple regression analysis was used to establish evidence for the relative contributions of individual predictor variables to compliance behaviour. It was used to determine the extent to which certain variables were related and the extent to which compliance (dependent variable) can be predicted if the predictor variable (independent variable) is present. Regression analysis is a parametric test that measures the degree of relationships between independent and dependent variables and subsequently using known values of the independent variable to predict values of the dependent variable (Argyrous 2000:201). Regression analysis only explains observed relationships and does not establish causality.

3.6.2 Inferential statistics

Associations between socio-demographic variables and compliance were explored using the Chi-square test and the differences between obtained means were examined through the Analysis of Variance test.

3.6.2.1 Chi-Square (X^2) test

The Chi-Square test is a nonparametric procedure used to test a hypothesis about the proportion of cases that fall into different categories as when a contingency table has been created (Polit & Beck 2008:493). It is an appropriate test when data are in the form of categories and frequencies (nominal data). The test is performed to calculate the significance of the differences between two or more groups. The most commonly preferred test is the Pearson's chi square test, used to test the null hypothesis that there is no relationship between observed frequency of events in two samples and whatever relationship is observed is due to chance (Burns & Grove 2001:570).

In this study the chi-square test was applied to establish whether significant relationships existed between the biographical variables and compliance. The significance level was pegged at $p<0.05$.

3.6.2.2 Analysis of Variance (ANOVA) test

The ANOVA test is a method for assessing the significance of differences between the means of two variables or two or more groups involving a single variable (Burns & Grove 2001: 583). This test is a parametric statistical test. It is regarded as a special form of t-test because it uses the same procedure and would produce the same result if only two means are analysed. However, the ANOVA test is preferable when examining the differences between the means of three or more levels of nominal variables. The test statistic is called an F-ratio (Argyrous 2000:230).

In the current study, the responses on several Likert item scales were summed and treated as interval data. Assumptions were made that the data were normally distributed and therefore the ANOVA test was deemed appropriate. The one-way ANOVA test was consequently used to test the

relationships between the theoretical variables and treatment compliance. The significance level was pegged at $P<0.05$.

3.7 ETHICAL CONSIDERATIONS

In times past, individuals who were used as research subjects had their rights perverted by researchers. An important requirement in all research involving human subjects is the upholding of institutional and individual human rights. Research ethics is succinctly defined by De Vos (2002:24) as "a set of moral principles which are suggested by an individual or group, subsequently widely accepted and which offers rules and behavioural expectations about the most correct conduct towards experimental subjects and respondents, employers, sponsors, other researchers, assistants and students."

3.7.1 Protecting the rights of the institutions involved

The institutions involved in this research were the University of South Africa and the Ministry of Health and Social Services of Seychelles. The researcher obtained written permission to conduct the study from the Research Ethics Committees of the University and the Ministry. Consent to gain access to the clinical records of the respondents was obtained in particular. The researcher ensured that the institutional protocol of confidentiality of information was not breached. All the respondents' clinical records were analysed by the researcher in a private room in the health centres. The clinical records were not taken out of the health centres and analysed information was coded to ensure confidentiality.

3.7.2 Protecting the rights of the respondents

According to Brink et al (2006:31), there are three fundamental ethical principles that researchers must uphold and these are the principles of respect for persons, beneficence and justice. How these principles were upheld in this research is explained below.

3.7.2.1 Principle of respect for human dignity

The principle of human dignity encompasses the right to self-determination and the protection of vulnerable groups.

- ***The right to self-determination***

The right to self-determination means that research participants have the freedom of choice whether to participate or withdraw from the study without coercion or risk of punishment. To ensure that this right is upheld, the researcher must fully explain not only the purpose and nature of the study but also his/her role and all aspects relating to the conduct and participation by the subjects. This ought to be done in a manner they would understand and allow them to make up their own minds (Burns & Grove 2005:181; Polit & Beck 2008:171-172). This constitutes informed consent, which is defined as "an ongoing agreement by a person to receive treatment, undergo procedures or participate in research, after risks, benefits and alternatives have been adequately explained to them" (RCN 2005:3).

In this current study, all the respondents were fully informed of the research purpose, the nature of their involvement, their right to withdraw from the study, if they so wish, without any prejudicial punishment from the research team or the clinic staff. The researcher fully explained the nature and purpose of the study to the respondents in the local language they could understand. All respondents were required to indicate their willingness to participate in the study by signing the consent form (refer to annexure B) while provision was also made for the respondents who could not write to thumbprint their approval. Consent was also obtained to use their clinical records.

- ***The protection of vulnerable groups***

Individuals such as children, mentally retarded patients or those in an unconscious state are particularly vulnerable and require protection from exploitation for research purposes (Brink et al 2006:32). These are individuals who cannot make decisions on their own and depend completely on others for help. Therefore, in a given study, voluntary participation by individuals of sound mind and at least 18 years of age and above and the integrity of the researcher are important requirements. The respondents who participated in this current study were vulnerable because they relied on the clinics for their free treatment. They may have felt obliged to participate and the researcher took care to avoid any force of coercion.

3.7.2.2 The principle of justice

This principle encompasses the respondents' right to fair treatment and privacy.

- ***The right to fair selection and treatment***

Every respondent in a study has an inalienable right to be treated fairly in line with the ethical principle of justice (Burns & Grove 2005:180). The principle stipulates fair selection of study participants; free from social, cultural, racial, political, gender or religious biases. It also advocates fair treatment of study participants, that is, respecting the prior agreement between the researcher and respondent such as providing benefits promised (Burns & Grove 2005:180).

In this current study, the respondents were all registered patients attending two public health institutions on Praslin Island. They were selected by means of a probability sampling method, thus minimising researcher bias. No financial benefits were promised and none were handed out. The respondents

were informed that, although they would not experience immediate benefits, the outcomes of the research would eventually benefit the larger society. The researcher also explained that this study was for educational purposes and funding was entirely the responsibility of the researcher.

- ***Right to privacy***

The right to privacy entails the right to withhold or share personal information with others (Burns & Grove 2005:186). Research subjects have the right to withhold information that may be deemed psychologically distressing and researchers must respect this. Disclosure of private information to a third party without the permission of the subjects constitutes a breach of this right. Obtaining data anonymously by secret taping or filming or recording is an infringement of the right of privacy (Brink et al 2006:33).

In this current study, the researcher visited the respondents' homes only after consent had been received to do so. Thereafter, respondents who accepted to participate voluntarily shared their personal information in the privacy of their homes. The interview questions were limited only to those in the interview schedule.

Anonymity refers to keeping the identity of the respondent secret (Brink et al 2006:35). Anonymity was ensured in this study by using code names rather than respondents' real names during data collection and analysis. The same code name appeared on the interview schedule and checklist of each respondent. The list of real names was later destroyed.

Confidentiality of information refers to keeping all the respondents' divulged information safe. Such information including questionnaires, interview schedules, audio-tapes and video recordings must be locked in a safe place (Brink et al 2006:35). In this current study, all interview schedules and checklists used for data collection were stored in a secure place. The researcher extracted data from each clinical record in a private room in the two health centres and immediately locked it in the record safe on completion.

3.7.2.3 Principle of beneficence and non-maleficence

According to Davis (1990:29), beneficence means, "doing good," while non-maleficence means "do no harm," These two concepts are derived from the Latin phrase *Primum non nocere* which means, "above all do no harm," Davis (1990:29) and Polit and Beck (2008:170-171) both emphasise the necessity for researchers to abide by these principles, which literally implies causing no harm and discomfort to respondents.

- ***The right to protection from harm and discomfort***

Researchers must conduct their studies in a way that greatly minimises potential harm and discomfort. Polit and Beck (2008:170) and Burns and Grove (2005:190), mention four categories of harm and discomfort that could be caused during research, namely social, physiological, emotional and economic. Risks may be real or anticipated. On the other hand, a study could be directly beneficial to individual participants or may generate new knowledge and help advance the body of science (Burns & Grove 2005:192-193). It is thus necessary to weigh the risks against the benefits.

Regarding this current study, non-invasive physiological parameters of blood pressure, weight and height were measured without causing physical discomfort or physical harm. According to Burns and Grove (2005:190), interviews usually have minimal physical risks. This study involved structured interviews with respondents at their homes on an agreed date and time. Each interview did not take more than 30 minutes thus minimising physical risks such as fatigue and headache.

Polit and Beck (2008:170-171), explain that a researcher should offer assurances to all respondents that information divulged would not be adversely used against them. In this current study the researcher offered such assurances and honoured this promise. The respondents may have feared victimisation if they revealed information about their non-compliance or their

health care provider perceptions. The researcher assured the respondents that the information obtained would not compromise their treatment at the clinics. The contact address and telephone number were left by the researcher should it become necessary to contact him after the interview.

The study did not incur any financial cost to the respondents. The researcher bore the cost of transportation to the respondents' homes and provided all instruments required for the study. This study intended to identify problems associated with compliance with medication use and lifestyle modifications. The research results could be used to improve compliance, which serves the interests of patients suffering from hypertension. Therefore, the researcher opined that the potential benefits of conducting this study far outweighed any anticipated risks.

3.7.3 Scientific honesty and integrity

According to Burns and Grove (2005:203), the main goal of any research is to generate sound scientific knowledge through honest methods. Scientific dishonesty involves fabrication or falsification of research steps and results, plagiarism and manipulating results to obtain financial benefits or honour. Research must be conducted and reported with honesty and integrity and in line with established national, institutional and professional codes of practice (Brink et al 2006:40). In this current study, the principle of scientific honesty and integrity in research was upheld. A due process of data collection was followed and made available to the research supervisor for scrutiny. An independent statistician performed the statistical analysis of data and no attempts were made to manipulate or fabricate raw data or falsify research findings. All quoted or paraphrased sources of information used in this study were acknowledged accordingly.

3.8 CONCLUSION

This descriptive-correlational research involved the data collection methods of interviewing and document analysis. Various issues related to the compliance

behaviour of 102 hypertensive respondents were investigated. Data collection was done involving an interview schedule and a checklist. Various measures were applied to enhance scientific rigour and to comply with the principles of research ethics. The data obtained is presented in the next chapter.

CHAPTER 4
PRESENTATION OF RESEARCH FINDINGS

4.1 INTRODUCTION

This was a quantitative descriptive-correlational study conducted on the Island of Praslin, Seychelles during which structured interviews were held with 102 respondents systematically sampled from registers of hypertension patients maintained at Baie Sainte Anne Hospital and Grand Anse Health Centre. A 108-item interview schedule consisting of 10 sections was developed specifically for the study. A 9-item checklist was also developed to extract information from the clinical records of the respondents.

The study was purposed to describe compliance to the drug and required lifestyle modification regimens (treatment compliance) of diagnosed hypertension patients and to identify such factors that influenced compliance behaviour in this population. Furthermore, possible relationships between treatment compliance and the theoretical variables of the Health Belief Model were explored using statistical methods.

The results of the descriptive, correlational and inferential statistics are discussed in this chapter. Non-response items are presented as missing values below each table. Since percentages were rounded off to 2 decimal places, the cumulative percentages may not add up to 100.00 in all cases. However, in all such cases the error was never larger than 0.01% which was acceptable.

Data analysis is presented in sections based on the interview schedule used for the study. Complementary information from the checklist is also included, where appropriate. In all cases, clarity of data is invigorated with the use of bar charts, histograms and tables. The analysis of data was conducted in two phases. In the first phase, descriptive analysis of all variables in the interview

schedule and checklist was performed. In the second phase, inferences and correlations of variables with treatment compliance were performed.

4.2 BIOGRAPHICAL DATA

This section presents data pertaining to the respondents' physiological parameters of blood pressure, height, weight and body mass index. Also included are demographical data such as age, gender, ethnic background, duration of illness, employment status, marital status, educational status and family income.

4.2.1 Blood pressure of respondents (N=102)

Item A1 on the checklist inquired about evidence of a hypertension diagnosis on the clinical records of the respondents. All the respondents, namely 102 (100%) were clinically diagnosed as having hypertension.

Item A1 on the interview schedule inquired about the blood pressure of the respondents at the time of data collection. Hypertension was defined as a systolic blood pressure ≥140 mm Hg or a diastolic blood pressure ≥90 mm Hg (refer to section 1.7.5). The mean systolic blood pressure for males was 142 (n=44), which was relatively higher than the mean systolic blood pressure for females, namely 137 (n=58). The mean diastolic blood pressures for the male and female respondents were 89 and 88 respectively. Figure 4.1 shows that altogether 67 (65.69%) respondents had high blood pressure and 35 (34.31%) had a normal blood pressure at the time of data collection. Among those with high blood pressure, 39 (38.24%) were females and 28 (27.45%) were males and among those with normal blood pressure 19 (18.63%) were females and 16 (15.69%) were males.

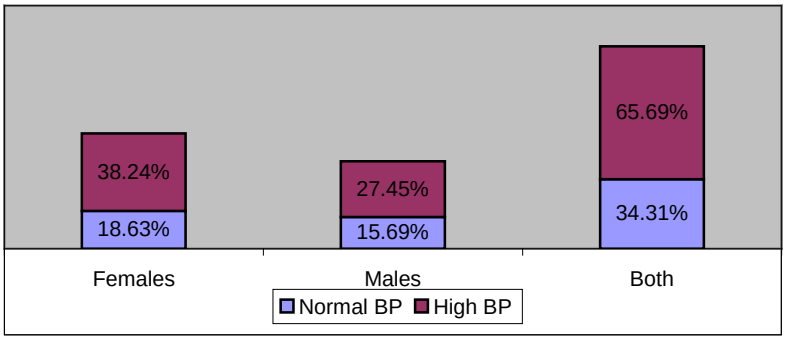


Figure 4.1

Respondents' blood pressure status taken during the interview (n=102)

Item A9 on the checklist inquired about evidence of uncontrolled hypertension noted on the respondents' clinical records during past three appointments (refer to figure 4.2). Altogether, 62 (60.78%) clinic records had evidence of uncontrolled hypertension. There was no evidence of uncontrolled hypertension in the clinical records of 40 (39.22%) respondents.

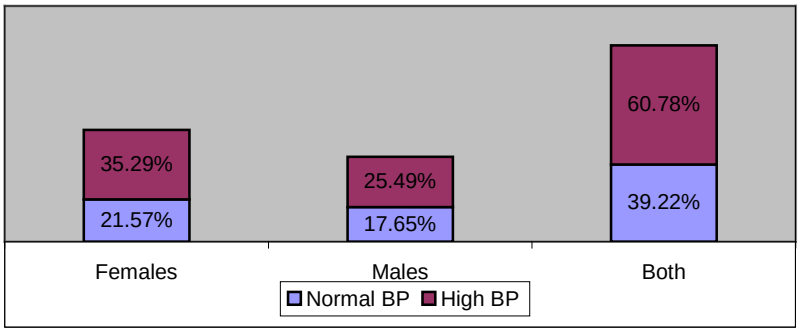


Figure 4.2

Uncontrolled hypertension noted on the respondents' clinical records during past three appointments (n=102).

The high number of respondents with high blood pressure values together with the evidence of uncontrolled hypertension, especially among the female respondents, is noteworthy.

4.2.2 Body mass index of the respondents (N=102)

Item A4 on the interview schedule inquired about the body mass index of the respondents. The researcher measured the weight and height of the respondents. The respondents' body mass index was calculated by dividing the weight in kilograms (item A2) by the height (item A3) squared in meters.

The results are shown in figure 4.3. 51 (50.00%) of the respondents were obese, 38 (37.25%) overweight while only 13 (12.75%) had a normal body weight for height.

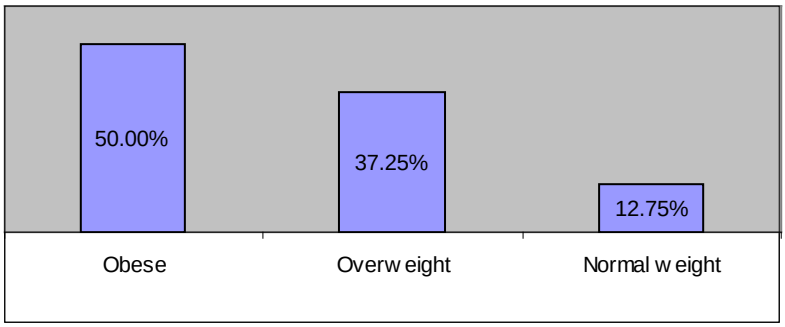


Figure 4.3

Body mass index of respondents

The high percentage of obese and overweight respondents (87.25%) is of particular concern considering the fact that weight control is an important variable in blood pressure control.

4.2.3 Age of respondents (N=102)

Item A5 on the interview schedule inquired about the age of the respondents. The respondents' ages were grouped into 7 categories for analysis (refer to table 4.1). The majority of the respondents 26 (25.49%) fell in the category 35-44 years, followed by 24 (23.53%) in the category 55-64 years, 21 (20.59%) in the category 45-54 years and 16 (15.69%) in the category 65-74 years.

Altogether about 85.30% of respondents were aged between 35-74 years while only 14.70% were aged less than 35 years. This is not surprising as hypertension is largely seen in adult life.

Table 4.1: Age groups of respondents (n=102)

Age	Frequency	Percent	Cumulative frequency	Cumulative percent
<25 years	1	0.98	1	0.98
25-34 years	9	8.82	10	9.80
35-44 years	26	25.49	36	35.29
45-54 years	21	20.59	57	55.88
55-64 years	24	23.53	81	79.41
65-74years	16	15.69	97	95.10
≥75 years	5	4.90	102	100.00
TOTAL	102	100.00	-	-

4.2.4 Gender of respondents (N=102)

Item A6 on the interview schedule inquired about the gender of the respondents. The sample consisted of 58 (56.86%) females and 44 (43.14%) males. This is shown in figure 4.4

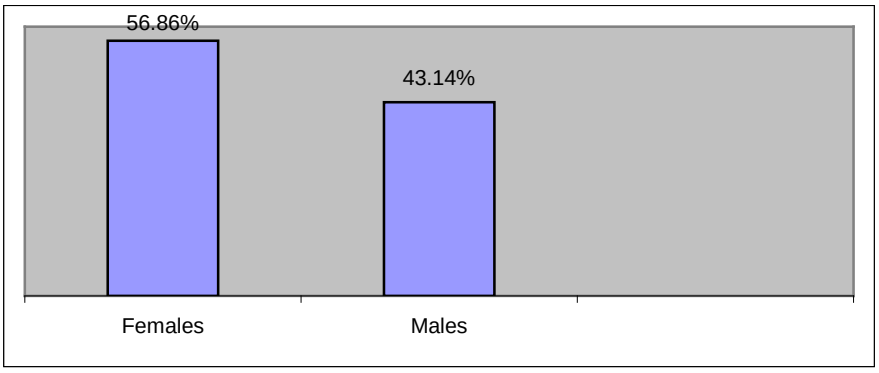


Figure 4.4

Gender of respondents (N=102)

4.2.5 Ethnic background (N=102)

Item A7 on the interview schedule inquired about the ethnic background of the respondents (refer to figure 4.5). The majority of the respondents 51 (50.00%) identified themselves as Black Africans, 38 (37.25%) of mixed heritage, 11 (10.78%) Caucasians and 2 (1.96%) Indian/Chinese.

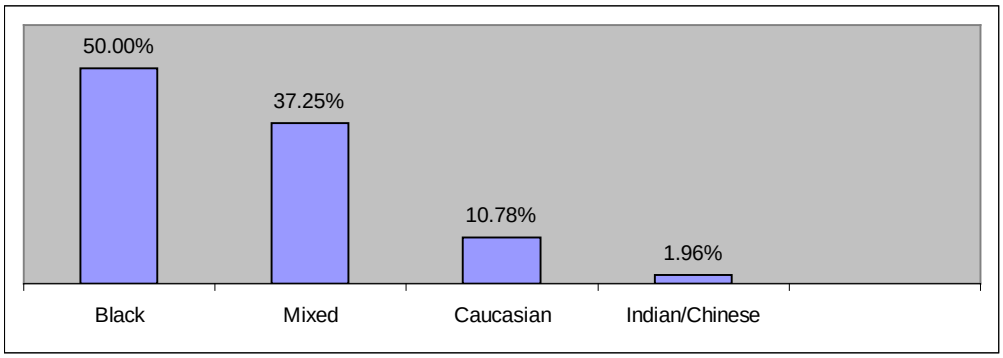


Figure 4.5

Ethnic background of respondents (N=102)

4.2.6 Marital status (N=102)

Item A8 on the interview schedule inquired about the marital status of the respondents (refer to figure 4.6). The majority of the respondents, namely 40 (39.22%) were married, 30 (29.41%) were never married, 13 (12.75%) were cohabiting, 8 (7.84%) were widowed, 7 (6.86%) were divorced and 4 (3.92%) were separated.

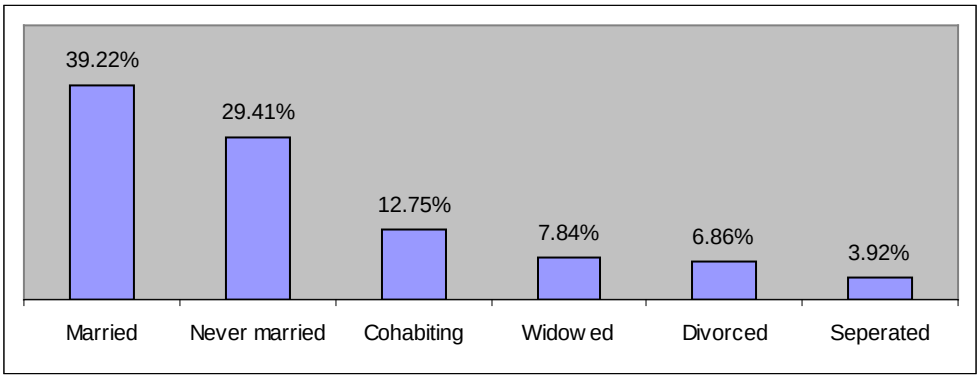


Figure 4.6

Respondents' marital status (N =102)

4.2.7 Educational status (N=102)

Item A9 on the interview schedule inquired about the level of education attained by the respondents (refer to figure 4.7). The majority of the respondents, namely 47 (46.08%) had completed primary school, 31 (30.39%) had completed secondary school, 12 (11.76%) had completed post

secondary school while 3 (2.94%) had completed university education. 9 (8.82%) respondents had no schooling.

The results suggest that the majority of the respondents (91.18%) had formal education and are literate. A highly literate population is associated with better understanding of health information and the importance of treatment compliance. This research population was mainly literate and capable of comprehending the significance of treatment compliance.

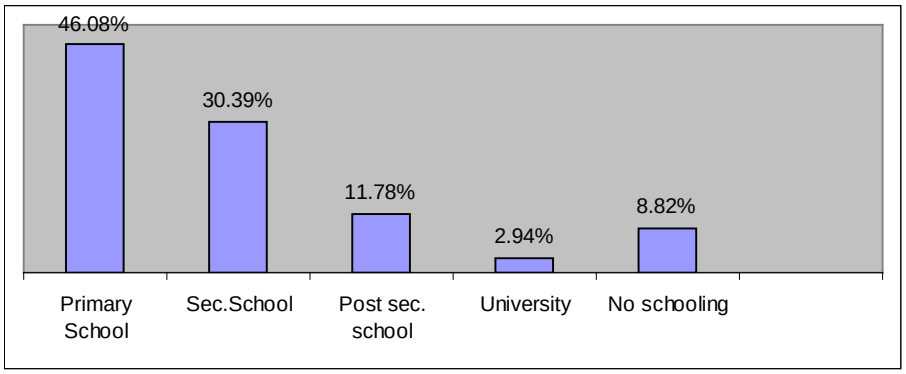


Figure 4.7

Educational status of the respondents (N=102)

4.2.8 Employment status (N=102)

Item A10 on the interview schedule inquired about the respondents' work status in the last three months (refer to figure 4.8). Majority of the respondents, namely 37 (36.27%) were government employees, 24 (23.53%) were retired, 17 (16.67%) were employed in the non-government sector, 14 (13.73%) were self-employed and 10 (9.80%) were unemployed. There was no student in the sample. Thus 90.20% of the respondents in this study were either involved in one form of economic activity or retired.

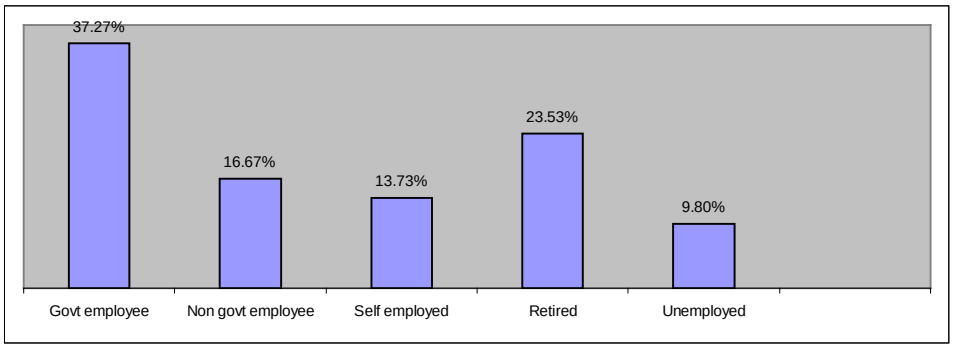


Figure 4.8

Respondents' employment status (N=102)

4.2.9 Monthly income in Seychelles Rupees (SR) (N=102)

Item A11 on the interview schedule inquired about the respondents' average monthly earnings (in rupees) over the past year (refer to table 4.2). The majority of the respondents, namely 39 (38.24%) earned a monthly salary of between SR2000-2999, 24 (23.53%) earned SR3000-3999, 17 (16.67%) earned SR1000-1999, 11 (10.78%) earned SR4000-4999 and 7 (6.86%) earned SR5000 or more per month. Only 4 (3.92%) earned SR0-999.

Table 4.2: Monthly income of the respondents

Income	Frequency	Percent	Cumulative frequency	Cumulative percent
SR 0 – 999	4	3.92	4	3.9
SR 1000 – 1999	17	16.67	21	20.59
SR 2000 – 2999	39	38.24	60	58.83
SR 3000 – 3999	24	23.53	84	82.36
SR 4000 – 4999	11	10.78	95	93.14
SR ≥ 5000	7	6.86	102	100
Total	102	100.00	-	

4.2.10 Duration of illness (N=102)

Item A12 on the interview schedule inquired about the time when the respondents were informed that they had high blood pressure (refer to figure 4.9). Most of the respondents, namely 62 (60.78%) were diagnosed more than five years ago. The duration of illness were further revealed as follows: diagnosed two years ago (10 (9.80%)), one year ago (9 (8.82%)), three years ago (9 (8.82%)), five years ago (9 (8.82%)), four years ago (6 (5.88%)), less

than one year ago (3 (2.94%)). Most of the respondents therefore had hypertension for more than five years.

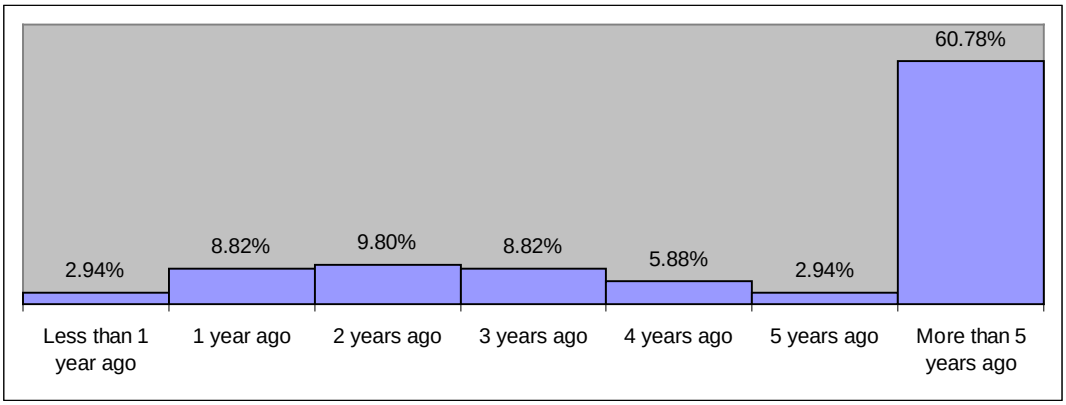


Figure 4.9

Duration of illness (N=102)

4.2.11 Reported health complaints by respondents at time of the interview

Item A13 on the interview schedule inquired about the respondents' present health complaints (refer to table 4.3). Because many respondents had more than one complaint, they chose more than one response option. The majority of the respondents, namely 55 (32.80%) did not have any health complaints. 25 (14.97%) respondents reported palpitations, 20 (11.98%) reported visual impairment, 14 (8.38%) reported swelling of the feet, 13 (7.78%) reported swelling of the leg, 11 (6.59%) reported heart problems, 11 (6.59%) reported dyspnoea on exertion and 7 (4.19%) reported angina. Furthermore, 4 (2.40%) reported dyspnoea at rest, 4 (2.40%) reported paralysis of a limb and 3 (1.80%) reported kidney problems.

Table 4.3: Health complaints by respondents at time of the interview

Health complaint	Frequency	Percent (%)
None	55	32.93
Palpitations	25	14.97
Visual impairment	20	11.98
Swelling of the feet	14	8.38

Swelling of the leg	13	7.78
Health complaint	Frequency	Percent (%)
Heart problems	11	6.59
Dyspnea on exertion	11	6.59
Angina	7	4.19
Paralysis of a limb	4	2.40
Dyspnea at rest	4	2.40
Kidney problems	3	1.80

Item A2 on the checklist inquired about evidence of associated co-morbidity in the clinical records of the respondents (refer to figure 4.10). No co-morbidities were documented in the medical records of the majority of the respondents, namely 60 (58.82%). The clinical records of 17 (16.67%) included references to cardiac failure, 13 (12.75%) to visual impairment (specifically cataract attributable to aging), 8 (7.84%) to angina, 8 (7.84%) to chronic renal failure and 6 (5.88%) to coronary artery disease. 4 (3.92%) respondents had paralysis of a limb as a consequence of a stroke and none of the respondents was living with myocardial infarction.

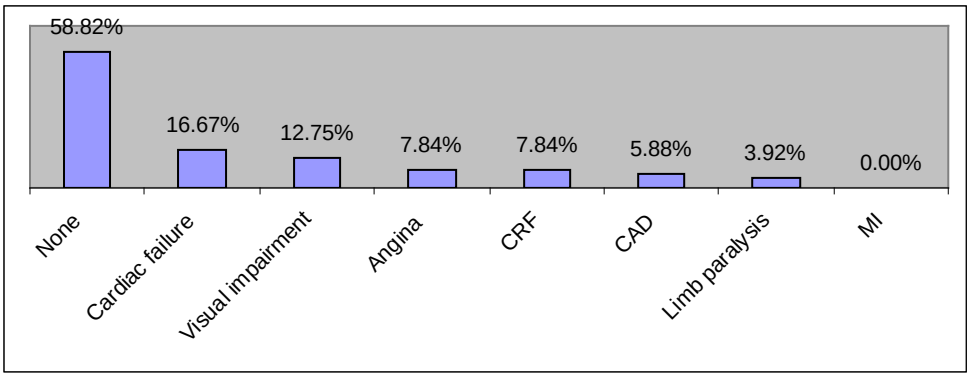


Figure 4.10

Complications of hypertension recorded in the clinical records (n=102).

Key: CRF = Chronic renal failure; CAD = Coronary artery disease; MI = Myocardial infarction

4.3 COMPLIANCE WITH ANTIHYPERTENSION DRUG TREATMENT, CLINIC APPOINTMENTS AND BLOOD PRESSURE MONITORING

In this section the researcher intends to answer the following research question:

How compliant are the respondents with their hypertension drug regimen, clinic appointments and blood pressure monitoring?

4.3.1 Number of medicines which the respondents were taking for hypertension (N=101)

Item A14 on the interview schedule inquired about the number of different kinds of medicine the respondents were taking for hypertension (refer to figure 4.11). The majority of the respondents, namely 33 (32.67%) took two different kinds of medicine, 30 (29.70%) took one kind, 22 (21.78%) took three kinds, 8 (7.92%) took four kinds, while 4 (3.96%) took more than four kinds of medicine. Interestingly, 4 (3.96%) respondents reported they did not take any medicine for the blood pressure at all. One respondent declined to respond to this item.

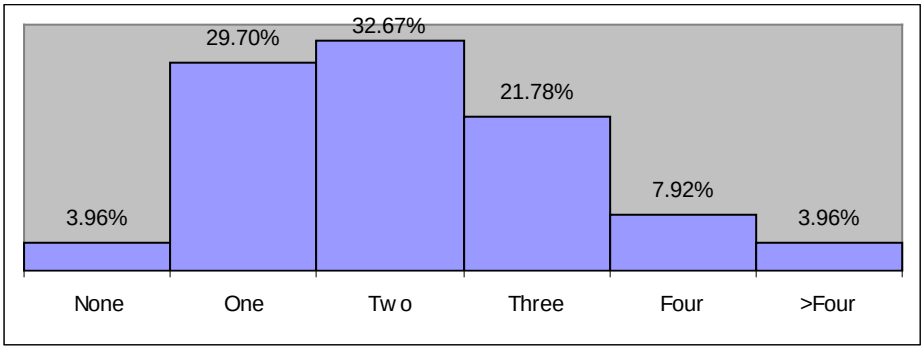


Figure 4.11

Numbers of different kinds of medicine respondents were taking

4.3.2 Types of medicines respondents were taking (N=102)

Item A3 on the checklist inquired about the type of medications prescribed for each respondent (refer to figure 4.12). The majority of the respondents, namely 73 (71.57%) took Amlodipine singly or in addition to other

medications, 40 (39.22%) took Bendrofluazide and 38 (37.25%) took Lisinopril. 26 (25.49%) respondents were on Atenolol, 18 (17.65%) took Frusemide and 7 (6.86%) took Losartan. Only 4 (3.92%) respondents took Methyldopa and none of the respondents took Spironolactone.

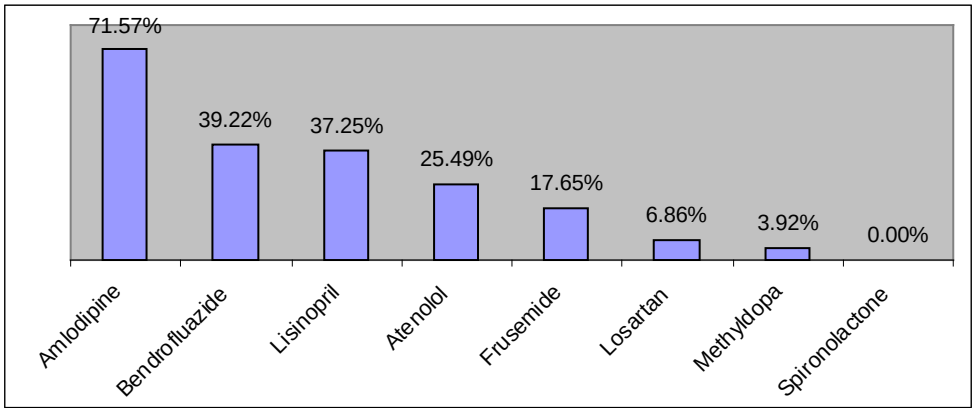


Figure 4.12
Types of medications taken by respondents

4.3.3 Dosage of medications respondents were taking (N=102)

Item A4 on the checklist inquired on the prescribed dosage of the medications in terms of a single or multiple dosage per day or a combination of single and multiple dosage (refer to figure 4.13). Generally, most antihypertension medications are taken only once a day (single dose). Almost all respondents, namely 98 (96.08%) were on a single dose regimen, whereas 4 (3.92%) were on combined single and multiple dose regimens. No respondent was on a multiple dose regimen only.

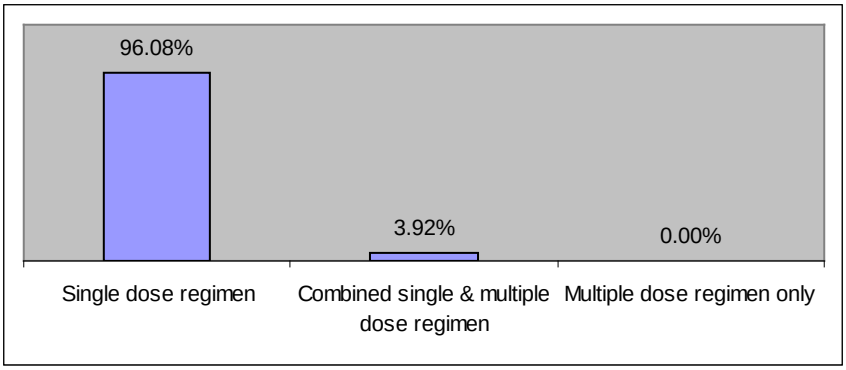


Figure 4.13
Dosage regimen of medications taken by respondents

4.3.4 Doses of medications respondents skipped in the last three days (N=102)

Item A15 on the interview schedule inquired about the number of doses of medication the respondents had skipped during the past three days (refer to figure 4.14). The responses were collapsed into two groups: those who did not skip a dose of medication in the last three days were regarded as compliant and those who skipped one or more were regarded as non-compliant. The majority of respondents, namely 72 (70.59%) did not skip a dose and 30 (29.41%) skipped one or more doses.

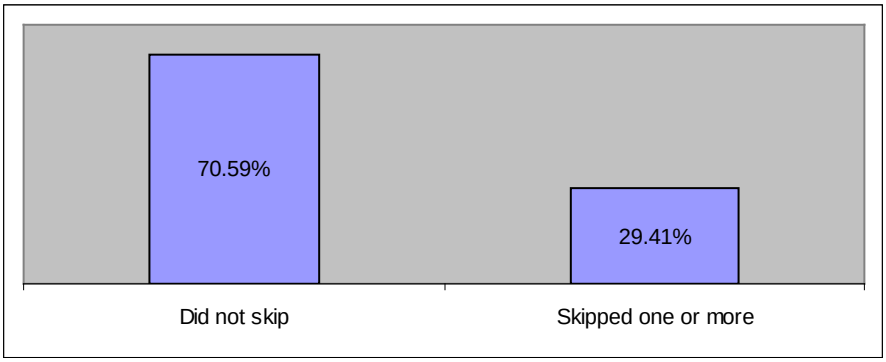


Figure 4.14

Medications skipped by respondents in the last three days (N=102)

4.3.5 Evidence of medication compliance in the last three appointments (N=102)

Item A7 on the checklist inquired about evidence of medication compliance noted in the clinic records during the past three appointments (refer to figure 4.15). In 73 (71.57%) records, there was no reference to non-compliance whereas 29 (28.43%) of the records included documented incidences of non-compliance with medications.

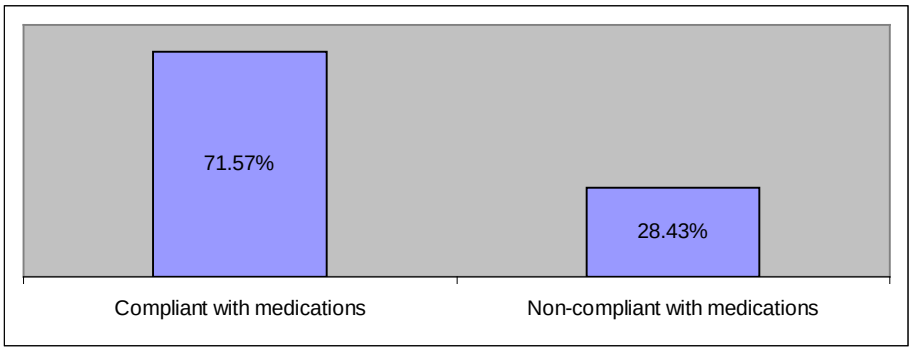


Figure 4.15

Respondents' compliance with medications as reported in the clinical records

Item B1 on the interview schedule inquired about how often the respondents took their medications (refer to table 4.4). The respondents were categorised into two groups; those who reported taking medication daily were regarded to be the compliant group and all others as the non-compliant group. This is because hypertension medications should be taken on a daily basis and not intermittently. Out of 102 respondents, 65 (63.73%) were compliant while 37 (36.27%) were non-compliant. According to Zen et al (2002:12) non-compliant patients would usually admit not taking medications on certain days.

Table 4.4: Compliance with medications

Compliant	Non-compliant
65 (63.73%)	37 (36.27%)

4.3.6 Medication side effects recorded in the clinical notes (N=102)

Medication side effect is a significant reason why most patients would stop taking medications (Benson & Britten 2003:1314; Jokisalo 2002:577). Item A4 on the checklist inquired about evidence of complaints of medication side effects during the past three appointments (refer to figure 4.16). Surprisingly, in 93 (91.18%) of the records, no entry was found for medication side effects. Only 9 (8.82%) of the records contained evidence of medication side effects. This finding may indicate the relative tolerability of antihypertension medications, inaccurate recordkeeping by the doctor, or failure on the part of the patient to report side-effects.

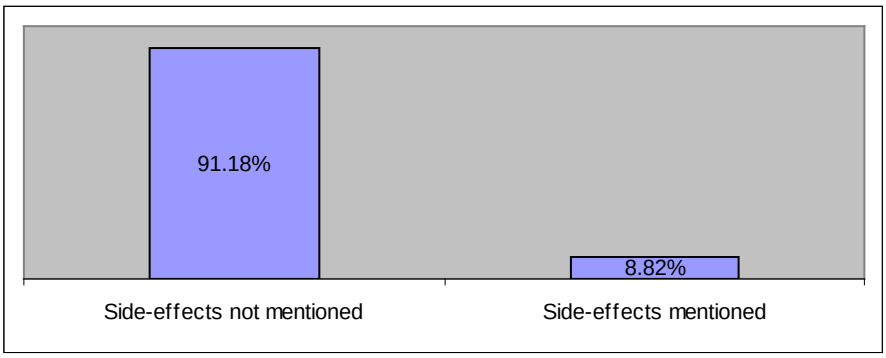


Figure 4.16

Respondents' complaints of side effects of medications as reported in the clinical records

Medication side effects did not appear to be problematic and was therefore unlikely to contribute to medication non-compliance.

4.3.7 Compliance with clinic appointments and blood pressure monitoring (N=102)

Item B13 on the interview schedule inquired about how often the respondents turned up for clinic appointments as scheduled (refer to table 4.5). Honouring clinic appointment was considered to be a variable indicative of medication compliance. The respondents were categorised into compliant and non-compliant groups based on their responses. The majority of respondents, namely 80 (79.21%) were compliant with clinic appointments while 22 (21.57%) were non-compliant.

Table 4.5: Compliance with clinic appointments

Compliant	Non-compliant
80 (79.21%)	22 (21.57%)

Item A6 on the checklist inquired about evidence of follow-up visit compliance noted for past three appointments (refer to figure 4.17). The clinic records of 74 (72.55%) respondents (N=102) contained no evidence of non-compliance and in 28 (27.45%) records there was documented evidence of follow up non-compliance.

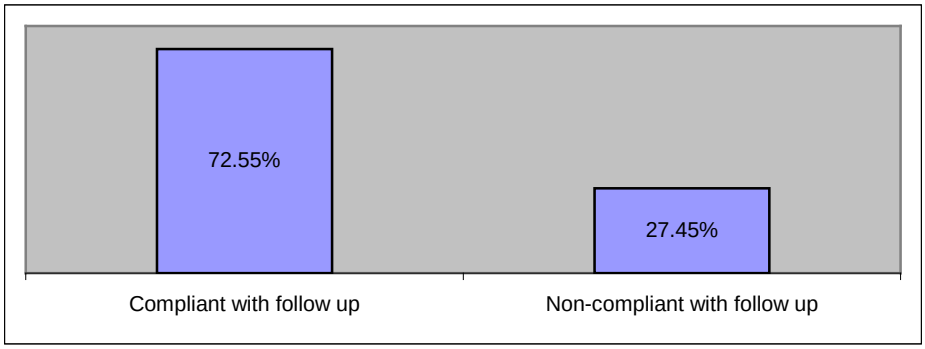


Figure 4.17

Respondents' compliance with follow up visits as reported in the clinical records.

Item B14 on the interview schedule inquired about how regularly the respondents had their blood pressure checked. Interestingly, the majority of the respondents, namely 80 (78.43%) indicated rarely, 13 (12.75%) frequently and 5 (4.90%) never. Only 4 (3.92%) checked their blood pressure daily.

4.3.8 Compliance as measured on the Compliance with the Medication Regimen Scale (n=101)

Section B of the interview schedule measured compliance with the antihypertension medications regimen. This section discusses the descriptive statistics of responses to this scale, while inferences and correlations are presented in section 4.12.

Responses to the items on the Compliance with the Medication Regimen Scale were collapsed for discussion purposes to indicate the respondents' reasons for failure to comply with their treatment. Table 4.6 shows that failure to obtain a refill of their prescription was the strongest reason for non-compliance. Other significant reasons were forgetfulness, carelessness and the use of alternative remedies. Less significant reasons were medication side effects, medication ineffectiveness and fear of addiction. Frequent change of medications and frequent change of dosage were the least indicated reasons for not complying with the medication regimen.

Table 4.6: Reasons for non-compliance with antihypertension drug treatment

Stated reasons for not complying with medications	Agreement with stated reasons for not complying	Disagreement with stated reasons
Failure to refill a prescription *	22 (21.78%)	79 (78.22%)
Forgetfulness *	19 (18.81%)	82 (81.18%)
Carelessness *	17 (16.83%)	84 (83.17%)
Use of alternative remedies *	13 (12.87%)	88 (87.13%)
Because they are feeling better *	12 (11.88%)	89 (88.12%)
Medication side-effects *	10 (9.90%)	91 (90.10%)
It makes them feel worse *	9 (8.91%)	92 (91.09%)
Belief that the medications are ineffective *	6 (5.94%)	95 (94.06%)
Fear of addiction *	6 (5.94%)	95 (94.06%)
Frequent change of medications *	4 (3.96%)	97 (96.04%)
Frequent change of dosage **	3 (2.97%)	98 (97.03%)

* 1 Missing value; ** 2 Missing values

Table 4.7 summarises the values of central tendency and dispersion on the Compliance with the Medication Regimen Scale. As can be seen in figure 4.18, the distribution was negatively skewed (distribution = -1.01). This indicates that most respondents scored high thus clustering of scores occurred towards the right. By implication, most of the respondents tended to be compliant with antihypertension medications. For a skewed distribution, the median and the interquartile range best approximate the central location and the dispersion of distribution compared to the mean and standard deviation. The median represents the 50th percentile of the distribution and is not affected by outliers. The interquartile range, which represents the difference between the 75th percentile and 25th percentile of a distribution, is also not affected by outliers (Crawshaw & Chambers 2001:68). For this scale, the median was 3.14 and the interquartile range was 0.64 (refer to table 4.7).

Table 4.7: Measures of central tendency and dispersion on the compliance with the medication regimen

Variable	N	Median	Interquartile range	Mean	Range of scores	Distribution	SD
CAMR	102	3.14	0.64	2.96	1.89-3.57	-1.01	0.43

CAMR = Compliance with antihypertension medication regimen; SD = Standard deviation

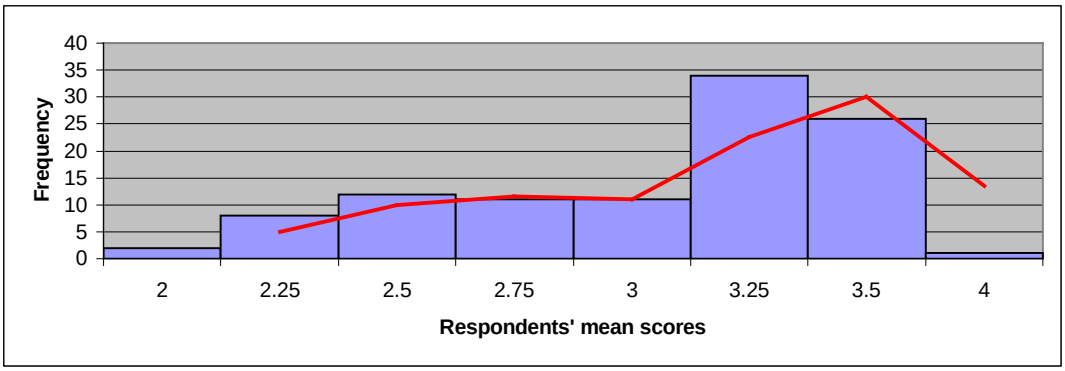


Figure 4.18

Respondents' mean scores on the Compliance with the Medication Regimen Scale

The mean score for this scale was 2.96 (SD = 0.43) (refer to table 4.7). The mean scale score of individual respondents was used to categorise the respondents into compliant and non-compliant groups to facilitate correlational and inferential statistics (refer to section 4.12). Respondents with a mean score below 3 were considered as non-compliant and respondents with a mean score of 3 and above were considered as compliant.

4.4 COMPLIANCE WITH THE LIFESTYLE MODIFICATIONS REGIMEN

In this section the researcher intend to answer the following research question:

How compliant are the respondents with their lifestyle modifications regimen?

4.4.1 Number of cigarettes the respondents smoked per day (N=102)

Item A16 on the interview schedule inquired about the number of cigarettes smoked per day (refer to figure 4.19). The majority of the respondents, namely 86 (84.31%) did not smoke at all, 7 (6.86%) smoked between one and four cigarettes, 5 (4.90%) smoked five to nine cigarettes and 4 (3.92%) smoked between ten and fourteen cigarettes per day. No respondents smoked fifteen and more cigarettes per day.

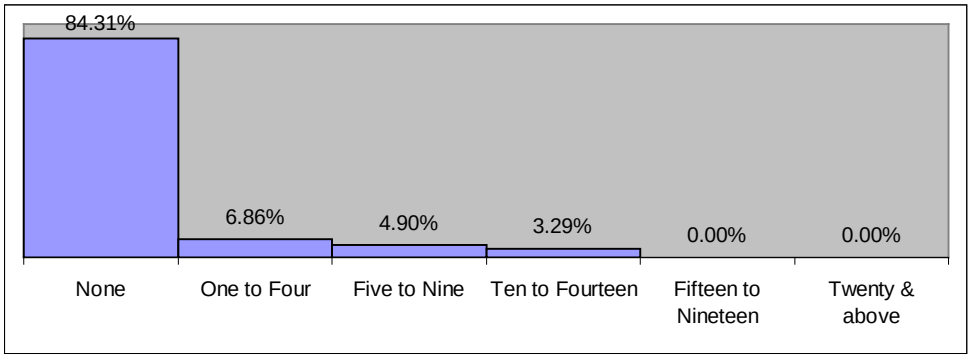


Figure 4.19

Quantity of cigarettes smoked per day (N=102)

The data is indicative of a general compliance with the smoking cessation requirement.

4.4.2 Frequency of alcohol consumption (N=102)

Item A17 on the interview schedule inquired about the frequency of alcohol consumption (refer to figure 4.20). The majority of the respondents, namely 33 (32.35%) seldom ingested alcohol, 22 (21.57%) never ingested alcohol, 13 (12.75%) ingested alcohol more than once per day, 11 (10.78%) ingested alcohol about once a week, 10 (9.80%) ingested alcohol less than once per week, 8 (7.84%) ingested alcohol a few times per week and 5 (4.90%) ingested alcohol daily.

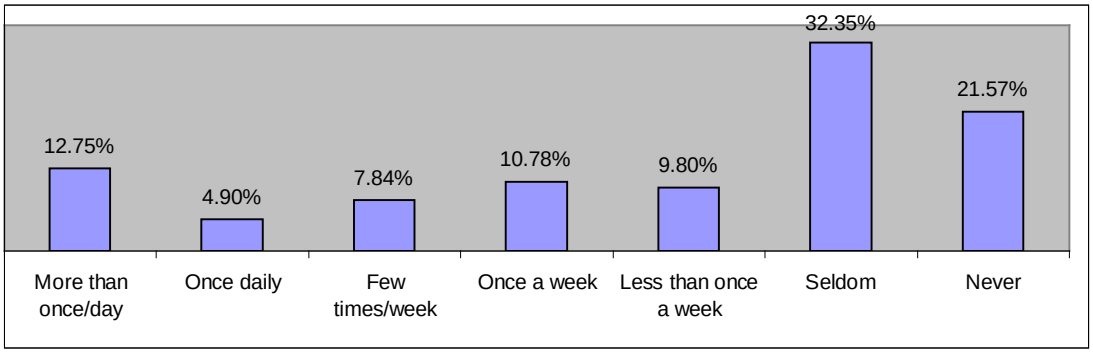


Figure 4.20

Respondents' frequency of alcohol consumption

The above data is indicative that the majority of the respondents tended to comply with the alcohol intake restriction requirement but that a substantial number failed to comply.

4.4.3 Lifestyle modification compliance reported in the clinic records

Item A4 on the checklist inquired about evidence of lifestyle modification compliance noted for past three appointments (refer to figure 4.21). In the clinic records of the majority of respondents, namely 65 (63.73%), there were no entries with regard to non-compliance with the lifestyle modifications regimen and in 37 (36.27%) respondents such entries were documented. It should however, be understood that absence of documentation does not necessarily imply those patients were compliant with required lifestyle modifications. Some omission may have been as a result of lack of documentation by clinicians.

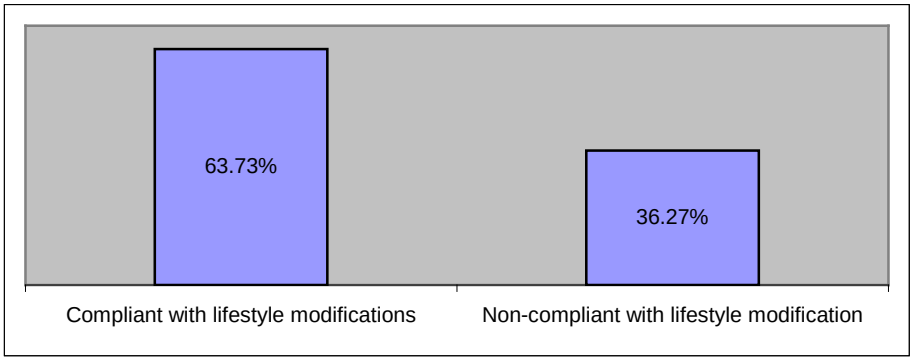


Figure 4.21

Respondents' compliance with lifestyle modifications reported in the clinic records

4.4.4 Compliance as measured on the Compliance with the Lifestyle Modifications Regimen Scale

Section C of the interview schedule measured compliance with lifestyle modifications among respondents. The descriptive statistics of responses to this scale is discussed in this section while inferences and correlations with other variables are presented in sections 4.12.

The lifestyle modification behaviours assessed in this section were categorised into 6 recommended and 5 non-recommended behaviours. The recommended behaviours were eating vegetables, eating fruits, engaging in physical exercise, trying to lose some weight, relaxing and having enough sleep. The non-recommended behaviours were smoking, drinking alcohol, eating a meal high in animal fat, eating fast food and sprinkling salt on food.

Table 4.8 indicates that the respondents tended to be compliant with the recommended behaviours of eating fruits and vegetables and relaxation. They tended to be less compliant with physical exercise and weight reduction. Most respondents indicated that they did not sleep enough.

Table 4.8: Frequencies of responses on the Compliance with the Lifestyle Modifications Regimen Scale

How often do you:	Compliant	Non-compliant
Eat fruits?	96 (94.12%)	6 (5.88%)
Eat vegetables?	94 (92.16%)	8 (7.84%)
Relax?	70 (60.63%)	32 (31.37%)
Engage in physical exercise?	51 (50.00%)	51 (50.00%)
Try to lose some weight?	47 (46.08%)	55 (53.92%)
Get enough sleep?	29 (28.43%)	73 (72.56%)

Table 4.9 indicates that most respondents tended to be compliant with avoidance of the non-recommended behaviours namely smoking and the consumption of alcohol, salt, fast food and animal fat. However there are indications that interventions are required to motivate more respondents to refrain from consuming of alcohol, salt, fast food and animal fat.

Table 4.9: Frequencies of responses on compliance with the avoidance of non-recommended behaviours on the Compliance with the Lifestyle Modifications Regimen Scale

How often do you:	Compliant	Non-compliant
Smoke? *	85 (84.16%)	16 (15.84%)
Drink alcohol?	80 (78.43%)	22 (21.57%)
Sprinkle salt on your food?	77 (75.49%)	25 (24.51%)
Eat fast food?	74 (72.59)	28 (27.45%)
Eat a meal high in animal fat?	73 (71.57%)	29 (28.35%)

* 1 missing value

The distribution of the respondent's scores for this scale as plotted in figure 4.22 is negatively skewed (distribution = -0.46) indicating that most respondents scored high on the scale. This means that the majority of respondents tended to be compliant with lifestyle modifications. The median score was 3.09 and the interquartile range was 0.64 (refer to table 4.10).

Table 4.10: Measures of central tendency and dispersion on the compliance with the lifestyle modifications regimen.

Variable	N	Mean	SD	Median	Range of scores	Distribution	Interquartile range
CLMR	102	3.04	0.46	3.09	1.82 – 3.91	-0.46	0.64

Key: CLMR = compliance with lifestyle modification regimen.

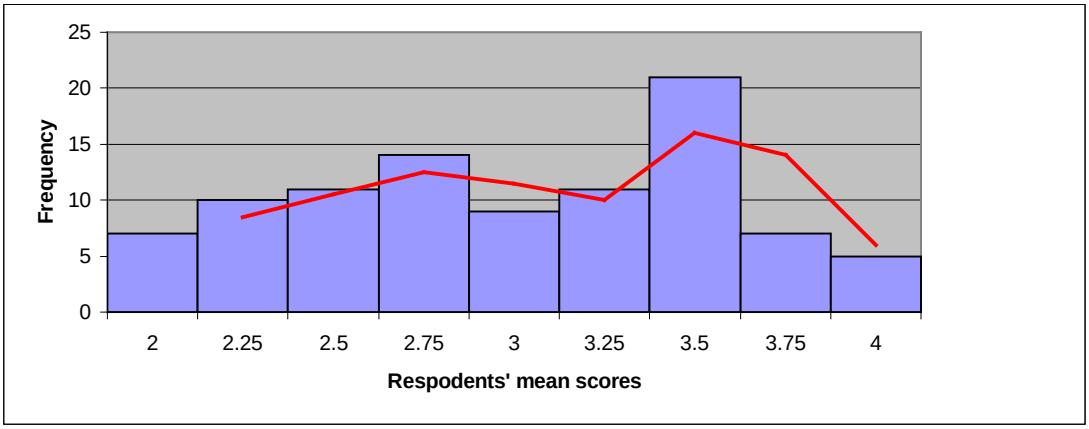


Figure 4.22

Respondents' mean scores on the Compliance with the Lifestyle Modifications Regimen Scale

The mean score for this scale was 3.04 (SD = 0.46) (refer to table 4.10). The mean scale score of individual respondents' score was used to categorise the respondents into compliant and non-compliant groups to facilitate correlational and inferential statistics (refer to section 4.12). Respondents with a mean score below 3 were considered as non-compliant with recommended lifestyle modifications and respondents with a mean score of 3 and above were considered as compliant.

4.5 RESPONDENTS' PERCEPTIONS OF THE SEVERITY OF HYPERTENSION (N=101)

Section D of the interview schedule measured the respondents' perceptions of hypertension as a serious disease. The descriptive statistics of responses to this scale are presented in this section while inferences and correlations with treatment compliance are presented in section 4.12.

For discussion purposes, the responses were collapsed into two categories, namely high and low perception of severity. Table 4.11 shows that a significant number of the respondents rightly did not perceive themselves to be cured when they were symptom-free. The majority indicated that they perceived their hypertension as serious and that they were not relaxed about hypertension when they were symptom free. A problematic finding is that the majority of the respondents indicated that they did not consider their hypertension as serious.

However the high number of respondents who had a low perception of severity is problematic. According to the WHO (2003a: 35), uncomplicated hypertension is usually asymptomatic and primary hypertension is not curable. The erroneous perception that hypertension is symptomatic is problematic because this could lead to non-compliance with treatment. Patients who believe hypertension is symptomatic, may not comply with their treatment when there are no symptoms present. Likewise patients who believe that an absence of symptoms means that they are cured may be likely to be non-compliant.

Table 4.11: Perception of severity in order of importance

To what extent do you agree with the following statements?	High perceptions of severity	Low perceptions of severity
I think I am cured because I do not have symptoms #	76 (74.51%)	26 (25.49%)
I am relaxed about my blood pressure condition because I don't have any symptoms #	64 (62.74%)	38 (37.62%)
I am worried about my blood pressure condition because I have symptoms	58 (56.86%)	44 (43.14%)
My blood pressure condition is serious *	38 (37.62%)	63 (61.76%)

* 1 missing value; # Item was reversed coded

Table 4.12 summarises the values of central tendency and dispersion on the Perceptions of Severity Scale. The data was positively skewed (distribution = 0.37) (refer figure 4.23). The median score was 2.50 and the interquartile range was 0.75. A positively skewed distribution implies that the average score of most respondents was low on the scale. This implies that the respondents tended to have a low perception of severity.

Table 4.12: Measures of central tendency and dispersion on perception of severity

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
POS	102	2.65	0.47	2.50	0.75	0.37	1.50-3.75

POS = Perception of severity. SD = Standard deviation. Missing values range from 0 to 1

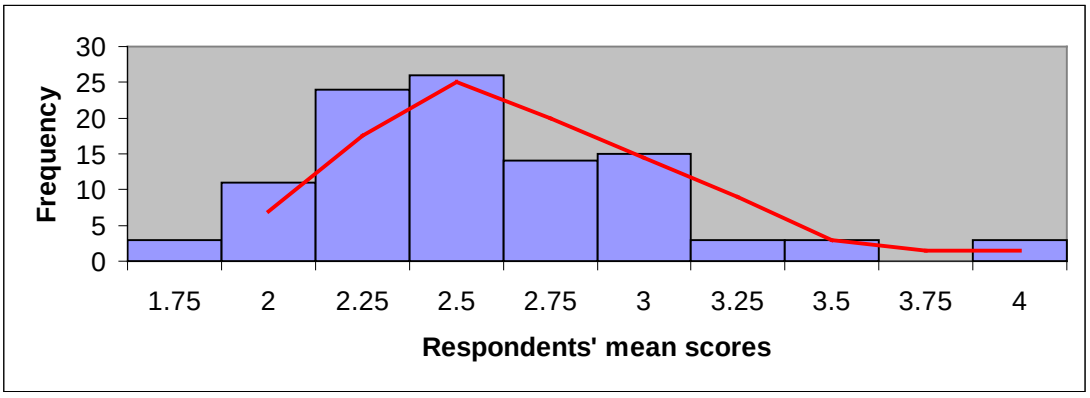


Figure 4.23

Respondents' mean scores on the Perception of Severity Scale

The mean score for this scale was 2.65 (SD = 0.47) (refer to table 4.12). The mean scale score of individual respondents was used to categorise the respondents into high and low perception of severity to facilitate correlational and inferential statistics (refer to section 4.12). The respondents with a mean score below 3 were considered as having a low perception of severity and respondents with a mean score of 3 and above were considered as having a high perception of severity.

4.6 RESPONDENTS' PERCEPTIONS OF THEIR RISK OF DEVELOPING HYPERTENSION COMPLICATIONS

Section E of the interview schedule measured the respondents' perceptions of their risk of developing complications as a result of hypertension. The descriptive statistics of responses to this scale are presented in this section while inferences and correlations with treatment compliance are presented in section 4.12.

For purposes of discussion, a choice of having a 0% to 49% chance of developing complications was taken as a low perception of risk while 50% to 100% was taken as a high perception of risk. Table 4.13 indicates that the respondents perceived themselves to be most at risk of developing kidney problems, followed by becoming a burden for their families, having a disrupted family, social and career life and developing paralysis. The respondents indicated a lower risk for developing a stroke, heart problems and visual problems.

Table 4.13: Perception of risks in order of importance

	High risk	Low risk
Kidney problems	50 (49.02%)	52 (50.98%).
Becoming a burden for the family	47 (46.53%)	54 (52.94%)
Disrupted family life *	46 (45.54%)	58 (56.86%),
Disrupted social life	46 (43.11%	58 (56.86%),
Career being negatively affected	45 (44.12%)	57 (55.88%)
Paralysis	45 (44.12%)	57 (55.88%)
Stroke	42 (41.18%)	60 (58.82%)
Heart problems	42 (41.18%)	60 (58.82%)
Visual problems	38 (37.26%)	64 (62.75%)

*1 missing value

Table 4.14 summarises the values of central tendency and dispersion for the Perception of Risks Scale. The distribution of data was somewhat negatively skewed (-0.21) (see figure 4.24). The median was 2.94 while the interquartile range was 2.14. The distribution of respondents' scores reveals that most

respondents scored low on this variable and a few scored high. Thus the respondents tended to underestimate their risk of developing the complications of hypertension.

Table 4.14: Measures of central tendency and dispersion on perception of risk

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
POR	102	2.77	1.11	2.94	2.14	-0.21	1.00-4.00

POR = Perception of Risks; SD = Standard deviation. Missing values range from 0 to 1

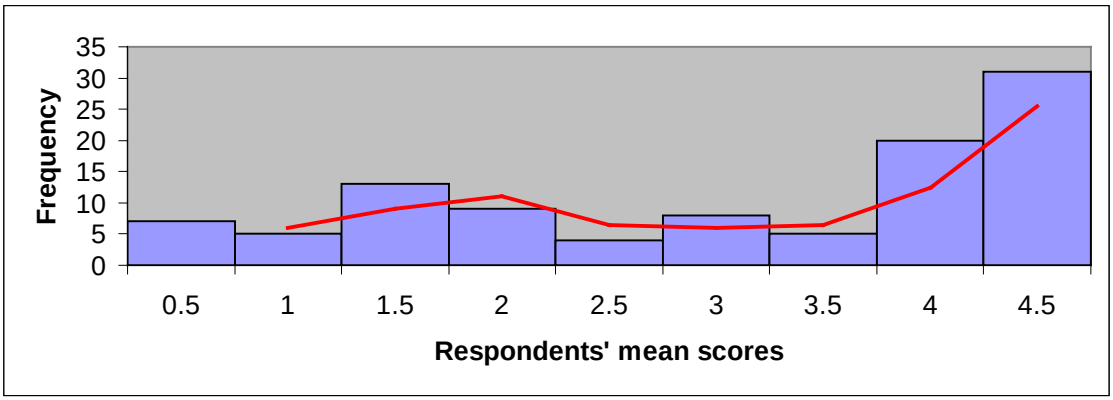


Figure 4.24

Respondents' mean scores on the Perception of Risk Scale

The mean score for this scale was 2.77 (SD = 1.11) (refer to table 4.14). The mean scale score of individual respondents was used to categorise the respondents into high and low perception of risk to facilitate correlational and inferential statistics (refer to section 4.12). Respondents with a mean score below 3 were considered as having a low perception of risk and respondents with a mean score of 3 and above were considered as having a high perception of risk.

4.7 RESPONDENTS' PERCEPTIONS OF THE BENEFITS OF ANTIHYPERTENSION TREATMENT

Section F of the interview schedule measured how beneficial the respondents perceived the hypertension treatment. The descriptive statistics of responses

to this scale are discussed in this section while inferences and correlations with treatment compliance are discussed in section 4.12.

For discussion purposes the responses were collapsed into positive and negative perceptions of the benefits of treatment. Table 4.15 indicates the perceptions of benefits in order of importance. The most important benefit was indicated as protection from complications, followed by keeping blood pressure under control, increasing the quality of life, avoidance of added financial burden to treat complications, an increased sense of well-being, decreased chance of dying and giving peace of mind.

Table 4.15: Perception of benefits in order of importance

	Positive perception of benefits	Negative perception of benefits
Protection from complications *	88 (87.13%)	13 (12.87%)
Keeping blood pressure under control *	84 (83.17%)	18 (17.82%)
Increased quality of life *	79 (78.22%)	22 (21.78%)
Avoidance of added financial burden to treat complications *	78 (77.23%)	23 (22.77%)
Increased sense of well-being *	76 (75.25%)	25 (24.75%),
Decreased chance of dying *	76 (75.25%)	25 (24.75%)
Giving peace of mind *	72 (71 .29%)	29 (28.71%)

*1 missing value

Table 4.16 summarises the values of central tendency and dispersion of this variable. The distribution was negatively skewed (distribution = -0.65). The median score was 3.29 while interquartile range was 1.86 (refer to table 4.16 and figure 4.25). The high median score implies that the respondents scored high on the scale. Deductively, this means majority of respondents perceived the benefits of anti-hypertension treatment favourably.

Table 4.16: Measures of central tendency and dispersion on perception of benefits

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
POBe	101	3.23	0.81	3.29	1.86	-0.65	1.00-4.00

POBe = Perception of Benefits; SD = Standard deviation.

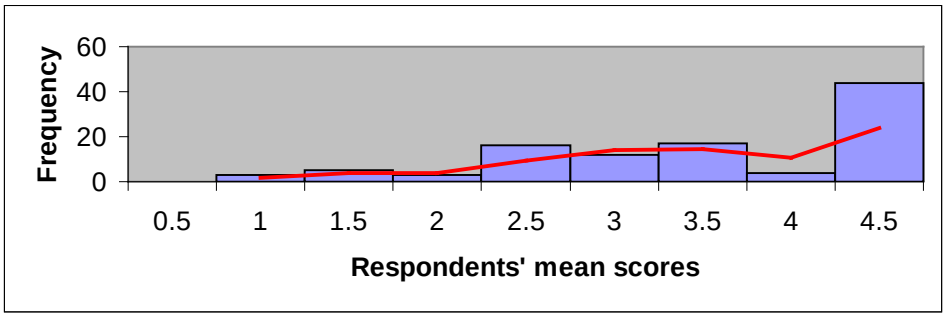


Figure 4.25

Respondents' mean scores on the Perception of Benefits Scale

The mean scale score was 3.23 (SD = 0.81) (refer to table 4.16). The mean score was used to categorise the respondents into those who had a positive perception of benefits and those with a negative perception of benefits. Respondents with a mean score of 3 and above were categorised as having positive perceptions of benefits while those with a mean score of below 3 were categorised as having negative perceptions of the benefits of antihypertension treatment. This distinction was necessary to facilitate correlational and inferential statistics (refer to section 4.12).

4.8 RESPONDENTS' PERCEPTIONS OF BARRIERS TO ANTIHYPERTENSION TREATMENT

Section G of the interview schedule measured the extent to which stated barriers hindered the respondents from complying with hypertension treatment. This section discusses the descriptive statistics of responses to this scale, while inferences and correlations are presented in section 4.12.

The responses were collapsed into high perception of barriers and low perception of barriers for discussion purposes. The frequencies are presented in table 4.17. The most important barrier was lack of discipline to comply with the required dietary restrictions. Other important barriers were not having enough time to exercise, ineffectiveness of the medicine to stabilise their blood pressure, lack of motivation because they could not be cured, lack of

time to relax and sleeping problems. The least important barrier was a lack of discipline to stop smoking.

Table 4.17: Perception of barriers in order of importance

Barriers	High perception of barriers	Low perception of barriers
lack of discipline to comply with the dietary restrictions *	57 (56.44%)	44 (43.56%)
not having enough time to exercise	56 (54.90%)	46 (45.10%)
Ineffectiveness of the medicine to stabilise my blood pressure **	55 (55.00%)	45 (45.00%)
lack of motivation because I cannot be cured	55 (53.92%)	47 (46.08%)
lack of time to relax	54 (52.94%)	48 (47.06%)
having sleeping problems	49 (48.04%)	53 (51.96%)
lack of discipline to stop smoking	37(36.27%)	65 (63.73%)

*1 missing value ** 2 missing values

Table 4.18 summarises the values of central tendency and dispersion for the Perception of Barriers Scale. The median was 2.29 and the interquartile range was 1.43. The distribution was positively skewed to the right (see figure 4.26), which means respondents generally scored low on this scale. By way of interpretation, this means that the respondents tended to have low perceptions of the stated barriers.

Table 4.18: Measures of central tendency and dispersion on perception of barriers

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
POBa	102	2.34	0.77	2.29	1.43	0.01	1.00-4.00

POBa = Perception of barriers; SD = Standard deviation. Missing values range from 0 to 2.

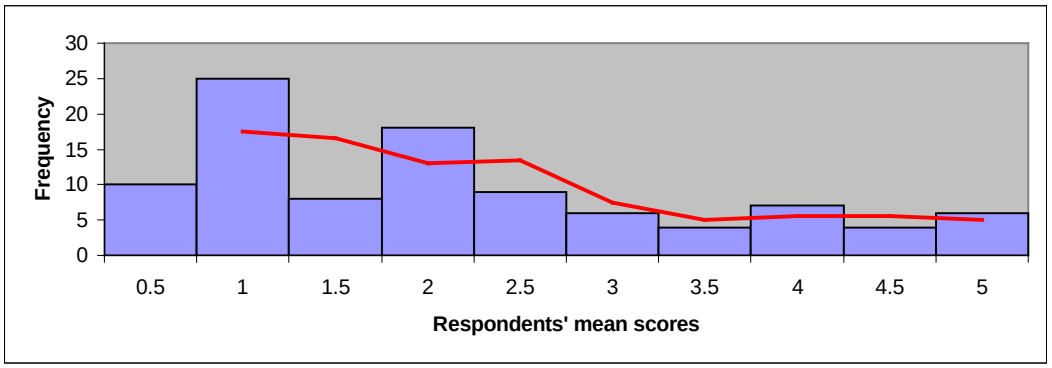


Figure 4.26

Respondents' mean scores on the Perception of Barriers Scale

The mean score for the scale was 2.34 (SD = 0.77) (refer to table 4.18). The mean scale score of individual respondents was used to categorise the respondents into high and low perception of barriers to facilitate correlational and inferential statistics (refer to section 4.12). Respondents with a mean score below 3 were considered as having a low perception of barriers and respondents with a mean score of 3 and above were considered as having a high perception of barriers.

4.9 RESPONDENTS' PERCEPTIONS OF INTERNAL FACTORS RELATED TO TREATMENT COMPLIANCE

Section H of the interview schedule measured the extent to which internal factors influenced respondents' compliance with antihypertension treatment. This section discusses the descriptive statistics of responses to this scale, while inferences and correlations with treatment compliance are presented in section 4.12.

As in the previous sections, the responses were collapsed into high and low internal factors scores for discussion purposes. The collapsed frequencies in order of importance are presented in table 4.19.

The respondents indicated that they understood their condition. An overwhelming majority understood why it was necessary to take medications as prescribed. They also understood what they should do to keep their blood pressure under control. It is noteworthy that the respondents understood how their medications worked to keep blood pressure under control, what caused their hypertension and the meaning of their blood pressure readings to a lesser extent. A point of concern is the fact that the majority of respondents indicated that they believed that hypertension could be cured with local herbs.

The responses indicated that the respondents were highly self-aware. They were aware how healthy their body feels and would notice immediately if they didn't feel healthy.

With regard to who is primarily responsible for managing their hypertension they indicated that they were in charge of their physical health, that their physical health was determined largely by what they did or did not do and that they were primarily responsible for managing their hypertension. Interestingly, they also considered their doctor as primarily responsible for managing their hypertension. This may be indicative that the respondents accepted responsibility for their health but that they regarded the management of hypertension as a shared responsibility. The majority indicated that they had the ability to manage their hypertension. However the number of respondents who were not convinced of their ability to manage their hypertension is noteworthy.

Table 4.19: Perception of internal factors in order of importance (N=102)

	High internal factors score	Low internal factors score
I understand why it is necessary to take my medicine as prescribed	98 (97.03%)	3(2.97%)
I understand the nature of my condition	94 (92.16%)	8(7.84%)
I am aware of how healthy my body feels	93 (91.18%)	9(8.82%)
I notice immediately when my body is not healthy	92 (90.20%)	10(9.80%)
I understand what I can do to keep my blood pressure under control	90 (88.24%)	12(11.88%)
I am in charge of my physical health	89 (87.25%);	13(12.75%)
My physical health is determined largely by what I do or don't do	86 (85.15%;	15(14.85%)
I am primarily responsible for managing my hypertension	78 (76.47%)	24(23.52%)
I have the ability to manage my hypertension	70 (69.31%).	31(30.69%)
I understand how my medication works to keep my blood pressure under control	65(64.36%)	36 (35.64%)
I understand what caused my blood pressure condition	56 (54.90%)	46 (45.10%)
I understand the meaning of the blood pressure readings	59 (57.84%)	43 (42.16%)
I think that I can cure my hypertension with local herbs other than the prescribed medication#	35 (34.31%)	67 (65.69%),
My doctor is primarily responsible to manage managing my hypertension#	34 (33.33%)	68 (66.67%)

Item was reversed coded

Table 4.20 summarises the values of central tendency and dispersion for the Internal Factors Scale. The median was 2.93 and the interquartile range was 0.61. This indicates that the respondents scored low on this scale. The data followed a near normal distribution (distribution = 0.41) implying that the

respondents' scores were mainly clustered around the centre with few extreme scores (refer to figure 4.27).

Table 4.20: Measures of central tendency and dispersion on internal factors

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
IF	102	2.96	0.52	2.93	0.61	0.41	1.79-4.00

IF = Internal factors; SD = Standard deviation. Missing values range from 0 to 1

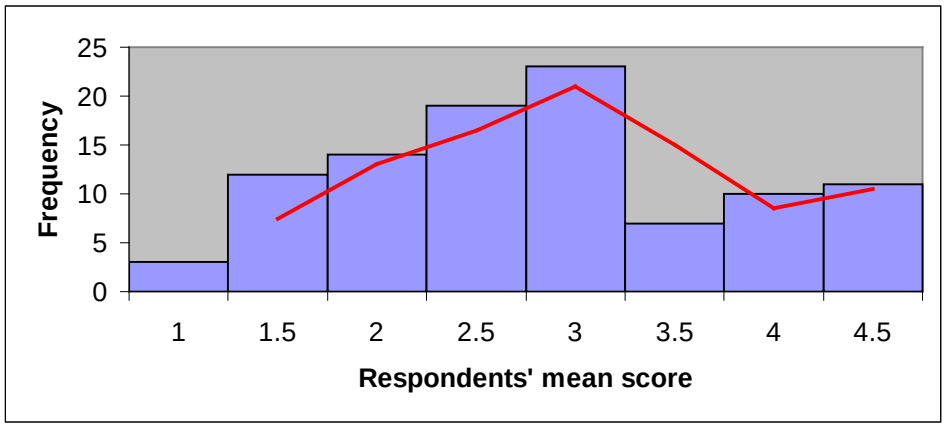


Figure 4.27

Respondents' mean scores on the Internal Factors Scale

The mean scale score was 2.96 (SD = 0.52) (refer to table 4.20). The mean scale score of individual respondents was used to categorise the respondents into high and low internal factors score groups to facilitate correlational and inferential statistics (refer to sections 4.12). Respondents with a mean score below 3 were considered as having a low internal factor score and respondents with a mean score of 3 and above were considered as having a high internal factors score.

4.10 RESPONDENTS' PERCEPTIONS ON HEALTH CARE PROVIDER FACTORS

Section I of the interview schedule measured the respondents' health care provider perceptions. This section discusses the descriptive statistics of responses to this scale, while inferences and correlations are presented in section 4.12.

For discussion purposes, the responses have been collapsed into two categories, positive and negative perceptions on the health care provider factors. As indicated in table 4.21, an overwhelming majority of the respondents indicated that they had confidence in their doctors. They had positive perceptions about their doctors' attitudes. They indicated that the doctor was patient with them, treated them with respect and understood their concerns. The respondents indicated that they held positive perceptions about the knowledge and experience of their doctors. Likewise, the other health workers equally treated them with respect.

With regard to the doctor's interpersonal skills, an overwhelming majority of the respondents indicated that their doctor explained the nature of their condition and how to manage their blood pressure to them and listened to their concerns.

Similarly an overwhelming majority held positive perceptions about the availability of medicines at the clinic and effectiveness of the medicines. The majority of the respondents regarded the waiting time at the clinic as acceptable.

Table 4.21: Health care provider factors in order of importance

	Positive perceptions	Negative perceptions
The doctors is patient with me	99 (97.06%)	3 (2.94%)
I have confidence in the doctors	99 (97.06%)	3 (2.94%)
The doctors treat me with respect	98 (96.08%)	4 (3.92%)
The health care workers other than the doctors treat me with respect	98 (96.08%)	4 (3.92%)
The doctor clearly explains to me how I should manage my blood pressure condition	93 (91.18%)	9(8.82%)
The doctor listens to my concerns	93 (91.18%)	9 (8.82%)
The doctor understands my concerns	92 (90.20%)	10 (9.80%)
The availability of medicine when I need it is good *	89 (88.12%)	12 (11.88%)
The medicine I receive at the clinic is effective *	89 (88.12%)	12 (11.88%)
The doctor clearly explains my condition to me *	85 (84.16%)	16 (15.54%)
The doctor who attends to me at the clinic is knowledgeable *	84 (83.17%)	17 (16.67%)
The doctor who attends to me at the clinic is experienced	82 (80.39%)	20 (19.61%)

	Positive perceptions	Negative perceptions
The waiting time at the clinic is acceptable	67 (65.69%)	35 (34.31%)

* 1 missing value

Table 4.22 summarises the values of central tendency and dispersion of the Health Care Provider Scale. This score indicates that the respondents had positive perceptions of the health care provider factors. The median was 3.00 and the interquartile range was 0.25. The data followed a near normal distribution (distribution = -0.16) implying that the respondents' scores were mainly clustered around the centre with few extreme scores (refer to figure 4.28).

Table 4.22: Measures of central tendency and dispersion on health care providers factors

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
HCPF	102	3.07	0.41	3.00	0.25	-0.16	1.58-4.00

HCPF = Health care provider factors; SD = Standard deviation

Figure 4.28

Respondents' mean scores on the health care provider factors scale

The mean score for this scale was 3.07 (SD = 0.41) (refer to table 4.22). The mean scale score of individual respondents was used to categorise the respondents into positive and negative perceptions of health care provider factors. This is done to facilitate correlational and inferential statistics (refer to section 4.12). Respondents with a mean score below 3 were considered as having a negative perception of health care provider factors and respondents

with a mean score of 3 and above were considered as having a positive perception of health care provider factors.

4.11 RESPONDENTS' PERCEPTIONS OF THE CUES TO ACTION FACTORS

Section J of the interview schedule measured the extent to which stated cues to action could influence antihypertension treatment compliance. This section discusses the descriptive statistics of responses to this scale, while inferences and correlations with treatment compliance are presented in section 4.12.

For discussion purposes these responses were collapsed into two categories, namely positive and negative perceptions of cues to actions. Table 4.23 summarises these responses in order of importance. An overwhelming majority indicated that advice from their doctor and a health care worker other than the doctor motivated them to comply with their blood pressure treatment. Many respondents indicated that advice from family members and friends also motivated them to comply with their treatment.

Television and radio programmes, health education leaflets and health posters displayed were also important motivators for treatment compliance. Reading newspaper articles and information on the Internet appeared to be weak motivators.

The majority of the respondents indicated that they were motivated to comply with their treatment when they felt unwell and by the hypertension related death of a relation or friend.

The findings of this current study differs from those of Oliviera, Chen, McCarthy, Davis and Hill (2005:224).Their study, which was conducted in the USA, revealed that 74% of respondents indicated that doctors and other health care workers were major sources of information on hypertension, 55% indicated mass media (radio, television, newspaper and magazines)

motivated them to take treatment while only 30% indicated advice from friends or family members as motivators.

Table: 4.23: Cues to actions in order of importance

Which of the following motivates you to comply with your blood pressure treatment?	Motivated	Not motivated
Advice from my doctor	92 (90.20%)	10 (9.80%)
Advice from a health care worker other than my doctor	90 (88.24%)	12 (11.76%)
TV programmes on high blood pressure	88 (86.27%)	14 (13.72%)
Radio programmes on high blood pressure	84 (83.35%),	18 (17.65%)
Advice from a family member	79 (77.45%),	23 (22.55%)
Advice from my friends	73 (71.57%)	29 (28.43%)
Health education leaflets given to me	71 (69.61%)	31 (30.39%)
When I feel unwell	68 (66.67%)	34 (33.33%)
Death of a relation or friend due to high blood pressure	66 (64.71%)	36 (35.29%)
Health posters displayed	66 (64.71%)	36 (35.29%)
Newspaper or journal article	47 (46.08%)	55 (53.92%)
Information on the internet	34 (33.33%)	68 (66.67%)

Table 4.24 summarises the values of central tendency and dispersion of the Cues to Action Scale. This indicates that the respondents scored low on this scale. The median was 2.75 and the interquartile range was 0.50. The data followed a near normal distribution (distribution = 0.74) implying that the respondents' scores were mainly clustered around the centre with few extreme scores (refer to figure 4.29). The respondents tended to have a low score on the Internal Factors Scale.

Table 4.24: Measures of central tendency and dispersion on cues to action

Variable	N	Mean	SD	Median	Interquartile range	Distribution	Range of scores
CA	102	2.81	0.52	2.75	0.50	0.74	1.58-4.00

CA = Cues to action; SD = Standard deviation

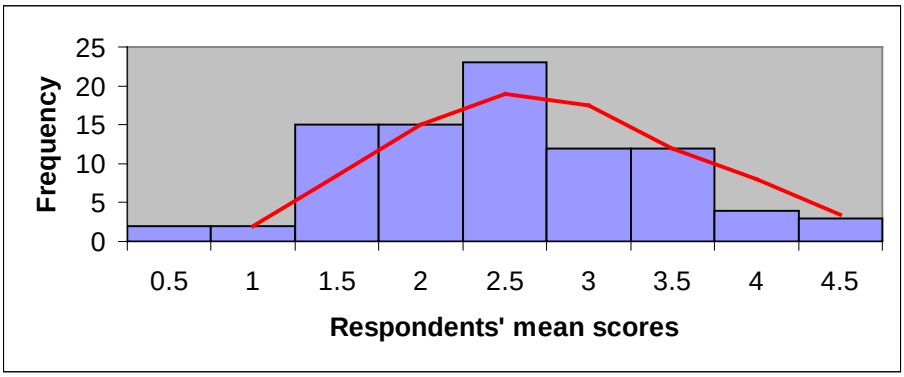


Figure 4.29

Respondents' mean scores on the Cues to Action Scale

The mean score for this scale was 2.81 (SD=0.52) (refer to table 4.24). The mean scale score of individual respondents was used to categorise the respondents into having high and low motivation scores to the cues to action. This was done to facilitate correlational and inferential statistics (refer to section 4.12). Respondents with a mean score below 3 were considered as having a low motivation score and respondents with a mean score of 3 and above were considered as having a high motivation score to the cues to action.

4.12 RELATIONSHIPS BETWEEN THE RESEARCH VARIABLES

This section discusses the results of correlational and inferential statistics that were conducted to investigate the relationships between the theoretical variables and treatment compliance. By combining sections B and C of the interview schedule, a single variable (treatment compliance) was created. Section B measured compliance with the antihypertension medication regimen and Section C measured compliance with lifestyle modifications regimen. Using the Health Belief Model as the theoretical framework, the researcher developed three research questions to examine the relationships of socio-demographic factors, perceptions of severity, perceptions of risks, perceptions of barriers, perceptions of benefits, internal factors, health care provider factors, and cues to actions with treatment compliance. The specified variables encompassed the various aspects of compliance

behaviour. The results pertaining to each of the three research questions are discussed below:

4.12.1 Relationships between the biographical variables and treatment compliance

This section seeks to answer the following research question:

> ***What is the relationship between treatment compliance and the following variables among patients diagnosed with hypertension on the Island of Praslin: socio-demographic factors (age, gender, ethnic background; marital status, educational status, work status, household income); physiological factors (weight status); duration of illness; number of medications prescribed; doses of medication skipped; and alcohol intake per week?***

The Chi-square test was used to answer the above research question. Mosaic plots were developed to elucidate the associations between the research variables stated in the research question.

At a 95% level of confidence set a priori, age, gender, employment status, duration of illness, doses of medication skipped and alcohol intake per week demonstrated significant statistical associations with treatment compliance. The findings were as follows:

- Respondents who were 44 years and older were more compliant with treatment than respondents who were younger than 44 years of age (Chi-square = 11.51 p-value = 0.0032).
- A slightly significant relationship was found between gender and treatment compliance with females being more compliant than the males (Chi-square = 4.11, p-value=0.043). .
- Respondents who had been employed during the past 12 months were statistically less compliant with treatment than unemployed respondents (Chi-square = 5.43 p-value =0.0198).

- Respondents who were diagnosed with hypertension five years and more ago were more compliant with treatment than those whose diagnosis was made less than five years ago (Chi-square =16.02 p-value = 0.0001).
- There was a strong relationship between doses of medication skipped in the last three days and compliance (Chi-square = 35.15 p-value = <0.0001). Respondents who admitted skipping one or more doses of medications in the previous three days were less compliant with treatment than those who reported not skipping any dose.
- Respondents who admitted taking alcohol a few times per week were less likely to be compliant with treatment than those who seldom drink alcohol (Chi-square = 15.89 p-value = 0.0012).

There were no significant associations between treatment compliance and the following factors:

- Ethnic background (Chi-square =1.399 p-value = 0.7057)
- Marital status (Chi-square = 0.102 p-value = 0.7495)
- Household income (Chi-Square = 2.02 p-value = 0.3639)
- Number of pills taken daily (Chi-square = 0.838 p-value = 0.6577)
- Number of cigarettes smoked per day (Chi-square 1.547 = p-value = 0.2136).

The Analysis of Variance (ANOVA) test was conducted to test for statistically significant differences between the means of compliant and non-compliant groups. A statistical significant difference was found between the means of medication compliance and the physiological measure of weight assessed with the body mass index. The respondents were classified into two groups of normal weight (BMI $\leq$ 24.9kg/m^2) and overweight (BMI $\geq$ 25kg/m^2). The result showed a statistically significant difference between the means of the two groups. Respondents who were overweight were more compliant with treatment than those who had a normal weight (F = 8.06 p-value = 0.0055).

4.12.2 Relationships between the theoretical variables and treatment compliance

This section seeks to answer the following research question:

> ***What is the relationship between treatment compliance and the following variables among patients diagnosed with hypertension on the Island of Praslin: perception of severity; perception of risk; perception of benefits; perception of barriers; internal factors; health care provider factors; cues to action?***

Pearson's correlation analysis was utilised to assess the relationships between the variables stated in the above question. In order to perform statistical analysis on the data, it was assumed that the respondents' perceptions would relate in a linear fashion with treatment compliance. Thus zero-order (bivariate) correlation analysis was performed between the independent variables (perception of severity, perception of risk, perception of benefits, perception of barriers, internal factors, cues to action and health care provider factors) and the dependent variable (treatment compliance). Significant relationships were found between treatment compliance and 4 variables namely; perception of benefits, perception of risks, internal factors and cues to action (Refer to table 4.25).

The findings were as follows:

- Perception of benefits demonstrated a significant relationship with treatment compliance (r = 0.46 P = < .0001) indicating that patients who perceived benefits of taking medications and effecting lifestyle modifications were likely to be compliant with their treatment.
- Perception of risks demonstrated a significant relationship with treatment compliance (r = 0.30. P = 0.0020). This relationship implies that patients who perceived risks of developing complications of hypertension were likely to comply with their treatment.
- A significant relationship was also noted between treatment compliance and internal factors (r = 0.37 P = 0 .0001). This indicates

that patients who measured high in self efficacy, knowledge and internal locus of control concerning taking antihypertension medications and adopting lifestyle modifications were likely to be compliant with their treatment.

- A significant relationship was noted between cues to action and treatment compliance (r = 0.45 P = < .0001). This implies that cues to action are necessary to increase compliance with treatment in hypertension.

Table 4.25: Zero-order correlational analysis showing theoretical variables that demonstrated significant relationships with treatment compliance (P **≤ 0.05).**

Variable	r	*P -value*
Perceptions of benefits	0.46	<.0001
Perceptions of risks	0.30	<0.0020
Internal factors	0.37	<.0001
Cues to actions	0.45	<0.0001

4.12.3 Regression analysis between the theoretical variables and treatment compliance

This section seeks to answer the following research question:

Which of the following variables are predictor variables for treatment compliance: socio-demographic variables; perception of severity; perception of risk; perception of benefits; perception of barriers; internal factors; health care provider factors and cues to action?

Stepwise multiple regression analysis was further performed on the seven theoretical variables (perception of severity, perception of risks, perception of benefits, perception of barriers cues to action, internal factors and health care provider factors). This was done to predict the relative contribution of each variable to treatment compliance. Multiple regression analysis was performed because compliance was hypothesised as a complex multidimensional

phenomenon that cannot be easily predicted with only a single variable. According to Argyrous (2000:484), a stepwise multiple regression analysis involves creating a model and adding each independent variable sequentially to the model to test its relative contribution. Variables that do not contribute to the model are dropped and those that contribute are retested to ascertain veracity.

Owing to a small sample size, subgroup analysis of the biographical variables could not be performed. However, a single model was created and each of the six theoretical variables was sequentially added to determine the relative contribution of each variable to treatment compliance. The best predictive model involved the combination of three predictor variables with an R^2 = 0.313, thus contributing 31.32% of the variance in treatment compliance. The degree of significance was F= 14.742; P < 0.0001.

The three independent variables that contributed significantly to predicting treatment compliance were (refer to table 4.26):

- Perception of benefits
- Perception of barriers and
- Cues to action.

Table 4.26: Regression analysis summaries of predictor variables for treatment compliance (medication and lifestyle modification)

Variable	Estimate (β)	Std error of β	t-Ratio	P-value
Intercept	2.024	0.198	10.21	<.0001
Perception of benefits	0.181	0.050	3.64	0.0004
Cues to action	0.239	0.077	3.10	0.0025
Perception of barriers	-0.118	0.046	-2.56	0.0120

R^2 = 0.31, R^2 adjusted = 0.29, P < 0.0001

4.13 CONCLUSION

In this chapter, the researcher presented the results of the descriptive, correlational and inferential statistics. Various factors related to the respondents' compliance with their hypertension medications and lifestyle modification regimens were covered. The information presented in this chapter form the basis for the recommendations and conclusions that are incorporated in the next chapter.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter which concludes this study, summarises the research findings and proffers recommendations. The conduct of this study was motivated by the researcher's observations that the prevalence of uncontrolled hypertension remained high on Praslin Island despite the availability of free health care. The literature confirmed that non-compliance with the medication and lifestyle modification regimens was by far the most significant cause of uncontrolled hypertension. The physical, psychological, social and financial implications of uncontrolled hypertension are grave, affecting not only the individual and his/her immediate family but also the society at large. In order to improve compliance with treatment (anti-hypertension medication and lifestyle modification regimens), factors that militate against compliance must be identified and addressed.

Against this background, this study focused on identifying factors that affected compliance with medications and lifestyle modifications among patients diagnosed with hypertension on the Island of Praslin. It was assumed that if such factors were identified, then strategies could be developed to improve compliance. The Health Belief Model provided the theoretical background for which variables were developed for the study. The central question which the researcher sought to address was:

> *What are the reasons for non-compliance with the drug treatment and lifestyle modification regimens among hypertensive patients on Praslin Island?*

Specifically, the study sought to answer the following five questions:

- *How compliant are the respondents with their hypertension drug regimen?*
- *How compliant are the respondents with their lifestyle modifications regimen?*
- *What is the relationship between treatment compliance and socio-demographic factors (age, gender, ethnic background; marital status, educational status, work status, household income); physiological factors (weight status); duration of illness; number of medications prescribed; doses of medication skipped; and alcohol intake per week?*
- *What is the relationship between treatment compliance and perception of severity, perception of risks; perception of benefits; perception of barriers; internal factors; health care provider factors; cues to action?*
- *Which of the following variables are predictor variables for treatment compliance: socio-demographic variables; perception of severity; perception of risks; perception of benefits; perception of barriers; internal factors; health care provider factors; and cues to action?*

5.2 SUMMARY OF THE RESEARCH FINDINGS

5.2.1 Sample characteristics

The multicultural sample (N=102) comprised of 58 women and 44 men. Altogether about 85.30% of respondents were aged between 35-74 years while only 14.70% were aged less than 35 years. This is not surprising as hypertension is largely seen in adult life. The respondents generally had some form of education, were economically productive and had a source of income. The majority (60.78%) had lived with hypertension for more than five years, 42.14% were diagnosed 1-5 years ago and only 2.94% were diagnosed less than one year ago.

More respondents were placed on combined drug therapy (66.33%) than on monotherapy (29.70%), and 3.96% did not take any medication. Most respondents required two or more different kinds of medicine to control their high blood pressure. With regards to the specific drugs prescribed the majority of the respondents, namely (71.57%) took Amlodipine, followed by Bendrofluazide (39.22%) and Lisinopril (25.49%). Almost all the respondents (96.08%) were on a single dose regimen. This pattern of prescription probably arose because doctors adhered to the institutional requirements and standard treatment protocols which usually recommend these medications as first line. For many hypertension patients, combination therapy is required to achieve reasonable hypertension control. Combination therapy is believed to achieve a better control of blood pressure than mono-therapy as some drugs work synergistically. The fact that most antihypertension medications are now available in a single daily dosage, supports efforts to improve compliance among patients. Since antihypertension medications are taken daily for life, a simple dosage is expected to reduce frustration and a propensity for non-compliance (Benson & Britten 2003:1314).

The high number of respondents with high blood pressure values together with the evidence of uncontrolled hypertension as observed in this study, especially among the female respondents, is noteworthy. Altogether 65.69% respondents had high blood pressure recorded during the interview as against 60.78% documented in the clinical notes. Similarly, 34.31% had a normal blood pressure at the time of data collection as against 39.22% documented in the clinical notes. The high percentage of obese and overweight respondents (87.25%) is of particular concern considering the fact that weight control is an important variable in blood pressure control. Another concern is the fact that 83.33% rarely or never had their blood pressure monitored. This is noteworthy as routine blood pressure monitoring is important and recommended for patients who are either on a drug therapy and/or a lifestyle modifications regimen (Chobanian et al 2003:1250).

Almost a half of the respondents (41.18%) had co-morbidities and a high prevalence of health complaints related to the cardiovascular and renal conditions, visual impairment and stroke were noted.

5.2.2 Compliance with anti-hypertension medications

The data obtained from the Compliance with the Medication Regimen Scale indicates that the respondents were generally compliant with their medications regimen (median 3.14, mean 2.96). The reasons for non-compliance were inherent in the respondents themselves (e.g. forgetfulness) rather than the medications (e.g. side-effects) or treatment factors (e.g. multiple dosage or frequent change of medications or dosage).

Compliance with the medications regimen as reported by the respondents (71.57%) was almost similar to that observed in the clinic notes (70.59%). This similarity implies that the respondents were willing to reveal their level of compliance to their doctors. The majority of the respondents (63.73%) took their medications daily and 36.27% did not take it daily. The majority of the respondents (70.59%) did not skip doses of medications during the previous three days and 29.41% skipped doses. These non-compliance figures are unacceptable since hypertension medications should be taken as prescribed and not intermittently. The near similarity between the data obtained from the interviews and by means of document analysis may indicate that self-report is a reliable method of assessing medication compliance as suggested by Zen et al (2002:12). According to Vitolins, Rand, Rapp, Ribisl and Sevick (2000:193), medication adherence that requires recalling adherent behaviour over a short period is more reliable and valid than assessing compliance over a longer period of time.

Medication side-effects are reported in the literature as a significant reason why most patients do not comply with their medications regimen (Benson & Britten 2003:1314; Jokisalo et al 2002:577). However, in this current study, there was no evidence of reported medication side-effects in the clinical records of 91.18% respondents. Only 9 (8.82%) respondents had such

records. This finding may indicate the relative tolerability of antihypertension medications.

The interviews revealed that, although the majority of the respondents (72.55%) complied with follow-up visits, 27.45% did not comply. Similarly, the majority of the respondents (79.21%) were compliant with clinic appointments while 21.57% were non-compliant. A comparative analysis with clinic records of follow-up visits over three appointments (9 months duration), revealed that 72.55% were compliant and 27.45% were non-compliant. The relatively high levels of non-compliance are problematic in light of the evidence of uncontrolled hypertension, co-morbidities and health complaints in the sample. Honouring clinic appointments is as important as complying with the medication regimen because it is an opportunity for the patient to interact with health provider, share problems associated with treatment and be examined to detect early onset of complications.

5.2.3 Compliance with the lifestyle modifications regimen

The respondents scored high on the Compliance with the Lifestyle Modifications Scale (median = 3.09, mean = 3.04). However, the respondents were insufficiently compliant with the following recommended behaviours: physical exercise (50.00%), weight reduction (53.92%), sleep (27.56%) and relaxation (31.37%). In addition to this, some respondents persisted with the following non-recommended behaviours: ingestion of animal fat (28.35%), fast foods (27.45%), salt (24.51%) and alcohol (21.57%), as well as smoking (15.84%). The respondents appeared to have internalised the importance of eating fruits (94.12%) and vegetables (92.16%).

The comparative analysis of the clinical records of the respondents showed that there were no entries with regard to non-compliance with the lifestyle modifications regimen in 63.73% records, while in 36.27% records such entries were documented. The disparity between the data obtained from the clinical records and those obtained from the interview schedule may be

indicative that clinicians tended to focus on the drug regimen rather than the lifestyle modifications regimen during consultations.

5.2.4 Relationships between treatment compliance and socio-demographic factors

The results indicate that employed persons younger than 44 years, who had a normal weight, smoked and skipped dosage were at risk of being inadequately compliant with their hypertension treatment (medication and lifestyle modification regimens). The relationship between normal weight and compliance with treatment is not entirely clear. It is possible that hypertensive patients with normal weights could perceive their condition as less serious compared to obese patients. Interestingly, this study showed that males and those persons who had been diagnosed less than five years ago might be particularly at risk of being inadequately compliant with their treatment.

5.2.5 Relationships between treatment compliance and perceptions

The WHO (2003a:35), and other authorities adjudge uncomplicated hypertension as an asymptomatic disorder, and primary hypertension as not curable. This current research revealed that the respondents underestimated the severity of their hypertension (median = 2.50, mean = 2.65) and their risk to develop physical, social and economic complications (median = 2.94, mean = 2.77). They perceived the benefits of anti-hypertension treatment favourably (median = 3.29, mean = 3.23) and had low perceptions of the stated barriers (median = 2.29, mean = 2.34). However, despite these favourable statistics, it is noteworthy that between 12.87% and 28.71% of the respondents were not convinced of the benefits of the hypertension treatment. In addition to this between 36.27% and 56.44% of the respondents indicated that they considered the stated barriers as problematic.

The Health Belief Model hypothesises that, for health behaviour change to occur, perceived benefits must outweigh perceived barriers to performing that behaviour (Finfgeld et al 2003: 293; Von, Ebert, Ngamvitroj, Park & Kang

2004:472). However, this study found a weak statistical association between perceived barriers and treatment compliance. Perceived barriers therefore, did not influence the respondents' compliance behaviour significantly. Pearson's correlation analysis indicated that the respondents who considered the treatment as beneficial ($r = 0.46$ $P = < .0001$) and considered themselves at risk for developing complications ($r = 0.30$. $P = 0.0020$) tended to comply with their treatment. According to the Health Belief Model, the risks of complications are supposed to provide the motivating force for individuals to comply with treatment (Finfgeld et al 2003: 293). This study corroborates the position of the model. It is therefore important to stress the benefits of hypertension treatment and the risks of developing complications if patients do not comply with their treatment when health care professionals give health education on the management of hypertension.

The respondents bordered between high and low internal factors scores (median = 2.93, mean = 2.96) on the Internal Factors Scale. The respondents indicated that they understood their condition and the management thereof. They were self-aware with regard to their subjective state of health. There appeared to be insufficient understanding about how their medications worked to keep their blood pressure under control (35.64%), what caused their hypertension (45.10%) and the meaning of their blood pressure readings (42.16%). While the respondents indicated that they were primarily responsible for their hypertension, they simultaneously believed that the doctor was primarily responsible for this. This may be indicative that they regarded the management of hypertension as a shared responsibility. The respondents were generally confident about their ability to manage their hypertension. Of particular concern are the number of respondents (30.69%) who were not convinced of this latter ability and the high number of respondents (65.69%) who believed that their hypertension can be cured with local herbs.

The study revealed that the respondents had positive perceptions as measured on the Health Care Provider Scale (median = 3.00, mean = 3.07). They indicated that they had confidence in their doctors. They perceived the

knowledge, experience, attitudes and interpersonal skills of their doctors positively. The availability of medicines at the clinic (88.12%), effectiveness of the medicines (88.12%) and the waiting time at the clinic (65.69%) were perceived positively by the majority of the respondents. However, it is unfortunate that some of the respondents did not have favourable perceptions of these aspects. Especially the waiting time at the clinic may be problematic because approximately a third of the respondents (34.31%) perceived this negatively.

The respondents scored low on the Cues to Actions Scale (median = 2.75, mean = 2.81). However, they regarded advice from doctors, other health workers, friends and family members as significant motivators to comply with their hypertension treatment. Health education programmes on hypertension should therefore, focus on patients and the community alike. Suitable media are television and radio programmes, and health education leaflets and posters.

Pearson's correlational analysis indicated that Internal factors (knowledge, internal locus of control and self-efficacy) (r = 0.37 P = 0 .0001) and the presence of cues to action (advice, health education, being unwell and death of a friend/relative) (r = 0.45 P = < .0001) also significantly influenced treatment compliance behaviour. Cochrane (2008:543), states that high internal factors scores contribute towards treatment compliance. This stance was supported by this current study. According to Glanz et al (2002:48), cues to actions are either internal or external. External cues include media publicity, effective health education, reminder cards, telephone calls or email messages reminding patients to take their medications. Internal cues include experiencing the symptoms of the disease. In this current study, the respondents placed more emphasis on external than internal cues.

5.2.6 Predictor variables of treatment compliance

The simple regression analysis performed on all study variables demonstrated that the combination of perception of benefits, perception of barriers and cues

to action formed the best predictive model in this study and explained over 31% of the variance in treatment compliance. The respondents who believed in the benefits of their treatment (medication and lifestyle modifications regimens) and held low perceptions of stated barriers would, in the presence of cues to action, comply with their treatment.

5.3 CONCLUSION

The findings in this current study have provided corroborative evidence to the usefulness of the Health Belief Model in the evaluation of compliance behaviour. This current study revealed high levels of uncontrolled hypertension, co-morbidities, overweight and obesity in the sample despite the favourable compliance scores on the Compliance to the Hypertension Medication Regimen and Compliance to the Lifestyle Modifications Regimen Scales and the corresponding favourable compliance evidence in the clinical records. This is not surprising since the respondents underestimated the severity of their disease and their risk of developing complications. They were not sufficiently convinced of the benefits of complying with their treatment despite their high perceptions of benefits scores and considered many of the stated barriers as problematic, despite the low perception of barriers score. Barriers against compliance were indicated as unacceptable waiting times at the clinics, unavailability of medications and attending doctors who lacked knowledge and experience.

The respondents apparently failed to sufficiently translate their understanding of their condition and the importance of compliance into compliance behaviours. This may be due to their insufficient understanding of the cause of hypertension, how their medications worked and the meanings of their blood pressure readings. Many respondents might consequently ingest local herbs for their hypertension. Another reason may be that many were not convinced of their ability to manage their condition.

The non-compliance behaviours which were revealed included failure to regularly monitor their blood pressure, comply with follow-up visit

requirements and honour their clinic appointments. An unacceptably high number of respondents also failed to ingest their medications as prescribed during the previous three days.

The risk behaviours which were identified are insufficient relaxation, sleep and physical exercise and failure to keep their weight under control. An unacceptable number of the respondents insufficiently complied with the dietary requirements of limiting their consumption of animal fat, fast foods, salt and alcohol, and smoking cessation.

5.4 RECOMMENDATIONS

Based on the literature and outcome of this study, the following two-pronged recommendations are made:

5.4.1 Recommendations for clinical practice

The following recommendations for clinical practice are derived from the findings:

- Doctors must educate hypertensive patients about their disease with specific emphasis on its causes, the severity of the disease, how their medications work and the consequences of non-compliance with treatment. Patients should be taught how to interpret their blood pressure readings. Doctors need to stress that the drug treatment is for life, dosage should not be skipped and that the medications should not be discontinued. Patients should be discouraged from relying on local herbs to treat their condition. Messages on the importance of keeping blood pressure under control should be especially targeted at females.
- Doctors need to stress the importance of compliance with their hypertension treatment despite the absence of symptoms. This includes complying with follow-up visits and honouring clinic appointments. It is necessary to stress the benefits of their treatment and their risks of developing complications. The doctors should move

beyond these mere explanations by contributing towards the removal of the barriers which may compromise compliance. Special emphasis should be placed on reducing the waiting times at the clinics, ensuring that medicines are available at all times and regular in-service training sessions for doctors. Messages regarding treatment compliance should be targeted specifically at newly diagnosed patients who are males, young, smoke and consume alcohol. Contact mechanisms should be introduced at the health centres to trace and monitor patients who do not comply with follow-up visits and clinic appointments.

- Health education campaigns concerning hypertension ought to be delivered through the mediums of radio and television, posters and pamphlets. It is necessary to target patients and the community at large, especially family and friends of hypertensive patients. The health education message could be conveyed by persons who developed complications as a result of non-compliance and those who lost a loved one as a result of hypertension.
- This study has shown that most non-compliant patients are very likely to admit being so if interrogated by their doctors. Therefore, during consultation, doctors must inquire whether the patient is complying with prescribed medication and lifestyle modification regimens and if not steps must be taken to encourage compliance.
- This study has highlighted essential lifestyle behaviours to which patients should be motivated to comply. These are physical exercise, weight control and adequate sleep. Thus, health professionals must encourage their patients to have adequate sleep (6-8hours per day) and engage in moderate physical exercise lasting between 30 minutes and one hour on at least 3 to 5 days per week. Exercise helps weight control and maintenance of normal blood pressure.
- Doctors are required to motivate patients to reduce their consumption of animal fat, fast foods, salt and alcohol, and to quit smoking (15.84%). This study found unacceptably high level of obesity among the respondents. Therefore, policies should be formulated at the

national level to address diet and physical activity concerns in the community as a step toward controlling obesity and hypertension.

- Patient support groups should be established in all districts, as this would help compliant and non-compliant patients to meet, interact and share experiences.

5.4.2 Recommendations for further research

The following aspects require further research:

- Surveys of population-based prevalence of hypertension and uncontrolled hypertension must be conducted in the country. The last conducted survey, which is over a decade old, is no longer relevant. Such survey would provide useful information for policy makers to evaluate trends over time.
- A study aimed at comparing the medication and the lifestyle modifications compliance patterns in patients attending public and private health care centres should be conducted.
- Qualitative research should be conducted to obtain much more detailed information about factors that could improve compliance. It is imaginable that not all factors that affect compliance with medications and lifestyle modifications requirement were studied.
- Research should be conducted to demonstrate the effectiveness of the hypertension lifestyle modifications and medication regimens with regard to improved prognosis. No doubt, evidence from such studies would act to motivate not only patients to comply but also health care professionals to intensify strategies to improve compliance.

5.4.3 Limitations of the study

This study was conducted in government owned health facilities on the Island of Praslin and did not include patients who attended private clinics. It cannot be assumed that the responses expressed by respondents in this study would be similar to those attending private clinics.

The small sample size and the research settings, limits the generalisability of the study findings beyond the study population. Only diagnosed hypertensive patients who were registered at the clinics participated in the study. Thus patients who were not registered or are yet to be diagnosed were excluded in this study. However, the sample was representative of the clinic attendees with regards to the general characteristics assessed in this study.

5.5 CONCLUSION

This was a quantitative descriptive-corelational study aimed at determining the level of compliance of hypertensive patients to their treatment. The Health Belief Model was applied to investigate the interrelationships between various variables in the model and compliance.

The study revealed unacceptably high levels of uncontrolled hypertension and obesity despite high reported levels of compliance. The relatively high level of medication compliance reported in this study supports the interplay of other contributory factors to uncontrolled hypertension in addition to non-compliance.

Specifically, findings of this study have wide ranging implications for health care professionals dealing directly with hypertension patients in the health centres and generally with the Ministry of Health and Social Development whose mandate involves development and implementation of appropriate policies geared towards effective hypertension management in the whole country. The findings could potentially contribute towards evidence-based practice in the interest of improved patient care.

LIST OF REFERENCES

Addo, J, Smeeth, L & Leon, DA. 2007. Hypertension in Sub-Saharan Africa: a systematic review. *Hypertension* 50:1012-1018.

Appel, LJ, Brands, MW, Daniels, SR, Karanja, N, Elmer, PJ & Sacks, FW. 2006. Dietary approaches to prevent and treat hypertension: a scientific statement from the American Heart Association. *Hypertension* 47:296-308.

Argyrous, G. 2000. *Statistics for social and health research.* Thousand Oaks: Sage publications.

Ashford, J, Eccles, M, Bond, S, Hall, LA, & Bond, J. 1999. Improving health care through professional behaviour change. *British Journal of Clinical Governance* 4(1): 14-23.

Aubert, L, Bovet, P, Gervasoni, JP, Rwebogora, A, Waeber, B & Paccaud, F. 1998. Knowledge, attitudes, and practices on hypertension in a country in epidemiological transition. *Journal of Hypertension* 31(5): 1136-1145.

Babbie, ER & Mouton, J. 2001. *The practice of social research*; 9th edition. Belmont: Wadsworth.

Beevers, G, Lip, GYH, & O'Brien, E. 2001. ABC of hypertension:the pathophysiology of hypertension. *British Medical Journal* 322 :912-916

Benson, J & Britten, N. 2002. Patients' decisions about whether or not to take antihypertensive drugs: qualitative study. *British Medical Journal* 325:873–877.

Benson, J & Britten, N. 2003. Keep taking the tablets. *British Medical Journal* 326:1314–1315.

Berlowitz, DR, Ash, AS, Hickey, EC, Friedman, M, Glickman, M, Kader, B & Moskowitz, MA. 1998. Inadequate management of blood pressure in a hypertensive population. *New England Journal of Medicine* 339:1957-1963.

Bloom, BS. 2001. Daily regimen and compliance with treatment. *British Medical Journal* 323:647 - 648.

BNF. See British National Formulary.

Boutayeb, A, & Boutayeb, S. 2005. The burden of non-communicable diseases in developing countries. *International Journal for Equity in Health* 4:2.

Bovet, P, Shamlaye, C, Gabriel, A, Riesen, W & Paccaud, F. 2006. Prevalence of cardiovascular risk factors in a middle-income country and estimated cost of a treatment strategy. *BMC Public Health* 6:9. From: http://www.biomedcentral.com (accessed 18 May 2008).

Bovet, P, Burnier, M, Madeleine, G, Waeber, B & Paccaud, F. 2002. Monitoring one-year compliance to antihypertension medication in Seychelles. *Bulletin of the World Health Organization* 80: 33-39.

Bovet, P, Shamlaye, C, Kitua, A, Riesen, WF, Paccaud, F & Darioli, R. 1991. High prevalence of cardiovascular risk factors in the Seychelles (Indian Ocean). *Arteriosclerosis, Thrombosis and Vascular Biology* 11:1730-1736.

Brink, H, Van der Walt, C & Van Rensburg, G. 2006. *Fundamentals of research methodology for health care professionals*; 2nd edition. Cape Town: Juta.

British National Formulary. 2006. 52: 90-114.

Brown, B, Crawford, P & Hicks, C. 2003. *Evidence-based research: dilemmas and debates in health care*. Berkshire: Open University Press.

Burns, N & Grove, SK. 2001. *The practice of nursing research: conduct, critique & utilisation*; 4th edition. Philadelphia: W.B. Saunders.

Burns, N & Grove, SK. 2005. *The practice of nursing research*: *conduct, critique & utilisation;* 5th edition. Philadelphia: W.B.Saunders.

Cakir, H & Pinar, R. 2006. Randomized control trial on lifestyle modification in hypertensive patients. *Western Journal of Nursing Research* 28(2): 190-209.

Campbell, NR, Petrella, R & Kaczorowski, J. 2006. Public education on hypertension: a new initiative to improve the prevention, treatment and control of hypertension in Canada. *Canadian Journal of Cardiology 22*(7):599-603.

Cappucio, FP, Micah, FB, Emmett, L, Kerry, SM, Antwi, S, Martin-Peprah, R, Phillips, RO, Plange-Rhule, J & Eastwood, JB. 2004. Prevalence, detection, management and control of hypertension in Ashanti, West Africa. *Hypertension* 43:1017-1022.

Carpenter, R. 2005. Perceived threat in compliance and adherence research. *Nursing Inquiry* 12(3):192-199.

Chobanian, AV. Bakris, GL. Black, HL. Cushman, WC. Green, LA. Izzo, JL. Jones DW. Materson, BJ, Oparil, S. Wright, JT & Rocella, EJ. 2003. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *Hypertension* 42:1206-1252.

Cochrane, G. 2008. Role for a sense of self-worth in weight loss treatment: helping patients develop self-efficacy. *Canadian Family Physician* 54:543-547.

Collins Concise Dictionary and Thesaurus. 1995; 2nd edition. Glasgow: Harper Collins.

Crawshaw, J & Chambers, J. 2001. *A concise course in advanced level statistics: with worked examples*; 4th edition. Cheltenham: Nelson Thornes.

Davis, AJ. 1990. Are there limits to caring? Conflict between autonomy and beneficence. In : *Ethical and moral dimensions of care*; Edited by Madeleine M. Leninger. Detroit: Wayne State University Press.

Denhaerynck, K, Schafer-Keller, P, Young, J, Steiger, J, Bock, A & De Geest, S. 2008. Examining assumptions regarding valid electronic monitoring of medication therapy: development of a validation framework and its application on a European sample of kidney transplant patients. *BMC Medical Research Methodology* 8:5. From: http://www.biomedcentral.com/1471-2288/8/5 (accessed 1 June 2008).

De Vos, AS. 2002. *Research at grassroots for the social sciences and human service profession*; 2nd edition. Pretoria: JL van Schaik.

Finfgeld, DL, Wongvatunyu, S, Conn, VS, Grando, VT & Russel, CL. 2003. Health Belief Model and reversal theory: a comparative analysis. *Journal of Advanced Nursing Science* 43(3):288-297.

Flack, JM, Casciano, R, Casciano, J, Doyle, J, Arikian, S, Tang, S & Arocho, R. 2002. Cardiovascular disease costs associated with uncontrolled hypertension. *Managed Care Interface* 15: 28–36.

Free Online Dictionary. 2006. Free Online Dictionary, Thesaurus and Encyclopaedia. From: http://www.thefreedictionary.com (accessed 28 June 2006).

Ganong, WF. 2003. *Review of medical physiology;* 21st edition. New York: McGraw-Hill.

Garfield, FB & Caro, JJ. 2000. Achieving patient buy-in long-term compliance with antihypertensive treatment. *Disease Management and Health Outcomes* 7 (1): 13-20.

Geraci, TS & Geraci, SA. 2003. What ALLHAT tells us about treating high-risk patients with hypertension and hyperlipidemia. *Journal of Cardiovascular Nursing* 18(5): 389-395.

Gianaros, PJ. Jennings, R, Sheu, LK, Derbyshire, SWG, & Mathews, KA. 2007. Heightened functional neural activation to psychological stress covaries with exaggerated blood pressure reactivity. *Hypertension* 49: 134-140.

Gilbert, S. 2009. *The pathophysiology of hypertension.* From: http://www.ocw.tufts.edu/data/33/498002.pdf (accessed 27 June 2009).

Giles, TD, Berk, BC, Black, HR, Cohn, JN, Kostis, JB, Izzo, JL & Weber, MA. 2005. Expanding the definition and classification of hypertension. *Journal of Clinical Hypertension* 7(9): 505-512.

Glanz, K, Rimer, BK & Lewis, FM. 2002. *Health behaviour and health education: theory, research and practice*; 3rd edition. San Francisco: Jossey-Bass.

Greeff, D. 2006. An approach to preventing and treating hypertension through lifestyle modification. *Professional Nursing Today* 10(5): 8-22.

Green, LW & Kreuter, MW. 2000. *Health promotion: an educational and environmental approach*; 2nd edition. London: Mayfield Publishers.

Hadi, N & Gooran, NR. 2004. Determinant factors of medication compliance in hypertensive patients of Shiraz, Iran. *Archives of Iranian medicine* 7(4): 292-286.

Hashmi, SK, Afridi, MB, Abbas, K, Sajwani, RA & Salaheen, D. 2007. Factors associated with adherence to antihypertensive treatment in Pakistan. *PLOS ONE* 2:3. From: www.plosone.org (accessed 20June 2008).

Harsha, DW & Bray, GA. 2008. Weight loss and blood pressure control. *Hypertension* 51: 1420-1425.

He, FJ & MacGregor, GA. 2003. How far should salt intake be reduced? *Hypertension* 42:1093-1099. From: http://www.hypertensionaha.org/pdf (accessed 27 May 2008).

He, J, Whelton, PK, Appel, LJ, Charleston, J & Klag, MJ. 2000. Long-term effects of weight loss and dietary sodium reduction on incidence of hypertension. *Hypertension* 35: 544-549.

Higgins, M. 2006. Adherence or compliance? *World of Irish Nursing & Midwifery* 14 (10): 28-29.

Hong, TB, Oddone, EZ, Dudley, TK, and Bosworth, HB. 2006. Medication barriers and antihypertensive medication adherence: the moderating role of locus of control. *Psychology Health and Medicine* 11(1): 20-28.

Isikedjian, M, Einarson,TR, Mackeigan, LD, Shear, N, Addis, A, Mittmann, N, & Hersich, AL. 2002. Relationship between daily dose frequency and adherence to antihypertensive pharmacotherapy: evidence from a meta-analysis. *Clinical Therapeutics* 24:302-316.

Jokisalo, E, Kumpusalo, E, Enlund, H, Halonen, P & Takala, J. 2002. Factors related to non – compliance with antihypertensive drug therapy. *Journal of Human Hypertension* 16 (8): 577- 583.

Jokisalo, E, Kumpusalo, E, Enlund, H & Takala, J. 2001. Patients perceived problems with hypertension and attitudes towards medical treatment. *Journal of Human Hypertension* 15: 755-761.

Kannel, WB. 2004. Hypertension risk assessment: cardiovascular risk factors and hypertension. *Journal of Clinical Hypertension* 6(7): 393-399.

Kaplan, MN. 2005. *Kaplan's clinical hypertension;* 9th edition. Philadelphia: Lippincott Williams & Wilkins.

Kaveh, K & Kimmel, PL. 2001. Compliance in hemodialysis patients: multidimensional measures in search of a gold standard. *American Journal of Kidney Diseases* 37: 244-266.

Khatib, MNO & El-Guindy, MS. 2005. *Clinical guidelines for the management of hypertension.* (*EMRO Technical Publications Series 29).* Cairo: WHO Regional Office for the Eastern Mediterranean.

Khatib, O. 2004. Non-communicable diseases: risk factors and regional strategies for prevention and care. *Eastern Mediterranean Health Journal* 10(6): 778-788.

Kim, MT, Hill, MN, Bone, LR & Levine, DM. 2000. Development and testing of the Hill-Bone compliance to high blood pressure therapy scale. *Progressive Cardiovascular Nursing* 15(3): 90-96.

Knight, EL, Bohn, RL, Wang, PS, Glynn, RJ, Mogun, H & Avorn, J. 2001. Predictors of uncontrolled hypertension in ambulatory patients. *Hypertension* 38:809-814.

Kroll, T, Kehn, M, Ho, P & Groah, S. 2007. The SCI exercise self-efficacy scale (ESES): development and psychometric properties. *International Journal of Behavioural Nutrition and Physical Activity* 4:34. From: http://www.ijbnpa.org/content/4/1/34 (accessed 22 June 2008).

Kuulasmaa, K, Hense, H & Talonen, H. 1998. *Quality assessment of data on blood pressure in the WHO MONICA Project.* From: http://www.ktl.fi/publications/monica/bp/bpqa.htm (accessed 24 May 2008)

Kyngas, HA & Lahdenpera, TN. 1999. Compliance of patients with hypertension and associated factors. *Journal of Advanced Nursing* 29 (4): 832-839.

Lahdenpera, TN & Kyngas, HA. 2000. Review: compliance and its evaluation in patients with hypertension. *International Journal of Clinical Nursing* 9 (6): 826-833.

Lewanczuk, R. 2006. Innovations in primary care: implications for hypertension detection and treatment. *Canadian Journal of Cardiology* 22(7): 614-616.

Li, W-W, Wallhagen, MI & Froelicher, ES. 2008. Hypertension control, predictors for medication adherence and gender differences in older Chinese immigrants. *Journal of Advanced Nursing* 61(3): 326-335.

Management and Information System Division (MISD). 2004. *Population and vital statistical bulletin*. Victoria: MISD.

Manson, JE, Willet, WC, Stampfer, MJ, Colditz, GA, Hunter, DJ & Hankinson, SE. 1995. Body weight and mortality among women. *New England Journal of Medicine* 333: 677-685.

Mengden, T, Vetter, H, Tousset, E & Uen, S. 2006. Management of patients with uncontrolled arterial hypertension: the role of electronic compliance monitoring, 24hr ambulatory blood pressure monitoring and Candesartan/HCT. *BMC Cardiovascular Disorders* 6:36. From: http://www.pubmedcentral.nih.gov/pdf (accessed 30 May 2008).

McDonald, HP, Garg, AX & Haynes, RB. 2002. Interventions to enhance patient adherence to medical prescriptions: Scientific review. *Journal of American Medical Association* 288(22): 2868-2879.

Miller, ER, Erlinger, TP, Young, DR, Jehn, M, Charleston, J, Rhodes, D, Wasan, SK & Appel, LJ. 2002. Results of diet, exercise, and weight loss intervention trial (DEW-IT). *Hypertension* 46: 612-618.

Ministry of Health. 2004. *Strategic Framework 2005-2009*. Victoria: Ministry of Health.

Ministry of Health. 2005. *National Health Policy Draft* 2005. Victoria: Ministry of Health.

MISD. See Management and Information System Division.

Moshki, M, Ghofranipour, F, Hajizadeh, E & Azadfalleh, P. 2007. *Validity and reliability of the multidimensional health locus of control scale for college students.* From: http://www.biomedcentral.com/content.pdf/1471-2458-7-295.pdf (accessed 20 June 2008).

Munger, MA, Tassell, BWV & Lafleur, J. 2007. Medication nonadherence: an unrecognized cardiovascular risk factor. *Medscape General Medicine* 9(3): 58. From: http://www.pubmedcentral.nih.htm (accessed 27 March 2008).

Munro, S, Lewin, S, Swart, T & Volmink, J. 2007. A review of health behaviour theories: how useful are these for developing interventions to promote long-term medication adherence for TB and HIV/AIDS. *BMC Public Health* 7 (104): 1-16.

Naidoo, J & Wills, J. 2003. *Health promotion: foundations for practice*; 2nd edition. Philadelphia: Bailliere Tindall.

National HIV and AIDS Strategic Plan 2005 -2009. 2005. Victoria: National AIDS Council.

Obarzanek, E, Proschan, MA, Vollmer, WM, Moore, TJ, Sacks, FM, Appel, LJ, Svetkey, LP, Most-Winhauser, MM & Cutler, JA. 2003. Individual blood pressure responses to changes in salt intake: results from the DASH-Sodium Trial. *Hypertension* 42:459-467.

OECD. See Organization for Economic Cooperation and Development.

O'Leary, Z. 2004. *The essential guide to doing research.* London: Sage publishers.

Oliveria, SA, Chen, SR, McCarthy, BD, Davis, CC & Hill, MN. 2005. Hypertension knowledge, awareness and attitudes in a hypertensive population. *Journal of General Internal Medicine* 20:219-225.

Opie, LH & Seedat, YK. 2005. Hypertension in Sub-Saharan African populations. *Circulation* 112: 3562-3568.

Organization for Economic Cooperation and Development. Development and Cooperation Directorate. 2009. *International aid statistics.* From: http://www.oecd.org/dac (accessed 4 June 2008).

Oxford Dictionary of Current English. 2001; 3rd edition. London: Oxford University Press.

Parsons, JT, Rosof, E & Mustanski, B. 2007. Patient-related factors predicting HIV medications adherence among men and women with alcohol problems. *Journal of Health Psychology* 12(2): 357-370.

Pickering, TG. 2005. Do we really need a new definition of hypertension? *Journal of Clinical Hypertension* 7(12): 702-704.

Pocket Medical Dictionary. 1987; 14th edition. Edinburgh: Churchill Livingstone.

Polit, DF. Beck, CT & Hungler, BP. 2001. Essentials of nursing research: methods, appraisal and utilization; 5th edition. Philadelphia: Lippincott.

Polit, DF & Beck, CT. 2008. *Nursing research: generating and assessing evidence for nursing practice*; 8th edition. Philadelphia: JB Lippincott.

Psaty, BM, Lumley, T, Furberg, CD, Schellenbaum, G, Pahor, M, Alderman, MH & Weiss, NS. 2003. Health outcomes associated with various antihypertensive therapies used as first-line agents: a network meta-analysis. *Journal of American Medical Association* 289:2534-2544.

RCN. See Royal College of Nursing.

Ren, XS, Kazis, LE, Lee, A, Zhang, H & Miller, DR. 2002. Identifying patient and physician characteristics that affect compliance with antihypertensive medications. *Journal of Clinical Pharmacy and Therapeutics* 27(1): 47-58.

Riaz, K. 2007. *Hypertensive heart disease* From: http://www.emedicine.com/med/topic3432.htm (accessed 16 October 2007).

Rosalie, MW & Campling, L. 2004. Socio-economic development in Seychelles: an overview. *Seychelles Medical and Dental Journal* 7(1): 7-12.

Rose, S, Walker, A & Macleod, MJ. 2004. Patient compliance in hypertension: role of illness perceptions and treatment beliefs. *Journal of Human Hypertension* 18: 607-613.

Rosenstock, IM, Strecher, VJ & Becker, MH.1988. Social learning theory and the health belief model. *Health Education Quarterly* 15:175-183.

Royal College of Nursing. *Informed consent in health and social care research: RCN guidance for nurses*. 2005. From: http://www.rcn.org.uk (accessed 20 February 2009).

Seychelles Health Statistics 2005. Victoria: Ministry of Health.

Seychelles in Figures. 2007. National Statistics Bureau. Victoria: Government Printer.

Seychelles (Republic). *The Seychelles Constitution 1994*. Victoria: Government Printer.

Sharma, S & Kortas, C. 2007. *Hypertension*. From: http://www.emedicine.com/med/topic1106.htm (accessed 25 May 2008).

Shea, S, Misra, D, Ehrlich, MH, Field, L & Francis, CK. 1992. Correlates of nonadherence to hypertension in an inner-city minority population. *America Journal of Public Health* 82:1607-1612.

Siegel, D. 2005. Barriers to and strategies for effective blood pressure control. *Vascular Health and Risk Management* 1(1): 9-14.

Stewart, A & Eales, CJ. 2002. Hypertension: patient adherence, health beliefs, health behaviour and modification. *South African Journal of Physiotherapy* 8(1): 12-17.

Steyn, K, Gaziano, TA, Bradshaw, D, Laubschar, R & Fourie, J. 2001. Hypertension in South African adults: results from the demographic and health survey, 1998. *Journal of Hypertension* 19:1717-1725.

Stranges, S & Cappuccio, FP. 2007. Prevention and management of hypertension without drugs. *Current Hypertension Review* 3: 182-195.

Svetkey LP, Erlinger, TP, Vollmer, VM, Feldstein, A, Cooper, LS, Appel, LJ, Ard, JD, Elmer, PJ, Harsha, D & Stevens, VJ. 2005. Effects of comprehensive lifestyle modifications on blood pressure by race, sex, hypertension status and age: the report of the Premier Collaborative Research Group. *Journal Of Human Hypertension* 19: 21-31.

Thrall, G, Lip, GYH & Lane, D. 2004. Compliance with pharmacological therapy in hypertension: can we do better, and how? *Journal of Human Hypertension* 18: 595-597.

UNDP. 2003a. *Human Development Report 2002.* New York: UNDP.

UNDP. 2003b. *Millennium Development Goals Status Report Seychelles*. New York: UNDP.

UNDP. 2007. *Human Development Report 2007/2008. Fighting climate change: human solidarity in a divided world*. New York: UNDP.

Unisa. See University of South Africa.

University of South Africa. Department of Health Studies. 2006. *Principles and methods of health research. Only marking guide for MNURS1-E. Assignment 1.* Pretoria.

University of Virginia Health System (UVAHS). 2002. *Researchers identify genetic causes of hypertension*. From: http://www.healthsystem.virginia.edu/internet/news/archives02/kidney-gene.cfm (accessed 22 May 2008).

UVAHS. See University of Virginia Health System.

Van Wijk, BLG, Klungel, OH, Heerdink, ER & De Boer, A. 2004. The association between compliance with antihypertensive drugs and modification of antihypertensive drug regimen. *Journal of Hypertension* 22:1831-1837.

Verdecchia, P. 2000. Prognostic value of ambulatory blood pressure: evidence and clinical implications. *Hypertension* 35:844-851.

Vitolins, MZ, Rand, CS, Rapp, SR, Ribisl, PM & Sevick, MA. 2000. Measuring adherence to behavioural and medical interventions. *Controlled Clinical Trials* 21:188S-194S.

Von Ah, D, Ebert, S, Ngamvitroj, A, Park, N & Kang, D-H. 2004. Predictors of health behaviours in college students. *Journal of Advanced Nursing* 48(5): 463-474.

Wang, TJ & Vasan, RS. 2005. Epidemiology of uncontrolled hypertension in the United States. *Circulation* 112:1651-1662.

Wang, PS, Bohn, RL, Knight, E, Glynn, RJ, Mogun, H & Avorn, J. 2002. Non-compliance with antihypertensive medications: the impact of depressive symptoms and psychosocial factors. *Journal of General Internal Medicine* 17(7): 504-511.

Wang, W, Lee, ET, Fabsitz, RR, Devereux, R, Best, L, Welty, TK & Howard, BV. 2006. A longitudinal study of hypertension risk factors and their relation to cardiovascular disease. *Hypertension* 47: 403-409.

Webb, P. Bain, C & Pirozzo, S. 2005. *Essential epidemiology: an introduction for students and health professionals*. Cambridge: Cambridge University Press.

Weinberger, MH. 1999. Hypertension and heart disease. *Current Concepts in Hypertension* 3 (1): 1- 6.

Wetzels, GEC, Nelemans, PJ, Schouten, JSAG, van Wijk, BLG & Prins, MH. 2006. All that glitters is not gold: a comparison of electronic monitoring versus filled prescriptions-an observational study. *BMC Health Services Research*

6:8. From: http://www.biomedcentral.com/1472-6963/6/8 (accessed 20 May 2008).

Winfield, EB & Whaley, AL. 2002. A comprehensive test of the health belief model in the prediction of condom use among African American college students. *Journal of Black Psychology* 28(4): 330-346.

Whelton, SP, Chin, A, Xin X & He, J. 2002. Effects of aerobic exercise on blood pressure: a meta-analysis of randomised, controlled trials. *Annals of Internal Medicine* 36: 493-503.

WHO. 2003a. *Adherence to long-term therapies: evidence for action*. Geneva: World Health Organization.

WHO. 2003b. Diet, nutrition and the prevention of chronic diseases: report of a joint WHO/FAO expert consultation*. WHO Technical Report Series, No.916*. Geneva: World Health Organization.

WHO. 2003c. World Health Organization (WHO)/ International Society for Hypertension (ISH) statement on management of hypertension. *Journal of Hypertension* 21:1983-1992.

WHO. 2005. *Country Cooperation Strategy Seychelles 2004-2007.* Brazzaville: WHO Regional Office for Africa.

WHOSIS. See WHO Statistical Information Service.

WHO Statistical Information Service (WHOSIS). 2008. From: http://www.who.int/whosis/html (accessed 27 June 2008).

Wolk, R, Shamsuzzaman, ASM & Somers, VK. 2003. Obesity, sleep apnoea and hypertension. *Hypertension* 42: 1067-1074.

Xin, X, He, J, Frontini, MG, Ogden, LG, Motsamai, OI & Whelton, PK. 2001. Effects of alcohol reduction on blood pressure: a meta-analysis of randomised controlled trials. *Hypertension* 38(5): 1112-1117.

ANNEXURE A

UNIVERSITY OF SOUTH AFRICA
Health Studies Research & Ethics Committee
(HSREC)
College of Human Sciences

CLEARANCE CERTIFICATE

Date: 13 October 2008 Project No: 351-275-7

Project Title: Factors affecting compliance with antihypertensive drug treatment and required lifestyle modification among diagnosed hypertension patients on the Island of Praslin

Researcher: Dr TA Edo

Supervisor/Promoter: Prof L de Villiers

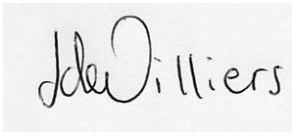
Joint Supervisor/Joint Promoter: Not applicable

Department: Health Studies

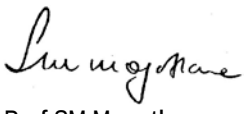
Degree: MPH

DECISION OF COMMITTEE

Approved [X] Conditionally Approved [ ]



Prof L de Villiers
RESEARCH COORDINATOR: DEPARTMENT OF HEALTH STUDIES



Prof SM Mogotlane
ACADEMIC CHAIRPERSON: DEPARTMENT OF HEALTH STUDIES

PLEASE QUOTE THE PROJECT NUMBER IN ALL ENQUIRES

ANNEXURE B

Enquiries: Prof. L. de Villiers
Tel: +27 12 429 6770
Fax: +27 12 429 6688
Email: dvilll@unisa.ac.za

Department of Health Studies
University of South Africa
P. O. Box 52
UNISA 0003

10th October 2008.

The Principal Secretary
Ministry of Health & Social Development
Seychelles.

Dear Madam,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH STUDY

I am an employee of the Ministry of Health and I am also registered with the University of South Africa for a Master's degree in Public Health in the Department of Health Studies. The title of my dissertation is *factors affecting compliance with antihypertensive drug treatment and required lifestyle modification among diagnosed hypertension clinic attendees on Praslin Island*. I am expected to carry out this research in partial fulfilment of the requirement for the award of the Master of Public Health (MPH) degree of the University of South Africa.

The purpose of the study is to analyse factors that negatively or positively influence compliance with drug treatment and lifestyle changes among those living with hypertension and to identify factors that are strongly related to improved compliance in order to recommend strategies that would lead to improved compliance.

The study will involve a random sample of hypertensive patients registered in the health centres on Praslin. Data collection with the use of structured questionnaires, will take place in the homes of selected participants after due consent had been obtained.

I am writing to seek your approval of the study proposal. Please find attached a copy of the study proposal, a checklist, consent form and provisional questionnaires for your perusal.

Your kind cooperation will be highly appreciated.

Yours Sincerely,

Thomas Akpan Edo (Dr)
Researcher/Student
Tel: +248 777888.

ANNEXURE C

MINISTRY OF HEALTH AND SOCIAL DEVELOPMENT
HEALTH DEPARTMENT
Health System Development
P. O. Box 52, Victoria Hospital, Mahé, Republic of Seychelles
E-Mail: techadvisor @ moh.gov.sc
Seychelles Telephone: 388000, Fax: 224792
Please address all correspondence to the Principal Secretary

Our Ref:
Enquiries to:
Telephone Ext:
Date: 7th November, 2008

Dr. Thomas Edo,
Baie Ste Anne Hospital,
Praslin.

Dear Dr. Edo,

Re: **Approval To Conduct Research On Factors Affecting Compliance With Antihypertensive Drug Treatment And Lifestyle Modification Among Diagnosed Hypertensive Clinic Attendees On Praslin Island**

Your research proposal has been discussed at the Research & Ethics Committee and I would like to convey our approval to conduct the above research as a partial requirement for the award of Masters Degree in Public Health.

With best wishes.

Yours sincerely,

OCCUPATIONAL HEALTH UNIT * SEYCHELLES *

Dr. Shobha Hajarnis
DIRECTOR GENERAL
HEALTH SYSTEM DEVELOPMENT
FOR : PRINCIPAL SECRETARY (HSD)

ANNEXURE D

ASSESSMENT OF THE DATA COLLECTION INSTRUMENT

Please indicate your view about the data collection instrument by circling the appropriate number option

	Excel-lent					Poor
Clarity of covering letter	6	5	4	3	2	1
Overall appearance	6	5	4	3	2	1
Page layout	6	5	4	3	2	1
Clarity of instructions	6	5	4	3	2	1
Legibility	6	5	4	3	2	1
Realistic completion time	6	5	4	3	2	1
Assurance of anonymity	6	5	4	3	2	1
Relevance of items to the study about compliance	6	5	4	3	2	1
Information required not too revealing	6	5	4	3	2	1

Please write any comments or suggestions below

_____

_____

_____

_____

ANNEXURE E

DOCUMENT ANALYSIS CHECKLIST

Respondent identification code: _____

SECTION A: MEDICAL DATA

				Office use
1	Medical diagnosis of hypertension noted	Yes	☐	1
		No	☐	2
				A1 ☐
2	Evidence of co-morbidity noted	Coronary artery disease	☐	1
		Myocardial infarction	☐	2
		Cardiac failure	☐	3
		Renal failure	☐	4
		Visual impairment	☐	4
		Paralysis from old CVA	☐	6
		Angina	☐	7
				A2 ☐
3	Medications prescribed	Bendrofluazide	☐	1
		Frusemide	☐	2
		Lisinopril	☐	3
		Amlodipine	☐	4
		Atenolol	☐	5
		Methyldopa	☐	6
		Losartan	☐	7
		Spironolactone	☐	8
				A3 ☐
4	Prescribed dosage	Single dose regimen	☐	1
		Multiple dose regimen	☐	2
		Combination of single and multiple dose regimen	☐	3
				A4 ☐

5	Complaints of medication side effects noted during past three appointments	Yes		1	
		No		2	
			A5		
6	Evidence of follow-up visit non-compliance noted for past three appointments	Yes		1	
		No		2	
			A6		
7	Evidence of medication non-compliance noted during past three appointments noted	Yes		1	
		No		2	
			A7		
8	Evidence of lifestyle modification non-compliance noted during past three appointments	Yes		1	
		No		2	
			A8		
9	Evidence of uncontrolled hypertension noted during past three appointments	Yes		1	
		No		2	
			A9		

ANNEXURE F

CONSENT FORM

RESEARCH TITLE: Factors affecting compliance with antihypertensive drug treatment and lifestyle modification among diagnosed hypertension patients on the Island of Praslin.

Researcher: Dr Thomas Akpan Edo
Supervisor: Prof. L. de Villiers

It is my pleasure to invite you to participate in a study with the above-mentioned title. The purpose of this study is to determine why some patients find it difficult to comply with their treatment for hypertension. Once I understand the reasons, I may be able to make recommendations that would improve the medical care which patients receive for hypertension and ultimately their quality of life.

The researcher would use an interview schedule to ask you questions about hypertension and its treatment. The interview would last not more than 25 minutes and would not cause you any physiological, financial or psychological harm. May I also stress that your participation in the study is entirely voluntary and you may decide not to participate. And should you withdraw from the study be assured that this would not affect the services you receive at the health centre. Code names rather than your real name would be assigned to the interviews to ensure your anonymity and all data collected would be for the research purposes. The information you share with the researcher would be treated as confidential.

Although you may not obtain immediate direct benefit by participating in this study, it is anticipated the outcome of this study would influence policies concerning both the management of hypertension and overall drug utilization in the health centres.

Please sign this form if you agree to participate.

I ---------- fully understand the nature of the study for which I have been invited to participate. I fully understand that the researcher would maintain my rights of anonymity and confidentiality. Therefore I hereby voluntarily give my consent to participate in the study.

Participant's full name: _____

Participant's signature: _____ Date: _____

Researcher's signature---------- Date----------

ANNEXURE G

INTERVIEW SCHEDULE

Respondent identification code: _____

SECTION A: BIOGRAPHICAL DATA

				For office use	
1	Blood pressure	/	mmHg	A1	
2	Weight	_____	kg	A2	
3	Height	_____	metre	A3	
4	BMI	_____	Kg/m^2	A4	

5 How old are you?

Less than 25 years		1
25-34 years		2
35-44 years		3
45-54 years		4
55-64 years		5
65-74 years		6
75 years or older		7

A5 ____

6 What is your gender?

Male		1
Female		2

A6 ____

7 What is your ethnic background?

Black		1
Mixed		2
White		3
Indian/Chinese		4

A7 ____

8 What is your marital status?

Never married		1
Married		2
Divorced		3
Separated		4
Widowed		5
Cohabiting		6

A8 ____

9 What is the highest level of education you have completed?

No schooling		1
Primary school		2
Secondary school		3

	Post secondary school (eg college)		4
	University		5
	Other (specify) _____		6
		A9	

10 What has your work status been in the last 3 months?

Government employee		1
Non -government employee		2
Self-employed		3
Student		4
Retired		5
Unemployed		6
	A10	

11 Over the past one-year can you tell me what the average earnings of your household have been per month in rupees?

SR 0 -999		1
SR 1000-1999		2
SR 2000-2999		3
SR 3000-3999		4
SR 4000-4999		5
SR 5000 and more		6
	A11	

12 When were you first told that you have high blood pressure? Would you say

Less than one year ago		1
One year ago		2
Two years ago		3
Three years ago		4
Four years ago		5
Five years ago		6
More than five years ago		7
	A12	

13 What health complaints other than high blood pressure do you have?

Heart problems		1
Paralysis of a limb		2
Swelling of the feet		3
Swelling of the legs		4
Visual impairment		5
Kidney problems		6
Heart cramps (angina)		7
Shortness of breath on exertion		8
Shortness of breath at rest		9
Irregular heart beats (palpitations)		10
None		11
	A13-23	

14 How many kinds of medicine are you taking for your high blood pressure?

None		1
One		2

Two		3	
Three		4	
Four		5	
More than 4		6	
		A24	

15 How many doses of medication did you skip during the past three days?

None		1	
1-3		2	
4-5		3	
More than 5		4	
All		5	
		A25	

16 How many cigarettes do you smoke per day?

None		1	
1-4		2	
5-9		3	
10-14		4	
15-19		5	
20 and more		6	
		A26	

17 How often do you consume alcohol per day?

More than once per day		1	
Once daily		2	
A few times per week		3	
About once a week		4	
Less than once per week		5	
Seldom		6	
Never		7	
		A27	

SECTION B: COMPLIANCE TO THE MEDICATION REGIMEN

How often		Daily 4	Frequently 3	Rarely 2	Never 1	Office use	
1	do you take your medicine as prescribed?					B1	
2	do you forget to take your medicine?					B2	
3	are you careless about taking your medicine?					B3	
4	do you stop taking your medicine because you feel better?					B4	
5	do you stop taking your medicine because it makes you feel worse?					B5	
6	do you stop taking the medication because you believe that they are ineffective?					B6	
7	do you stop taking your medicine because you try to avoid addiction?					B7	
8	do you stop taking your medicine because you fear negative side-effects?					B8	
9	do you stop taking your medicine because the doctor changes the type of medicine frequently?					B9	

10	do you stop taking your medicine because the doctor changes the dosage frequently?					B10	
11	do you stop taking your medicine because you want to try out alternative remedies?					B11	
12	do you obtain a medication refill in before you run out of medicine?					B12	
13	do you turn up for your clinic appointments as scheduled?					B13	
14	do you have your blood pressure checked?					B14	

SECTION C: COMPLIANCE TO THE LIFESTYLE MODIFICATION REGIMEN

How often do you		Daily 4	Frequently 3	Rarely 2	Never 1	Office use	
1	smoke?					C1	
2	drink alcohol?					C2	
3	eat a meal high in animal fat?					C3	
4	eat vegetables?					C4	
5	eat fruits?					C5	
6	eat fast food?					C6	
7	sprinkle salt on your food?					C7	
8	engage in physical exercise?					C8	
9	try to lose some weight?					C9	
10	relax?					C10	
11	get enough sleep?					C11	

SECTION D: PERCEPTIONS OF SEVERITY

To what extent do you agree with the following statements?		Strongly agree 4	Agree 3	Disagree 2	Strongly disagree 1	Office use	
1	My blood pressure condition is serious					D1	
2	I am relaxed about my blood pressure condition because I don't have any symptoms					D2	
3	I am worried about my blood pressure condition because I have symptoms					D3	
4	I think I am cured because I do not have symptoms					D4	

SECTION E: PERCEPTIONS OF RISK

	How do you view your risk of the following happening to you as a result of your high blood pressure?	75-100% chance 4	50-74% chance 3	25-49% chance 2	0-24% chance 1		
1	to have a stroke					E1	
2	to develop visual impairment					E2	

3	to develop heart problems					E3	
4	to develop kidney problems					E4	
5	to develop paralysis					E5	
6	to become a burden for my family					E6	
7	career being negatively affected					E7	
8	disrupted family life					E8	
9	disrupted social life					E9	

SECTION F: PERCEPTIONS OF BENEFITS

	How do you view the benefits of complying with the doctor's treatment?	Extremely beneficial 4	Bene-ficial 3	Some-what beneficial 2	Not at all beneficial 1		
1	keeping my blood pressure under control					F1	
2	increasing my quality of life					F2	
3	increasing my sense of well-being					F3	
4	protecting me from complications					F4	
5	avoiding added financial burden to treat complications					F5	
6	decreasing my chance of dying					F6	
7	giving me peace of mind					F7	

SECTION G: PERCEPTIONS OF BARRIERS

	Which aspects are problematic and hinder you from complying with your treatment	Extremely problematic 4	Proble-matic 3	Some-what problematic 2	Not at all proble-matic 1		
1	ineffectiveness of the medicine to stabilise my blood pressure					G1	
2	lack of motivation because I cannot be cured					G2	
3	not having enough time to exercise					G3	
4	lack of discipline to comply with the dietary restrictions					G4	
5	lack of discipline to stop smoking					G5	
6	lack of time to relax					G6	
7	having sleeping problems					G7	

SECTION H: INTERNAL FACTORS

	To what extent do you agree with the following statements?	Strongly agree 4	Agree 3	Disagree 2	Strongly disagree 1		
1	I understand the nature of my condition					H1	
2	I understand what caused my blood pressure condition					H2	
3	I understand how my medication work to keep my blood pressure under control					H3	
4	I understand why it is necessary to take my medicine as prescribed					H4	
5	I understand what I can do to keep my blood pressure					H5	

	under control						
6	I understand the meaning of the blood pressure readings					H6	
7	I think that I can cure my hypertension with local herbs other than the prescribed medication					H7	
8	I have the ability to manage my hypertension					H8	
9	I am primarily responsible for managing my hypertension					H9	
10	My doctor is primarily responsible to manage my hypertension					H10	
11	I am in charge of my physical health					H11	
12	My physical health is determined largely by what I do or what I don't do					H12	
13	I am aware of how healthy my body feels.					H13	
14	I notice immediately when my body does not feel healthy					H14	

SECTION I: HEALTH CARE PROVIDER FACTORS

To what extent do you agree with the following statements?		Strongly agree 4	Agree 3	Disagree 2	Strongly disagree 1	FOR OFFICE USE	
1	The waiting time at the clinic is acceptable					I1	
2	The doctor who attends to me at the clinic is experienced					I2	
3	The doctor who attends to me at the clinic is knowledgeable					I3	
4	I have confidence in the doctor					I4	
5	The doctor is patient with me					I5	
6	The doctor treats me with respect					I6	
7	The health care workers other than the doctors treat me with respect					I7	
8	The doctor listens to my concerns					I8	
9	The doctor understands my concerns					I9	
10	The doctor clearly explains my condition to me					I10	
11	The doctor clearly explains to me how I should manage my blood pressure condition					I11	
12	The availability of medicine when I need it is good					I12	
13	The medicine I receive at the clinic is effective					I13	

SECTION J: CUES TO ACTION

Which of the following motivates you to comply with your blood pressure treatment?		Strongly agree 4	Agree 3	Disagree 2	Strongly disagree 1	FOR OFFICE USE	
1	TV programmes on high blood pressure					J1	
2	radio programmes on high blood pressure					J2	
3	advice from my friends					J3	
4	advice from my doctor					J4	
5	advice from a health care worker other than my doctor					J5	
6	advice from a family member					J6	
7	death of a relation or friend due to high blood					J7	

	pressure						
8	newspaper or journal article					J8	
9	information on the internet					J9	
10	health posters displayed					J10	
11	health education leaflets given to me					J11	
12	when I feel unwell					J12	