

KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY,

KUMASI

**BIOPSYCHOSOCIAL
DETERMINANTS OF MEDICATION
ADHERENCE AMONG
HYPERTENSIVE PATIENTS IN
GHANA.**

**A THESIS SUBMITTED IN FULFILLMENT
OF THE
REQUIREMENTS FOR THE DEGREE OF**

**DOCTOR OF PHILOSOPHY
(SOCIAL PHARMACY)**

by

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DECLARATION

The research is my original work carried out at the Department of Clinical and Social Pharmacy, Faculty of Pharmacy and Pharmaceutical Sciences, K.N.U.S.T., under the supervision of Prof. Frances Owusu-Daaku and Prof. Samuel Danquah. References to the work of other researchers have been duly acknowledged. This work has not been presented elsewhere for a degree.

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ABSTRACT

Background

Medication non-adherence is a major public health problem globally. Often, non-adherence to medication has been a predominant setback in the management of hypertension and other chronic conditions leading to negative health outcomes.

Objectives

The purpose of this study was to explain adherence behaviour among hypertensive patients from a Biopsychosocial perspective.

Methods

A hospital-based mixed methods study using quantitative and qualitative approaches was conducted on hypertensive patients attending Korle-bu and Komfo Anokye Teaching Hospitals in Ghana from May to November, 2012. The rationale for including the qualitative phase was to triangulate the quantitative phase of the study. Information was quantitatively obtained from 400 participants on socio-demographic characteristics, personality characteristics, negative emotions, belief systems, complementary and alternative medicine (CAM) use, economic, pharmacological factors and medication adherence behaviour. The qualitative phase of the study involving 45 participants explored adherence in relation to perceptions about belief systems, complementary and alternative therapies and pharmacologically related issues.

Results

Most patients (93%) poorly adhered to their antihypertensive medications. Participants exhibited features of mixed LoC (both internal and external) usually referred to as bi-local

expectancy. However, orientation was skewed towards external LoC which significantly related with non-adherence behaviour ($p = 0.03$). High spiritual and religious beliefs formed core components of the lifestyles of patients, yet, spirituality ($p = 0.018$) and not religiosity ($p = 0.474$) related directly with medication non-adherence. Although some of the patients experienced symptoms of anxiety (57%), followed by stress (20%) and depression (4%), stress was rather significantly associated with medication non-adherence ($p = 0.035$). Out of the 400 study participants, 78 (19.5%) reported using CAM with the majority (65.38%) utilizing biological based therapies. There was no significant relationship between CAM use and non-adherence ($p = 0.176$). Medication side effects ($p = 0.04$) and the number of times per day for taking medicines significantly correlated with non-adherence ($p < 0.0001$).

The thematic content analysis of patients' belief system pertaining to hypertension and medication intake focused on the following themes: *conceptualizing illness, supernatural healing, medication non-adherence* and *holistic healthcare*. Likewise, CAM use elicited the following themes: *combination of remedies, categorization, availability, motivation for use, perceived effect, non-disclosure, medication non-adherence* and *health provider involvement*. Analysis of pharmacological factors revealed three main themes about medication use namely: *effect and continuance, hindrances to adherence* and *coping*.

Conclusion

This study has demonstrated that there is a significant interplay of psychological, socio-cultural and pharmacological factors associated with medication non-adherence. Multi-faceted intervention programmes highlighting these determinants should be initiated to improve medication adherence among hypertensive patients in Ghana.

DEDICATION

To Paul, Karen, Kayla and Kevin Kretchy

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LIST OF PUBLICATIONS FROM THE STUDY

1. Kretchy IA, Owusu-Daaku FT, Danquah SA (2014). Mental health in hypertension: assessing symptoms of anxiety, depression and stress on anti-hypertensive medication adherence. *International Journal of Mental Health Systems*, 8:25.
2. Kretchy IA, Owusu-Daaku FT, Danquah SA (2014). Locus of control and anti-hypertensive medication adherence in Ghana. *Pan African Medical Journal*, 17(Supp 1):13
3. Kretchy IA, Owusu-Daaku FT, Danquah SA (2014). Patterns and determinants of the use of complementary and alternative medicine: a cross-sectional study of hypertensive patients in Ghana. *BMC Complementary and Alternative Medicine*, 14:44
4. Kretchy IA, Owusu-Daaku FT, Danquah SA (2013). Spiritual and religious beliefs: do they matter in the medication adherence behaviour of hypertensive patients? *BioPsychoSocial Medicine*, 7:15.

ABBREVIATIONS

AIDS	-	Acquired Immune Deficiency Syndrome
AMP	-	Alternative Medical Practice
BBT	-	Biological-Based Therapy
BP	-	Blood Pressure
CAM	-	Complementary and Alternative Medicine
CSIR	-	Centre for Scientific and Industrial Research
DAS	-	Depression, Anxiety, Stress
DASS	-	Depression, Anxiety, Stress Scale
DSQoL	-	Disease Specific Quality of Life
DUREL	-	Duke Religious Index
ET	-	Energy Therapies
GHS	-	Ghana Health Service
GQoL	-	General related Quality of Life
HAART	-	Highly Active Antiretroviral Therapy
HBM	-	Health Belief Model
HIV	-	Human Immune-deficiency Virus
HLoC	-	Health Locus of Control
HMSEES	-	Hypertension Medication Side Effects Experiences Scale
HQoL	-	Health related Quality of Life
IRB	-	Institutional Review Board
JBS	-	Joint British Society
JNC	-	Joint National Committee
KATH	-	Komfo Anokye Teaching Hospital
KBTH	-	Korle-bu Teaching Hospital
KNUST	-	Kwame Nkrumah University of Science and Technology
LoC	-	Locus of Control
MBBM	-	Manipulative and Body-based Methods
MBI	-	Mind Body Interventions

MHLC	-	Multi-dimensional Health Locus of Control
MMAS	-	Morisky Medication Adherence Scale
NCCAM	-	National Centre for Complementary and Alternative Medicine
NICE	-	National Institute for Health and Care Excellence
NIH	-	National Institute of Health
NORA	-	Non-Organised Religious Activity
ORA	-	Organised Religious Activity
SPS	-	Spiritual Perspective Scale
S/R	-	Spirituality/ Religiosity
STG	-	Standard Treatment Guidelines
TM	-	Traditional Medicine
UK	-	United Kingdom
USA	-	United States of America
WHO	-	World Health Organization

DEFINITION OF TERMS

- Hypertension - Chronic medical condition related to an elevation in blood pressure.
- Adherence - Extent to which a person takes medications as prescribed by his/her health care providers.
- Non-adherence - Extent to which the health behaviour of a person in terms of medication intake deviates from medical/health advice.
- Locus of control - Personality construct from Rotter's social learning theory where individuals are differentiated in terms of whether their source of control is internal or external.
- Emotions - Biological and psychological experience of one's state of mind resulting from physiological and environmental influences.
- Depression - Mood disorder characterized by a persistent feeling of sadness and loss of interest.
- Anxiety - A pathological state characterized by a feeling of dread accompanied by somatic signs that indicate a hyperactive autonomic nervous system.
- Stress - A state of emotional strain as a result of difficulties in coping with demanding circumstances.
- Spirituality - Emotional feeling or experiences of reverence, peace, wonder, awe, harmony or attachment with a supreme being.
- Religiosity - Outward prescribed system of beliefs and guidelines of conduct such as meditations, prayers, fasting, reading religious scripts and attendance at services.
- Complementary and alternative medicine - Healing practice or product which is not part of the domain of conventional Western medicine.
- Pharmacological - Medication-related factors such as experiences of side effects and frequency of medication intake.

Chapter 1

INTRODUCTION AND LITERATURE REVIEW

1.1 GLOBAL TRENDS OF PREVALENCE OF HYPERTENSION

Globally, chronic conditions such as hypertension and stroke are the main causes of death with the burden of diseases transferring from infectious to non-communicable diseases (World Health Organization, 2008). Non-communicable diseases accounted for nearly 63% of all deaths in the year 2008 which is about 36 million people. Meanwhile 80% of these deaths were recorded in low- and middle- income countries with current projections indicating that by 2020 the largest increases in non-communicable mortality will occur in Africa and other low-and middle-income countries (WHO, 2010).

In 2003, hypertension affected approximately 28.4% of Ghanaians in urban Accra (Amoah, 2003) and 28.7% in the Ashanti Region of Ghana (Cappuccio, Micah, Emmet et al., 2004) of the Ghanaian population. Using a conventional projection of 15.8 million Ghanaian adults in 2008 with ages 15 years and above at 48% urbanization, prevalence of hypertension has been estimated at 25% in urban and 20% in rural populations in Ghana (Bosu, 2010). Similarly, a review of population-based studies on hypertension in Ghana has showed that the prevalence of hypertension is around 54.6% in urban and 19.3% in rural communities (Addo, Agyemang, Smeeth et al., 2012).

Elsewhere in Africa, the estimated prevalence of hypertension is 27.3% and 21.7% in Abidjan and Cotonou respectively, 42% in Niger (WHO AFRO, 2008), 31.5% for males and 28.9% for females in Addis Ababa (Tesfaye, 2009), 37% in semi-urban Nigeria (Adedoyin et al., 2008), 40% in Burkina Faso (Niakara et al., 2007).

Although, worldwide prevalence in the year 2000 was estimated at 26% totalling approximately 1 billion people, it has been projected to increase to 29% by the year 2025 due to the expectation that a greater proportion of the world's population will be older by 2025 (Kearney, Whelton, Raynolds & Mutnerp, 2005). Hypertension is a major risk when taking into account death and disability worldwide and it accounted for 9.4 million deaths and 7 percent of disability adjusted life years (DALYs) in 2010 (Lim, Vos, Flaxman et al, 2012).

1.2 DESCRIPTION OF HYPERTENSION

Hypertension refers to a chronic medical condition relating to an elevation in blood pressure. Descriptions of hypertension include the level of blood pressure at which detection and treatment do more good than harm (Evans & Rose, 1971), and as a systolic Blood Pressure of ≥ 140 mm Hg or diastolic Blood Pressure of ≥ 90 mm Hg or both (Addo, Amoah & Koram, 2006). The Ghana Standard Treatment Guidelines (STG, 2010) refers to hypertension as a condition in which the blood pressure of an adult aged 18 years or older is persistently higher than 140/90 mmHg in a non-diabetic, or above 130/80 mmHg in a diabetic, based on the average of two or more properly measured blood pressure readings. Although there are variations in the definitions of hypertension, the basic identifiable key concept about rise in blood pressure remains constant. To this end, hypertension for the purpose of this study will be defined as 'a chronic health condition associated with a consistent elevation of blood pressure which requires good adherence to therapy to improve health outcome'.

1.2.1 Historical Background to Hypertension

Hypertension which is also referred to as high blood pressure is a chronic health problem that dates back since the ancient Egyptian empires. Some names that were coined to refer to this condition were 'hypertensive vascular disease' by Janeway in 1913 and 'hypertonie essential' by Frank in 1925 (Esunge, 1991). The progress of the study of the disease has been varied and rapid in the nineteenth and twentieth century. Remarkable contributions which relate to the description of the pathology of the disease, the basis of the measurement of blood pressure and description of stethoscopic sounds can be linked to the pioneering works of Hales in 1733, Morgagni in 1761, Cotugno in 1770, Thomas Young in 1808, Richard Bright in 1836, Gull and Sutton in 1872, Gowers in 1876 and Nikolai Sergeyeovich Korotkoff in 1905 (Esunge, 1991). Further contributions particularly in the area of initial use of pharmacotherapy (Sodium thiocyanate) and diet can be associated with Treupel and Edinger in 1900, and Kempner in the early 1940s respectively. Sodium thiocyanate became very unpopular due to its toxicity and the numerous adverse effects associated with it. Later, newer drugs were studied and introduced in the management of hypertension. These include hydralazine by Reubi in 1949, chlorothiazide by Freis, Wilson, and Parish in 1957 (Freis, 1990), propranolol by Prichard and Gillam in 1964, alpha-methyldopa by Oates, Gillepsie, Udenfriend and Sjoerdsma in 1960, and in the early 1980s, with the contributions of John Alexander of Squibb and John Ltiragh, captopril, and enalapril (Esunge, 1991).

Until recently, the prevalence of hypertension was considered to be virtually non-existent in most African countries. Yet, it is considered a developing public health problem in Ghana, Africa and the world as a whole (Amoah, 2003; Van der Sande, Milligan, Nyan et

al., 2000; Wolf-Maier, Cooper, Banegas et al., 2003). Factors such as rapid changes in diet and lifestyle coupled with urbanization and modernization have been associated with this emerging phenomenon (Maletnlema, 2002).

1.2.2 Measurement of blood pressure

Blood pressure is measured and recorded on the mercury gauge of an instrument called a sphygmomanometer. A cloth-covered rubber cuff is wrapped around the upper arm and inflated in order to squeeze an artery in the arm and to temporarily stop the flow of blood. Afterwards, the air is let out of the cuff while a stethoscope placed over the artery is used to detect the sound of the blood spurting back through the artery. Two sounds are recorded. The first is the systolic pressure and the last sound is the diastolic pressure. Blood pressure is expressed in two numbers: the higher number is the systolic blood pressure, which is the pressure exerted by the blood against the walls of the blood vessels while the heart is contracting. The lower number is the diastolic blood pressure, which is the residual pressure that exists between heart contractions, or while the heart is relaxing.

1.2.3 Diagnosis of Hypertension

Hypertension is diagnosed when measurements of blood pressure are consistently elevated. Diagnosis is usually confirmed when the average of at least two diastolic and systolic blood pressures are 90 and 140 mm Hg respectively or higher. WHO recommends three elevated blood pressure recordings over a four week period for hypertension to be diagnosed. Hypertension is termed primary when the medical cause is unidentified or secondary when caused by other conditions stemming from the kidneys, arteries, heart or endocrine system (Carretero & Oparil, 2000). Nonetheless several

factors and conditions may play a role in its development, including alcohol consumption, smoking, overweight or obesity, lack of exercise, old age, sex, occupation, stress, family history and genetics (Olatunbosun, Kaufman, Cooper, & Bella, 2000)

In terms of classification, the America Heart Association (2003) has identified the following sub divisions; prehypertension (systolic 120-139, diastolic 80-89), hypertension stage I (systolic 140-159, diastolic 90-99), hypertension stage II (systolic ≥ 160 , diastolic ≥ 100), and isolated systolic hypertension which is elevated systolic pressure with normal diastolic pressure (systolic ≥ 140 , diastolic < 90).

1.2.4 Complications of hypertension

In spite of the absence of symptoms in most cases of hypertension, the following may be experienced; confusion, fatigue, headache, irregular heartbeat, vision changes, blurred vision, dizziness and nausea.

Complications that may occur as a result of hypertension include stroke, peripheral vascular diseases and heart diseases such as myocardial infarction, heart failure, left ventricular hypertrophy, dementia, retinopathy, sexual dysfunction, hypertensive encephalopathy, nephropathy and neuropathy (Krzesinski & Cohen, 2007; Agabiti-Rosei, 2008; Gardner & Afaq, 2008; Pedrinelli, Dell'Omo, Talini, Canale, & Di Bello, 2009; White, 2009). Hypertension is the leading risk factor for cardiovascular diseases and is a major cause of death globally (Lim et al, 2012; Novo et al, 2009).

1.2.5 Management of Hypertension

Although hypertension is an incurable condition, it can be managed with the help of medications and lifestyle modifications. The main goal of treatment is to reduce blood pressure and consequently lessen the risk of complications. Treatment of hypertension is usually based on the Joint National Committee (JNC8) Guidelines, Joint British Societies' (JBS2) Guidelines 2005 and NICE Clinical Guidelines 2004 (Willency, 2010) as well as the Ghana Standard Treatment (STG6) Guidelines 2010. Treatment and care should take into account patients' individual needs and preferences in that, people with hypertension should have the opportunity to make informed decisions about their care and treatment. The guidelines further recommends treatments that are specifically culturally appropriate, take into account patient factors such as age, sex, cardiovascular risk, associated medical conditions, adverse effects and the cost of the drug. Medicines such as alpha blockers, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, calcium channel blockers, central alpha agonists, diuretics, renin inhibitors and vasodilators as well as exercise, weight loss, and healthier diet therapies are prescribed in order to achieve optimum blood pressure control. Some psychological interventions have significantly influenced hypertension management in relation to the Biopsychosocial approach to healthcare. In order to evaluate the blood pressure-lowering effects of biofeedback which is a psychological treatment in patients with essential hypertension, Nakao, Yano, Nomura, and Kuboki (2003) conducted a meta-analysis on related studies published between 1966 and 2001. With a total of 905 essential hypertensive patients in 22 randomized controlled studies, relaxation-assisted biofeedback significantly decreased both systolic and diastolic blood pressures.

1.2.6 Hypertension in Ghana

Hypertension is a growing public health concern in Ghana (Addo et al., 2012) and according to the GHS report, it is one of the leading causes of death in the country. It is associated with relatively low levels of awareness, drug treatment, and blood pressure control (Addo et al., 2006; Cappuccio et al, 2004; Amoah, 2003). In the past, prevalence studies of hypertension in Ghana concluded an almost non-existent health condition affecting approximately 2%–5% (Pobee, Larbi, Belcher, Wurapa, & Dodu, 1977) of the Ghanaian population. Nevertheless later studies have indicated a significant rise in prevalence to 28.4% (Amoah, 2003), 28.7% (Cappuccio et al., 2004), 25.4 % (Addo et al., 2006), 20% - 25 % (Bosu, 2010), and 19.3% – 54.6% (Addo et al., 2012). In the majority of the ten regions in Ghana, hypertension is rated the fifth commonest cause of outpatient morbidity but in the Greater Accra Region, hypertension has moved from fourth to become second to malaria as the leading cause of outpatient morbidity in 2007 (GHS, 2008). Additionally, hypertension is among the leading cause of hospital admission, heart failure, renal failure and death in Ghana (GHS 2008). Since comprehensive reviews of studies on hypertension in Ghana were readily unavailable and almost non-existent, Bosu (2010) systematically reviewed existing studies on the prevalence of adult hypertension in Ghana. He observed factors such as older age group, over-nutrition and alcohol consumption to be independently associated with hypertension. Further results indicated that sex differences were insignificant with high prevalence rates in urban populations compared with rural and mixed populations. The major concern though was the finding from most studies that less than one-tenth of hypertensive patients had their blood pressures controlled. Medication non-adherence has

been the main antecedent of the above concern (Brown & Bussell, 2011; Kabir, Iliyasu, Abubakara, & Jibrilb 2004).

1.3 MEDICATION ADHERENCE

In terms of medication taking behaviours, concordance, persistence, compliance, and adherence are all terminologies commonly used in literature. Concordance refers to an agreement reached after negotiation between a patient and a healthcare professional to follow a recommended regimen, taking into account the beliefs and wishes of the patient. Persistence is the ability of a person to continue taking medications for the intended course of therapy. Adherence and compliance generally refers to the extent to which a person takes medications as prescribed by their health care providers. However, the term compliance is less widely used because it suggests that a person is passively following a doctor's orders, rather than actively collaborating in the treatment process. Hence, the desired term is adherence, through the process of concordance, which requires a person's agreement to recommended therapy and defined by WHO (2003) as the extent to which a person's behaviour taking medication corresponds with agreed recommendations from a health care provider. Thus, it is the extent to which the behaviour of patients in terms of medication intake, diet regimen and life style changes coincides with clinical prescription (Jin et al., 2008).

A key aspect of the health care delivery system, particularly in hypertension management, is pharmacotherapy which refers to the use of medicines in the treatment of diseases (Bushardt et al. 2008) and a critical aspect of pharmacotherapy is adherence to treatment regimen. Adherence to antihypertensive therapy and lifestyle changes has been

associated with obtaining full benefits of blood pressure reduction (Irvin et al. 2012). Adherence has been categorized as complete adherence when a patient takes all of the prescribed doses as stated and initial adherence when a patient engages in the first step of having a prescription presented to a pharmacy but fails to pick it up and/or does not consume the medication (Svarstad, Chewning, Sleath & Claesson, 1999). Generally, adherence rates are higher among patients with acute conditions than those with chronic conditions like hypertension. There is evidence suggesting persistently low adherence rates with dramatic decreases after the first six months of therapy with chronic conditions (Haynes, McDonald & Garg, 2002).

A number of different methods for measuring adherence have been developed but none is totally accurate (Winfield & Richards, 2004). Adherence to medication regimens has been monitored since the time of Hippocrates around 400 BC, when the effects of various potions were recorded with notations of whether the patient had taken them or not. Hippocrates gave stern warnings to his patients who *'lie about taking their medicines and refuse to confess when things go wrong'* (Osterberg & Blaschke, 2005; Winfield & Richards, 2004). There are directly and indirectly observed methods for measuring adherence. Direct methods use biologic markers in measuring concentrations of a drug or its metabolite in blood or urine. These direct approaches tend to be uncomfortable, taxing and economically expensive to both patient and the health care provider but are a good and objective means of assessing adherence. Indirect methods, like self-reports, questionnaires, interviews, evaluating clinical response, carrying out pill counts, determining refill of prescriptions, and using computerized medication adherence monitors (e.g. medication event monitoring), are the simplest and most common methods

for measuring medication adherence (Girerd et al., 2001). A more recent tool is the mobile computing and communications technology embodied in modern cell phone devices which help monitor and improving the rate of medication adherence (Hedtke, 2007). These indirect methods of measuring therapeutic adherence are subjective and may result in under or overestimation of patient's adherence rates (Osterberg & Blaschke, 2005).

Possible benefits of adherence to medication include better health outcomes such as control of symptoms, disease, disability and death; patient and prescriber satisfaction as well as improve quality of life (Andrade, Kahler, Frech & Chan, 2006). Despite these benefits, many people do not enjoy the full potential benefits of their medications as a result of their failure to adhere to taking their medications as prescribed.

1.4 MEDICATION NON-ADHERENCE

In the management of chronic conditions, medication non-adherence is seen as a complex problem. With the saying that the best medications are of little value unless they are taken (Awad, 1999 as cited in Awad, 2004), individuals with hypertension need to adhere to antihypertensive medications as well as other lifestyle changes (Gerth, 2002). Despite the availability of effective medicines, the adherence to antihypertensive medications remains far from ideal. The World Health Organisation estimates non-adherence to antihypertensive medications to be around 50% and further associated failure to control hypertension with poor medication adherence (DeGeest & Sabate, 2003).

Non-adherence is the extent to which the health behaviour of a person deviates from medical/health advice. Medication non-adherence is the number of doses not taken or

taken incorrectly that jeopardizes the therapeutic outcome of the patient (Jimmy & Jose, 2011). It includes the failure of patients to have their prescriptions dispensed or renewed, missing doses, errors in dosing, inappropriate administration of medications, inaccuracies in timing and frequency of administration, and premature discontinuation of the drug regimen (Shams & Barakat, 2010). Non-adherence is categorized as partial non-adherence when the medications taken by a patient is above or below the prescribed number of doses and complete non-adherence when the patient totally ignores all recommendations to treatment by avoiding the first step of presenting the prescription to the pharmacy (Svarstad et al. 1999).

Non-adherence has been proposed as a behavioral disorder so that a disorder model could be employed in understanding and managing this problem (Poirier, Jackson, Perri et al., 1999). This suggestion has been possible because of certain similar features observed for both medical disorders and non-adherence such as, both having identifiable risk factors, variations in severity, morbidity and mortality, long term adverse effects, availability of assessment and monitoring tools, and intervention techniques for some cases of both disorders (Nichols-English & Poirier, 2000). Significant worsening of disease, treatment failures, increased hospitalizations, death, and increased health care costs remain the main consequences of medication non-adherence. Few studies on medication non-adherence have been published in Ghana which includes conditions like tuberculosis, malaria, hypertension and HIV/AIDS (Van Der Werf, Dade & Van Der Mark, 1990; Agyapong, Ansah, Gyapong et al., 2002; Beune, Haafkens, Agyemang, Schuster, & Willems, 2008; Ohene & Forson, 2009). In one of such studies by Buabeng et al (2004), the level of non-adherence with hypertension medication in Ghana was assessed to be

ninety three percent in spite of an estimated global non-adherence rate of fifty percent by WHO. This brings to bear a very significant problem in Ghana. Identifying and understanding the determinants of non-adherence will lead to successful management of hypertension and other chronic illness in the country. A quantitative review of fifty years of non-adherence research in chronic diseases, showed significant relationships between levels of adherence with medication use and health behaviour change, social and emotional support (DiMatteo, 2004).

According to WHO (2003) medication non-adherence is a multidimensional phenomenon determined by the interplay of five sets of determinants: social/economic factors, provider-patient/health care system factors, condition-related factors, therapy-related factors, and patient-related factors. This current research study focuses on psychosocial and pharmacologic determinants as the dimensions of medication adherence and non-adherence in Ghana.

1.5 THEORETICAL FRAMEWORK OF STUDY

Psychosocial and cultural concepts as well as the responses of people to health and illness have been a core interest of psychologists and sociologists. Health care professionals have become aware of the importance of these concepts and their impact on improved diagnosis and treatment (Winfield & Richards, 2004). Likewise, the traditional, mechanistic biomedical paradigm of health is being replaced by a broader holistic perspective encompassing the biological, psychological, social and spiritual determinants of health and illness (Engel, 1980; WHO, 2008). Therefore, recognising and understanding these factors in relation to patient care is important, given their association

with various treatment behaviours and outcomes (Brown, Dunbar-Jacob, Palenchar et al, 2001).

Various psychosocial models may be applicable to medication intake and adherence. Social cognition models are increasingly also receiving research attention, and provide an important framework for increasing the understanding of the determinants of a wide range of health behaviours (Svensson & Kjellgren, 2003). Among these are beliefs about medicines (Horne & Weinman, 1999), theory of planned behaviour (Ajzen, 1991), illness representation model (Meyer, Levanthal & Gutman, 1985), and the health belief model (Janz, Champion & Strecher, 2002). All of these involve the identification of beliefs and cognitions which determine an individual's behaviour.

The theory of planned behaviour, an expanded version of the theory of reasoned action, and the health belief model have explained in part the health-related behaviours practiced by people (Sarafino, 2006). According to the theory of planned behaviour, the decision to engage in a voluntary behaviour is usually preceded in advance by the intention to carry out that particular behaviour and this intention tend to be the best predictor of what one would do. The theory suggest that attitudes regarding the behaviour, subjective norms and perceived behavioural control are the three judgements which determine a person's intention to perform a behaviour. Noting with particular interest the health belief model, it is the most widely mentioned to explain and predict health behaviours (Ross, Walker & MacLeod, 2004). The theory was originally developed by psychologists working for the public health service (Bishop, 1994) to explain preventive health behaviours and evolved

from the premise that each individual's perception of the world determines what that individual will do.

The fundamental assumption of the health belief model is the fact that health behaviours are rationally determined by a person's perceived vulnerability to a health threat. The readiness to take a health action is primarily a function of two factors: the person's perception of susceptibility to illness and the perceived severity of the consequences of getting the illness. The model proposes that patients weigh up a health-related behaviour such as adherence, by considering their perceived susceptibility to an illness and the seriousness of the illness, as well as the benefits of the action. Potential behaviours are specifically evaluated in terms of their perceived benefits of adherence in addition to other potential barriers, risks or costs that may be present. The model includes the concept of barriers to action and cues which might prompt adherence.

There have been some variations made to the health belief model and although the importance of the diverse constructs varies within and between cultures, (Nahcivan & Secginli, 2007) these constructs have validly predicted a wide variety of health behaviours and outcomes (Newell, Modeste, Marshak, & Wilson, 2009). Becker's revision of the health belief model facilitated research highlighting the impact of psychosocial determinants on medication adherence in addition to demonstrating clearly the relationship between the social and psychological needs of patients and medication adherence/ non-adherence (Rickles, 2010). This modification proposed three dimensions in predicting the extent to which a patient would engage in any sick-role behaviour.

Relating the three dimensions of the model with adherence to prescribed regimens, the first dimension is the readiness to adhere to the recommended management. The second dimension involves modifying and enabling determinants like psychosocial variables which might alter the perceptions and beliefs developed in the first dimension. Some examples of these psychosocial variables include demographics, cultural background, social support networks, attitudes toward health professionals and the environment. The third dimension describes the behaviours associated with the patient's acceptance of his or her illness leading to adherence to the prescribed regimens.

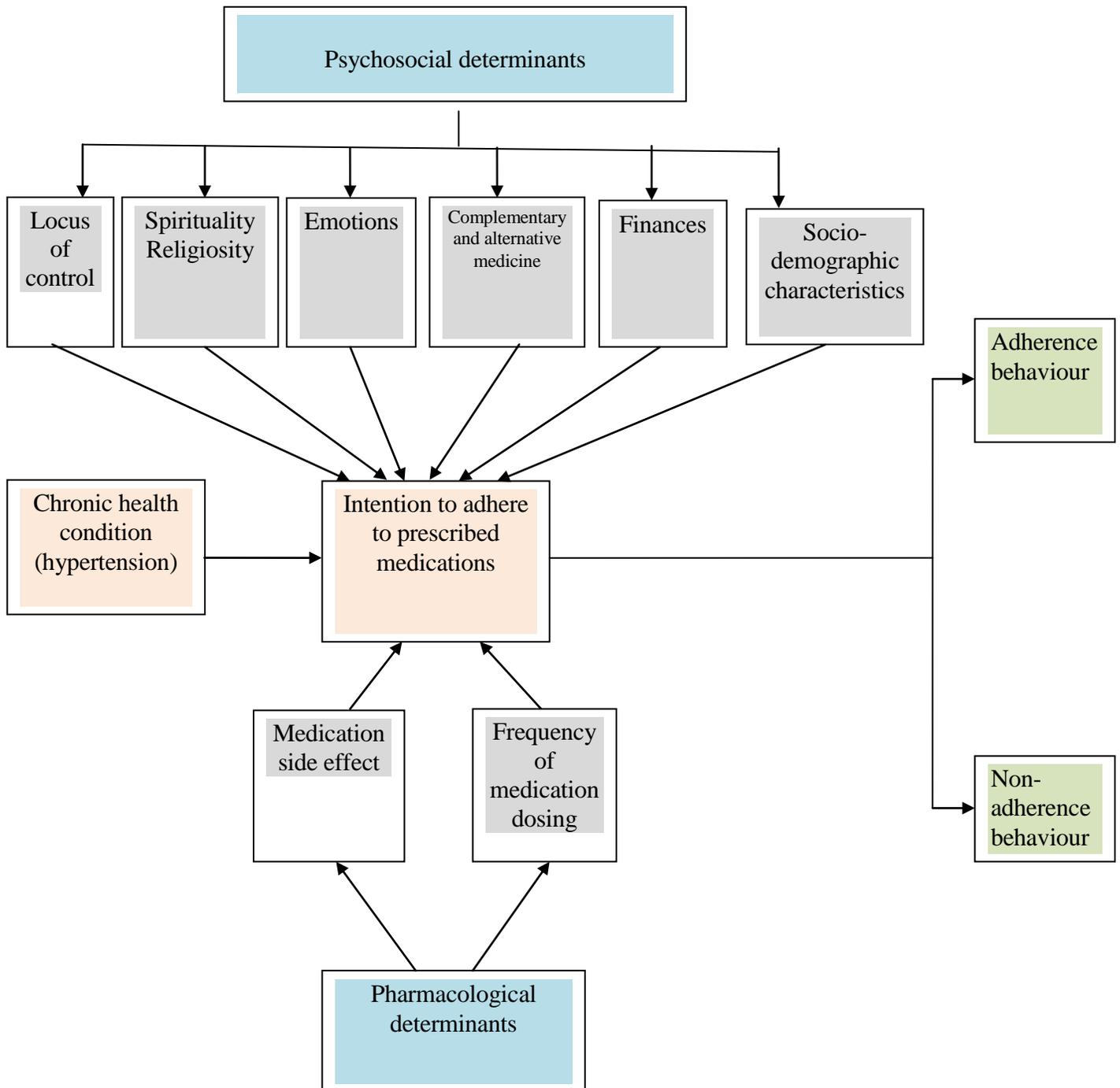
Hence, based on Becker's adjustments to the health belief model, a patient's readiness to engage in medication adherence (dimension 1) coupled with various psychosocial factors (dimension 2) will influence a patient's medication adherence behaviour (dimension 3).

In Becker's modification of the health belief model, the absence of other culturally specific possible variables like spirituality/religiosity or other factors like the pharmacologic, that may be considered as influencing the adherence decision and behaviour of hypertensive patients is readily evident. Secondly, the majority of the literature on the health beliefs and behaviours of hypertension patients particularly, Africans, is limited with most of the studies stemming from U.S.A., U.K. and elsewhere other than Africa (Newell et al., 2009). This study therefore proposes a further modification to the health belief model (Figure 1), incorporating the concept of intentions from the theory of planned behaviour and considers the role psychosocial and pharmacologic determinants play either independently or synergistically in the adherence behaviour of hypertensive patients in Ghana.

Patients will form intentions to adhere or otherwise by taking into account the state of their condition and treatment regimen targeting symptom reduction (if any) and improved health outcomes. Based on the revised theory presented, these intentions may take separate decision pathways eventually leading to adherence or non-adherence behaviours as a result of the single or joint influence of locus of control, spirituality/ religiosity, emotions, preference for alternative/ complementary therapies, medication side effects, cost of medications, frequency of medication dosing, and in some cases the demographic characteristics of hypertensive patients such as age, sex, education, marital status.

This suggested theory may be useful for developing interventions for increasing medication adherence and ultimately decreasing and controlling blood pressure among Ghanaians diagnosed with hypertension. It could further be applicable to other hypertensive and chronic patients elsewhere in the world.

Figure 1: A model representing the theoretical framework for anti-hypertensive medication adherence and non-adherence behaviour



Source: Author's construct, based on Becker's version of the health belief model and the theory of planned behaviour.

1.6 PSYCHOSOCIAL DETERMINANTS

1.6.1 Locus of control

Locus of control (LoC) is a personality construct from Rotter's social learning theory where individuals are differentiated in terms of whether their source of control is internal or external (Rotter, 1966). The concept which is thought to be stable over time particularly in adulthood (Cebi, 2007, Goldsmith, Veum, & Darity, 1997; McKibbin, Guarnaccia, Hayslip, & Murdock, 1997; Schurer, 2008) was conceived by Rotter (1966) as a one-dimensional construct with internality and externality at each end of a continuum in order to evaluate individual differences along this continuum. Yet, Heineck and Anger (2010) noticed in their study of cognitive abilities and personality traits, that, locus of control may change over time, assuming the changes are the same for people in that particular age-group.

LoC is based on the concept that people generally believe their actions can influence their health related behaviour (Norman & Bennet, 1996) and this control belief concerns the locus (Latin word for place or location) where control over outcomes resides (Wallston, 2001). People with internal locus of control tend to believe they control their lives and that good or bad outcomes of events in their lives are a result of something they themselves have done. Consequently, they take responsibility for their failures and credit for their successes and decisions are taken without any form of influence from the external world. This increases their tendency to adhere to prescribed treatment regimen because they believe that they can affect their own health (Burkhart & Rayens, 2005; Omeje & Nebo, 2011). Individuals with external locus of control attribute whatever happens to them to forces in the external world such as chance, fate or other people who

are more powerful than they are (Butler & Moran, 2007) and they may be less likely to adhere to therapy, knowing that their actions may not appreciably affect outcomes (Halimi, Pithon, Godard, Varrin & Chanez, 2010).

Still, some studies have demonstrated that individuals are not entirely internal or external in their locus of control; rather they consider different sources of control (Lynam et al., 2009). This leads to an exhibition of a mixed LoC also referred to as “bilocal” LoC (April, Dharani & Peters, 2012) or “responsible internal” (Wallston & Wallston, 1982).

Wallston, Wallston, and DeVellis (1978) developed the Multidimensional Health Locus of Control to precisely identify variations in locus of control beliefs in relation to health conditions. The assessment was three dimensional, i.e., ‘internal’, ‘chance’ and ‘powerful others’ with Wallston, Stein, and Smith (1994) later revising and separating the ‘powerful others’ sub scale to ‘doctors’ and ‘others’. Besides, internal health locus of control has been associated with knowledge and attitude, psychological state, health behaviour, and better health conditions, whereas, external health locus of control for negative health behaviours and weak psychological state (Malcarne, Drahota, & Hamilton, 2005).

Health related studies on chronic diseases showed varied results in the association between locus of control and adherence (Lynam, 2009; Wallston 1992). Adherence to daily peak expiratory flow rate monitoring recommended for asthma management positively correlated with internal health locus of control (Burkhart & Rayens, 2005) and non-adherence with external locus of control (Halimi et al., 2010). Additionally, significant associations between high internal locus of control and adherence have been observed for gluten-free diet in the control of celiac disease (Bellini, Zanchi, Martelossi

et al., 2011), regimen for diabetic management (Morowatisharifabad, Mahmoodabad, Baghianimoghadam, & Tonekaboni, 2010; Surgenor, Horn, Hudson, Lunt, & Tennent, 2000), antipsychotic medications in the management of schizophrenia (Combes, & Feral, 2011).

Of particular interest to this study is the associative bearing of locus of control on adherence to pharmacotherapy among hypertensive patients. In one such study among hypertensive patients in Nigeria, one hundred previously diagnosed hypertensive patients drawn from the Ituku-Ozalla University of Nigeria Teaching Hospital indicated significant associations between the two variables. Patients who were internally-oriented were more likely to adhere to their medication regimen compared with those who were externally oriented (Omeje & Nebo, 2011).

In Malaysia by Azlin, Hatta, Norzila, and Sharifa Ezat (2007) concluded that respondents with high internal locus of control reported poor adherence to medications. Relatively, higher internal locus of control was found to be beneficial when barriers to medication adherence (e.g., side-effects, forgetting to take medication, and keeping track of pills) were low, but at high perceived barriers, locus of control played a less role in medication adherence among hypertensive veterans in the U.S.A. (Hong, Oddone, Dudley & Bosworth, 2006). Although, these and some other studies (Omeje & Nebo, 2011; Hong et al., 2006 and Azlin et al., 2007) acknowledged significant effects and associations between locus of control and medication adherence, they further indicate that dissimilarities in the reported adherence behaviour in relation to locus of control may be peculiar to cultures or a particular group of people.

1.6.2 Spirituality/ religiosity

1.6.2.1 Relating religiosity and spirituality

Many studies have shown that religiosity (or religiousness) and spirituality are connected with health behaviours and health outcomes (Chatters 2000; George, Ellison & Larson, 2002; Hackney and Sanders 2003; Koenig 2000; Miller & Thoresen 2003; Powell, Shahabi, & Thoresen, 2003). Although there are still deliberations on possible association with health (Hall, Meador & Koenig, 2008) and weaknesses in the definition and measurement of the constructs (Hackney and Sanders 2003; Mokuau et al. 2001; Miller and Thoresen 2003), attempts have been made to conceptualize religiosity and spirituality to relate with health outcomes as well as its impact on the social domain as a whole (Campbell, Yoon & Johnstone, 2010; Hall et al. 2008; Hummer, Ellison, Rogers, Moulton, & Romero, 2004; Idler et al. 2003; Levin 2009; Szaflarski et al., 2010).

Spirituality largely relates to emotionality and feelings or experiences of reverence, peace, wonder, awe, harmony or attachment with a supreme being (Johnstone, Yoon, Franklin, Schopp & Hinkebein, 2008) and frequently defined as that which gives a transcendent meaning to life (Szaflarski et al., 2010) where God takes the initiative in this typical divine-human relationship (Pembroke, 2008). The Oxford English Dictionary defines spirituality as “*of the spirit or soul; religious, divine, inspired; refined, sensitive*”. Elsewhere, it has been defined as “a set of conscious/unconscious beliefs and morals underlying the motivation and reasons for undertaking any task or occupation” (Tanyi, 2002). Notwithstanding varied definitions of spirituality, the core concepts are the same (Miller & Thoresen 2003). It may well comprise the internal, personal, and emotional expression of the revered; and evaluated using spiritual wellbeing, peace and comfort

derived from faith, and spiritual coping (Szaflarski et al., 2010). Tanyi (2002) identified the vertical and horizontal facets of spirituality where the vertical component relates to a person's relationship with a higher power (God) and the horizontal aspect being one's relationship with self, others and the environment. The latter is often referred to as humanistic values and beliefs.

Religion is a more culturally and socially based construct from the Latin term *relegare*, which means "to bind fast, or tie together" (Mansen, 1993). While religiosity indicates an expression of one's spiritual perspective, it refers to an outward prescribed system of beliefs and guidelines of conduct (Mickley, Soeken & Belcher, 1992). The conduct is generally explained in a behavioural context where rituals and other related symbolic activities (e.g., meditations, prayers, fasting, reading religious scripts, attendance at services, etc.) are practiced by individuals according to their specific beliefs and modes of social organization (Koenig et al., 2001; Miller & Thoresen, 2003). These activities have been noted to strengthen the faith of people and assist them with decision making in health-related practices. Formerly, although spirituality and religiosity were examined as a one-dimensional construct, various researchers have attempted to categorize and distinguish particular aspects of the two constructs (Pearce, Little & Perez, 2003). Nevertheless, religion is generally inter-related with spirituality since the former provides a structured environment for spiritual exploration and practices in life and the two constructs have been conceptualized to influence the development of each other (McDade, 2007). For example, religious practices encourage spiritual growth and spiritual practices are often an important aspect of religious participation (Armstrong & Crowther, 2002; Miller & Thoresen, 2003). Moreover, the term 'spirituality/religion' has

been used as a single-item measure to denote the various dimensions of spirituality and religion/religiosity/religiousness (Miller & Thoresen, 2003).

1.6.2.2 Religion in Ghana

In Ghana, the Constitution provides for freedom of religion and according to the national population census in 2010, approximately 71%, 18% and 5% of the population are Christians, Muslims or Traditionalists respectively whereas 6% of the population do not associate with any particular religion. Some Christian groups include Roman Catholic, Methodist, Anglican, Presbyterian, African Methodist Episcopal Zionist, Methodist, Evangelical Lutheran, Charismatic, Seventh-day Adventist, Pentecostals, Baptist etc. Additionally, four Islamic groups exist in the country: Tijanis (a Sufi sect found in West Africa), Salafi/Wahhabi-oriented Ahlussuna (made up of the Ahlussuna Wal-Jam-A and the less conservative Ahlussuna Majilis), Ahmadis, and a small number of Shi'a. Likewise, other religious groups include the Baha'i Faith, Buddhism, Judaism, Hinduism, Shintoism, Ninchiren Shoshu Soka Gakkai, Sri Sathya Sai Baba Sera, Sat Sang, Eckankar, the Divine Light Mission, Hare Krishna, and Rastafarianism. Traditionally, belief in ancestors, fetishism and witchcraft exist in some parts of the country as well.

1.6.2.3 Spirituality/Religiosity and health

Worldwide, there has been a systematic introduction of the concept of spirituality/religiosity into the medical field with a growing interest in the possible perceived health benefits as a result of having a spiritual belief and following a religious lifestyle.

Specifically, it can be noted as an essential factor influencing the health quality of life of chronically ill patients due to its integration into positive thoughts and health behaviours, as well as healthy coping styles which alleviate the perceived overwhelming persistent situation (Kremer & Ironson, 2009; Levin, et al., 2005; Lewis, 2011).

Other studies have explored the influence of spirituality/religiosity on positive health behaviours among college students (Nagel & Sgoutas-Emch, 2007), in heart failure (Riegel et al., 2009; Van Ness, Towle, O’Leary & Fried, 2008), mental health outcomes (Koenig, 2004), lower blood pressures (Buck, Williams, Musick, & Sternthal, 2009; Gillum & Ingram, 2006; Naewbood, Sorajjakool, & Triamchaisri, 2010) and reduced mortality rates (Hummer, Ellison & Rogers, 2004; McCullough, Hoyt, Larson, Koenig & Thorenson, 2000; Powell, Shahabi, & Thoresen, 2003).

Studies performed by Westlake et al. (2002) and Beery, Baas, Fowler, & Allen (2002) found no significant association or effect of religious belief on Health Related Quality of Life (HQoL) or Disease Specific Quality of Life (DSQoL) but surprisingly, General Quality Of Life (GQoL) was significantly improved in patients reporting higher religious beliefs. Religious teachings which promote healthier lifestyles improve adherence to prescribed therapies (Kliwer, 2004; Szaflarski et al. 2010).

One study estimated the number of empirical studies showing a positive correlation between spirituality/religiosity and health as being between seventy five and ninety percent (Levin, Chatters & Taylor, 2005). Erah and Arute (2008) concede to the fact that addressing religious needs of patients could enhance their medication adherence behaviour and thus, improve their health outcome. Although a number of researchers

found spirituality/religiosity to be a primary resource among persons dealing with chronic disability and illness, research relating this specifically to medication adherence has been limited.

For example, with HIV infection requiring strict adherence to medication regimen, a study by Park and Nachman (2010), examined the patterns of adherence to highly active antiretroviral therapy (HAART) relative to religious beliefs in a population of HIV-infected adolescents. Findings were that patients with higher spiritual belief and religious practice scores showed high adherence to HAART. Similarly Simoni, Frick and Huang (2006) observed an association between spirituality/religiosity and medication use among cancer patients in the USA, as well as among chronic hepatitis C viral infected persons (Raghavan, Ferlic-Stark, Clarke, Rungta & Goodgame, 2011).

A study by Lewis (2011) to explore how African American older adults used spirituality to adhere to their antihypertensive medications showed that spirituality was perceived as a positive resource that helped study participants to adhere to their antihypertensive medication regimen. It is worth noting once again that spirituality/religiosity is an important component of the cultural beliefs of these participants but to date there is scant literature examining how Africans and specifically Ghanaian adults with hypertension use their spirituality/religiosity in the management of medication adherence.

1.6.3 Emotional factors

Emotion is an important determinant of mental and physical health decisions which dates back to past renowned classical philosophers like Aristotle, Descartes and Plato offering distinguishable emotional theories (Cacioppo & Gardner, 1999). Researchers predominantly in disciplines of psychology and business are increasingly noting the significance of emotional studies on important decisions in relation to these fields. Emotion has been defined as an intricate biological and psychological experience of one's state of mind resulting from physiological and environmental influences in connotation with personality, disposition, motivation and mood (Myers, 2004) or as a state of arousal that can be experienced as pleasant or unpleasant (Oxford Medical Dictionary, 2003). It involves a complex organized system entailing thoughts, beliefs, motives, meanings, subjective bodily experiences, and physiological states, all of which arise from our struggles to survive and flourish by understanding the world in which we live (Lazarus, 1999).

Previous studies have indicated that psychosocial factors are important determinants of antihypertensive medication adherence. However, studies on the influence of an individual's emotions on adherence to antihypertensive medications, particularly among Ghanaians are limited. Hypertension is a chronic illness and when an individual is diagnosed, he or she experiences many profound emotions which can prolong into a continuous form of distress leading to developing emotional responses to the illness (Duvdevany et al, 2011). Recent studies have shown patients with chronic medical conditions to have an increased risk for developing psychiatric disorders, particularly depression and anxiety (Joestl, 2011).

Some research efforts have been made in relating emotions with medication adherence for systemic lupus erythematosus, asthma, chronic obstructive pulmonary disease, contraceptive use, diabetes, and HIV/AIDS (Bourbeau & Bartlett, 2008; Chesney, 2000; Duvdevany, Cohen, Minsker-Valtzer & Lorber, 2011; Etienne, Hossain, Redfield, Stafford, & Amoroso, 2010; Jessop, Rutter, Sharma & Albery, 2004; Samar, 2001; Walsemann & Perez, 2006). It has been shown that attending to an individual's emotional responses can significantly increase the desire and ability to adhere to medication regimes (Pradier, Bentz, Spire et al., 2002).

Emotional expressions are exhibited as anger, anxiety, depression, happiness, frustration, satisfaction, stress and many others. However, for the purpose of this study emphasis is on depression, anxiety and stress. Incorporating the study of emotional responses to the concept of medication adherence may improve adherence behaviour of patients and further provide more understanding of non-adherence issues for healthcare professionals. This is in view of little knowledge about the existence and subsequent influence of depression, anxiety and stress in hypertensive patients on their adherence to antihypertensive pharmacotherapy.

1.6.3.1 Depression

The World Health Organization grades depression as one of the most burdensome diseases in the world. It is ranked fourth of all the causes of global disease burden and is anticipated to upswing to second by the year 2020 (Vettath, et al., 2012). Although prevalent, depression is mostly undiagnosed in patients with cardiovascular disease.

Some studies have found depressive factors to be connected with an increased risk of hypertension (DiMatteo, Lepper & Croghan, 2000; Steptoe & Cropley, 2000).

Depression has been observed among patients diagnosed with hypertension (Scalco, Scalco, Azul & Neto, 2005) with a prevalence of 7.9% to 17% in those with other chronic medical conditions (Lichtman, Bigger Jr, Blumenthal, et al, 2009). Though some studies have established an association between depression and increased risk for heart conditions, hospitalization and mortality (May, Horne, Carlquist, et al, 2009) not too many have specifically established the occurrence and severity of depression in hypertension medication adherence. Besides, few studies in the past have explicitly associated depression with medication non-adherence in hypertension, diabetes, hyperlipidemia, respiratory diseases, cardiovascular diseases and HIV/AIDS (Ammassari, Antinori, Aloisi et al., 2004; Ammassari, Trotta, Murri et al, 2002; Bane, Hughes & McElnay, 2006; Gonzalez, Peyrot, Mccarl, et al., 2008; Katon, Von Korff, Ciechanowski, et al, 2004; Kim & Park, 2010; Kim, Han, Hill et al, 2003; Krousel-Wood & Frohlich, 2010; Lin, Katon, Von Korff, et al, 2004; Wang, Bohn, Knight, et al, 2002). Elsewhere in five African countries (Kenya, Nigeria, Rwanda, Uganda and Zambia), a cross-sectional review of 921 adult patients on anti-retroviral therapy suggested a high level of depression negatively affected patients' adherence to the ARTs (Etienne et al., 2010).

A previous study by Bosworth, Bartash, Olsen and Steffens (2003) showed that high prevalence of hypertension was observed among depressed older persons. The researchers observed that presence of depressive symptoms worsened hypertension.

Reports indicate a threefold lower level of medication adherence among depressed patients than other patients (DiMatteo, et al., 2000). In the same meta-analysis of twelve papers on depression, a significant relationship was observed between depression and non-adherence to medical therapy. In another study, 62.6% of hypertensive older adults had mild-to-moderate depressive symptoms which as mainly related to the number of prescribed medications to be taken (Sung, 2011).

Many studies observed an inverse relationship between depressive symptoms and medication adherence; however, studies by Schweitzer et al. (2007) and Corvera-Tindel, Doering, Gomez and Dracup (2004) did not show any relationship between depression and adherence among patients with chronic heart failure. Although it has been difficult to draw causal conclusions between depressive symptoms and hypertension (DiMatteo, et al., 2000), overlooking the association between depression and adherence may further decrease attempts to manage the global burden of medication non-adherence. For Ghanaian hypertensive patients, this interaction between hypertension and depressive symptoms remains largely unexplored and incompletely understood in terms of prevalence and effect on medication adherence.

1.6.3.2 Anxiety

Anxiety is an emotional condition relating to changes in one's body, cognitions and behaviour and defined as a pathological state characterized by a feeling of dread accompanied by somatic signs that indicate a hyperactive autonomic nervous system (Kaplan & Sadock, 1996).

Even though there are types of anxiety disorders with variations in symptoms, they tend to share the same emotional fears. The types are panic disorder and agoraphobia, generalized anxiety disorder, specific phobia, social phobia, obsessive-compulsive disorder, and post traumatic and acute stress disorder. It is characterised by excessive and unrealistic worrying and typically, a hypertensive patient may have the tendency to worry continually about the chronic condition as well as the thought of taking medications for a lifetime. This act of worry usually reinforces the fact that they have a health problem.

There a reported high prevalence of anxiety among hypertensive patients (Vetere, Ripaldi, Ais et al., 2007). Anxiety has been linked to negative health outcomes for patients with cardiac diseases yet the precise mechanism underlying this causal relationship is unclear and inconclusive (De Jong, Moser, Chung & Wu, 2008). There are some documented studies evaluating a relationship between anxiety disorder and medication adherence for asthma, heart failure, haemodialysis and contraceptive use (Bosley et al., 1995; De Jong, et al, 2008; Kaveh & Kimmel, 2001; Schweitzer et al., 2007; Walsemann & Perez, 2006). A predictor of poor adherence to medication is the high rate of anxiety specific towards the medications (Kasahara, Ohno & Sugo, 2002). The studies generally observed that as anxiety increased among participants, the probability of adherence decreased. Contrarily, Kim et al (2010) noticed greater adherence among the majority of their patients with anxiety disorder. As anxiety has shown to have varying effects on adherence, it would be of great medical importance to reveal the exact role of anxiety in the intricacies of adherence to antihypertensive medication among Ghanaians.

1.6.3.3 Stress

Studies on emotional determinants of medication adherence have focused on depression and anxiety (De Jong et al, 2008; Schweitzer et al, 2007). One key aspect of emotions that is yet to be explored is the potential effect of stress on the medication adherence behaviour. The advantage of studying persons experiencing stress is that the causal direction of the relationship between stressful events and medication adherence in hypertension may be less ambiguous. In most clinical settings, the term stress has acceptably and repeatedly been used as a euphemism for negative emotions, particularly to address undesirable psychiatric diagnostic labelling (Hotopf, Henderson & Kuh, 2008). It signifies both a feeling and an overwhelming situation tasking an individual's coping abilities.

Stress is noted to cause hypertension by recurrently raising blood pressure in addition to stimulating the production of vasoconstriction hormones by the nervous system to further elevate blood pressure. While past research and empirical evidence obtained confirms that stress does play a role in the onset and exacerbation of essential hypertension (Kulkarni, Farrell, Erasi & Kochar, 1998) virtually no researcher has assessed the potential effectiveness of understanding a possible association between stress and medication adherence in hypertension management. Stress has been shown to negatively influence medication adherence behaviour in HIV/AIDS (Leserman, 2008; Weaver, Llabre, Durán et al., 2005; Reynolds, Testa, Marc et al., 2004) and acute coronary syndrome (Molloy, Perkins-Porras, Strike & Steptoe, 2008).

1.6.4 Complementary and Alternative medication (CAM)

Complementary medicine refers to any healing practice or product falling outside the domain of conventional Western medicine (Payyappallimana, 2009). This is usually grouped with alternative medicine under the umbrella term complementary and alternative medicine (CAM). CAM has also been defined and adopted as ‘a broad domain of healing resources that encompasses all health systems, modalities, and practices and their accompanying theories and beliefs, other than those intrinsic to the politically dominant health system of a particular society or culture in a given historical period’ (Zollman & Vickers, 1999). Complementary medicine is used in conjunction with standard conventional medical practice whereas alternative medicine is used as a substitute for conventional medicine (Kim, Lichtenstein & Waalen, 2002).

The National Institute of Health (NIH) and the National Centre for Complementary and Alternative Medicine (NCCAM) in the USA, categorize CAM into the following five: alternative medical practices (e.g. acupuncture, ayurveda, homeopathy, and traditional oriental medicine), mind-body interventions (e.g. hypnosis, meditation, relaxation techniques, spiritual healing and prayer), biological based therapies (e.g. herbal medicine, vitamin and mineral dietary supplements, natural products, and special diets), manipulative and body-based methods (e.g. chiropractic medicine, massage, and osteopathic medicine), and energy therapies (e.g. biofield or bio electromagnetic based interventions like Reiki therapy) (Chang, Wallis, & Tiralongo, 2007).

The practice of CAM is gaining ground in both developed and developing countries with a worldwide utilization pattern of 29% to 80% and Africa recording the highest levels

(Amira & Okubadejo, 2007; Eisenberg, Davis, Ettner et al., 1998; WHO, 2002). In Ghana, it is known that about 70% of the population depend on traditional medicine for their health care with approximately one traditional medicine practitioner for every 400 people, compared to one allopathic doctor for every 12 000 people (Commodore, 1995, as cited in WHO, 2001a) Generally, this observation in rise of CAM application is attributable to the fact that CAM is perceived to be 'natural' and because of this perception people say it is less harmful and less toxic to the human body (Astin, 1998). Additionally, they seem to be cheaper alternatives to conventional medicine although this assertion has been refuted by a study by Muela and colleagues (2000).

There is reported evidence on the potential negative effect of CAM (predominantly herbal preparations) on health outcomes of chronic patients (Fugh-Berman, 2000; Mansoor, 2001), indicating the need for effective disclosure and monitoring to be undertaken by primary care providers of such patients. Some studies suggest that healthcare professionals are minimally aware of their patients' use of CAM (Eisenberg, Kessler, Van Rompany et al., 2001). This has resulted from physicians not showing much interest in knowing what their patients are using, as well as patients declining to disclose such information to their healthcare providers for the fear of incurring their displeasure. Various studies have explored the role of CAM in the management of health conditions like pain, cancer, psychosis, depression and diabetes (Bishop, Rea, Lewith et al., 2011; Egede, Ye, Marc & Silverstein, 2002; Hazra, Noh, Boon, et al., 2010; Anup, Kanodia, Legedza et al 2010; Khalaf & Whitford, 2010; Tan & Alvarez, 2006; Tascilar, de Jong, Verweij, & Mathijssen, 2006; Wu, Fuller, Liu, et al., 2007) .

1.6.4.2 CAM in hypertension

There is evidence suggesting that some hypertensive patients combine CAM with conventional medical treatments (Amira & Okubadejo, 2007; Caspi, Koithan & Criddle, 2004). Ernst (2005) reviewed a number of studies on many herbal remedies, non-herbal remedies and other CAM approaches indicated for antihypertensive effects. Although he observed encouraging data pertaining to garlic, autogenic training, biofeedback and yoga, the general effect of CAM on hypertension was usually modest. Thus, there is the need for more research before recommendations on CAM could be offered. Garlic has been widely used throughout the world as a CAM mainly in hypertension.

In studies of Nigerian hypertensive patients, 21% (Osamor & Owumi, 2010) and 69% (Amira & Okubadejo, 2007) of the study population reportedly used garlic. Reports indicate that, while some studies on garlic have shown slight positive effects in reducing blood pressure, there was inadequate empirical evidence to draw inferences regarding its effectiveness on blood pressure outcomes (Edwards, Colquist & Maradiegue, 2005). Similarly, there have been studies that have suggested that cocoa, which is rich in flavanols, may be beneficial in relaxing blood vessels and eventually leading to a reduction in blood pressure among people with hypertension. Yet, Muniyappa, Hall, Kolodziej et al. (2006), concluded in their study that daily consumption of flavanol-rich cocoa for 2 weeks was not sufficient to lower blood pressure in people with essential hypertension.

1.6.4.3 CAM use in Ghana

The word 'traditional medicine' (TM) is a more common term of CAM in Ghana and progressively, these two terminologies are used interchangeably in several other parts of the world (Straus, 2004). CAM/ TM has been an age long practice in the country but to date there is not much in terms of a comprehensive policy or guidelines for the preparation, distribution and utilization of this type of medical practice. Additionally, there is no single very functional body responsible for control, information, catalogue, and in depth research of all CAM/ TM providing adequate data validating their safety and efficacy.

Ghana has a Traditional Medicine Practice Act 575 but until the passage of the Act in February 2000, the Government worked with the Ghana Psychic and Traditional Medicine Practitioners' Association to license and register traditional medicine practitioners and to ensure a standard of care (Kwete, 2006). The Act establishes a Council to regulate the practice of traditional medicine practitioners and license them to practice and to regulate the preparation and sale of herbal medicines.

One of the objectives for the establishment of the Food and Drugs Board under the Food and Drugs Law Act 1992, PNDCL 305B, was to regulate all foods, drugs and cosmetics including those that fall under herbal preparations. This mandate is also far from optimal and does not include all forms of CAM/TM. A common feature in Ghana is the ease with which people display and sell their CAM/TM products and practices in the community, moving from house to house, in public transportations, on the streets, schools and even health centres. Regulating such practitioners and practices becomes quite difficult. In

spite of this shortcoming, there are some CAM/TM centres of repute in the country with some of their products tried and tested by scientific institutions such as the Mampong Centre for Scientific Research into Plant Medicines, Centre for Scientific and Industrial Research (CSIR), and the Faculty of Pharmacy and Pharmaceutical Sciences at the Kwame Nkrumah University of Science and Technology (KNUST). The country can also boast of the first edition of the Ghana Herbal Pharmacopoeia containing scientific information on 50 medicinal plants. As a step in the direction of training, KNUST has since 2001 introduced a 4 year Bachelor of Science programme in Herbal Medicine.

Furthermore, the influence of CAM/ TM has been greatly felt in the treatment of malaria in Ghana. Malaria was noted as one of the major leading cause of maternal and infant mortality in Ghana as well as the cause of low productivity among the working population (Adams, Darko & Accorsi, 2004). There were reports of drug resistance strains of the plasmodium parasites towards the 4-aminoquinoline compounds (e. g. chloroquine, amodiaquine). However, with the introduction of Artemisinin, a herbal extract from China, alongside its derivatives, drug resistant strains of plasmodium parasites are effectively being managed.

Some CAM/TM products have been promoted for improved cardiovascular function. Some of these advertisements are sometimes channelled through the media. Various claims have been made concerning the blood pressure lowering properties of products such as garlic, natural cocoa powder, moringa and quite recently dandelion. However, scientific documentation in Ghana of the effect of these products on clinical blood pressure is quite minimal.

There is usually a rift and lack of cooperation between traditional medical practitioners and orthodox medical practitioners (Hillenbrand, 2006). Traditional practitioners believe that the knowledge acquired by the orthodox system is used for selfish purposes other than to serve communities. Besides, the orthodox medicine practitioners also believe that traditional medicine was primeval, primitive and unscientific. In a study to explore the strengths of the traditional medical system in Ghana, Foote (1999) noted keenly that traditional medicine system was shrouded in secrecy especially in relation to the transmission of knowledge about the traditional products and practices. One can vividly recall Nana Drobo, the first Ghanaian to claim a potential traditional cure for HIV/AIDS who died without passing the information on to a successor. In view of this, WHO has established guidelines on Developing Consumer Information on Proper Use of Traditional, Complementary and Alternative Medicine (WHO, 2004). According to the recommendation, since patients often use both CAM/TM and conventional treatment simultaneously, it is necessary to improve collaboration between registered/licensed CAM/TM practitioners and conventional health care providers. The report further advocates the training of conventional health care providers to include basic knowledge of commonly used CAM/TM. Similarly, the training of CAM/TM practitioners should comprise basic knowledge of relevant parts of conventional medicine, such as public health, hygiene, first aid and ethical issues. What is more, CAM/TM practitioners should be encouraged to conduct research and submit reports to medical journals, in order to initiate information sharing between conventional and traditional medicine. One major problem with the implementation of such recommendations in developing countries like Ghana is the component of high illiteracy rates among CAM/TM practitioners.

1.6.5 Financial considerations

Though past postulations on health and illness have ascribed high prevalence of health risk behaviours like medication non-adherence among people with lower levels of income (Lantz, House, Lepkowski et al., 1998; Wamala, Merlo, Bostrom, Hogstedt & Agren, 2007), the inability to afford medication treatment has been the main attributable factor (Elzubier, Husain, Suleiman & Hamid, 2000). Findings from Goldman, Joyce, Escarce et al. (2004) showed that patients actively chose which treatments to forego when cost pressures became a major difficulty. This makes the management of health conditions problematic and far from ideal.

Specific to hypertensive patients, a study in the Murtala Mohammed Specialist Hospital, Kano, Nigeria found that non-adherence to antihypertensive medications was mainly due to the lack of funds by patients to purchase their medications (Kabira, Iliyasu, Abubakara & Jibrilb, 2010) and Ghana is no exception. Research findings have vastly corroborated the effect of drug unaffordability on the extremely high rates (93%) of medication non-adherence behaviour of Ghanaian hypertensive patients (Buabeng, et al, 2004; Harries, Twumasi-Abosi, Plange-Rhule & Cappuccio, 2005). The above is quite surprising especially with the introduction of the National Health Insurance Scheme in Ghana. The management of hypertension is relatively covered by insurance to a large extent, yet the level of non-adherence is high due to medication unaffordability.

1.7 PHARMACOLOGIC DETERMINANTS

1.7.1 Medication side effects

Medication side effect refers to any unwanted consequences of taking medications. According to Edwards and Aronson (2000), side effects denotes any considerably damaging or unpleasant reaction, resulting from an intervention related to the use of a medicinal product, and warrants prevention, specific treatment, alteration of the dosage regimen, or withdrawal of the product. The therapeutic and side effects of prescribed medications are mostly based on recommended dosage and timing of dosing obtained from findings of clinical trials. Several studies have well-documented evidence on medication adverse effect being a major cause of non-adherence to therapy (Benson & Britten, 2002; Ho, Bryson, & Rumsfeld, 2009; Kabir et al., 2004; Osterberg & Blaschke, 2005; Recker, Gallagher & Maccosbe, 2005; Svensson et al., 2000). Physicians often cite side effects as the principal reason for medication amendment in their patients (Aranda, Tamargo, & Aranda et al., 1997).

Although these adverse effects have been noted to decrease medication adherence, other studies have explored and observed beneficial aspects of the negative medication effects. For example, some patients have associated and interpreted the effectiveness of their medications with the extent to which adverse events are experienced by them. The more the negative effects they experience, the better they associate it with the therapeutic effects of the medication thereby improving adherence to their medication (Svensson & Kjellgren, 2003).

The frequently prescribed antihypertensive medications are alpha blockers, angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, calcium channel blockers, central alpha agonists, diuretics, renin inhibitors and vasodilators. Common side effects associated with the medications include dizziness, fatigue, cough, headache, confusion, depressed mood, chest pain, difficulty breathing, constipation, diarrhoea, swelling in parts of body, reduced sex drive, erectile dysfunction, persistent cough, increased frequency of urination, rash and difficulty sleeping.

The main challenge however, is when there is an overlap between clinical symptoms concomitant with hypertension diagnosis and the medication induced side effect. A clear example is the manifestation of headache which may be attributable to either a clinical symptom of hypertension or a side effect of a calcium channel blocker or a vasodilator anti-hypertensive medication. Although some patients experience these side effects they are able to remain adherent. In spite of the lack of empirical data, a possible postulation could be made to link patient characteristics especially personality traits and their adherence behaviour irrespective of the experiences in side effects.

1.7.2 Medication Dosing Frequency

A complex medication regimen, such as having many medications and frequently taking these medications are well documented phenomena that are likely to increase the error leading to difficulty in maintaining adherence to therapy. According to Claxton, Cramer and Pierce (2001), medication adherence worsens with increasing frequency of medication doses and this factor has been indicated as one of the major causes of mild-to-moderate depressive symptoms among hypertensive older adults (Sung, 2011).

Shalansky and Levy (2002) in assessing the level of adherence of chronic cardiovascular regimens, observed lower adherence rates with fewer medications as against better adherence behaviour among patients with very frequent dosing regimen.

It is necessary to explore the possible relationship between dosing frequency and medication adherence among Ghanaian hypertensive patients.

1.8 PROBLEM STATEMENT

The need for medication adherence by hypertensive patients who usually require long-term treatment with medications can be a complex problem for both the patients and the healthcare providers. Although some factors which affect health beliefs and health behaviours of hypertensive patients have been explored, there is limited research on the relationship between locus of control, spiritual/religious factors, emotions, complementary and alternative medicine use, financial considerations, medication side effects, frequency of taking medications, and hypertensive medication adherence specifically in Ghana.

1.9 JUSTIFICATION OF STUDY

The prevalence of hypertension is increasing in Ghana (GHS report, 2008) and non-adherence to antihypertensive medication has been cited as the main contributor to hypertensive complications such as heart attack, stroke, renal impairment and eventually death. It is also clear that various psychosocial and pharmacological determinants influence the adherence and non-adherence behaviour of hypertensive patients. The majority of the studies and reviews on the various determinants of anti-hypertensive non-adherence have been carried out in countries other than Ghana. Some determinants of

non-adherence have been explored for other health conditions like diabetes, asthma and HIV/AIDS, and not for hypertension. In some cases the suggested factors are yet to be explored experimentally. Hence, this is a comprehensive study on hypertension in Ghana that seeks to bring the determinants of medication adherence to light.

1.10 RESEARCH QUESTIONS

What is the association between biopsychosocial factors and medication adherence in the management of hypertension in Ghana, and how can these findings be used to aid patients and healthcare providers in improving the adherence behaviour of hypertensive patients in Ghana?

1.11 HYPOTHESIS

H₀: The individual or synergistic role of locus of control, spirituality/religiosity, emotions, complementary and alternative medicine use, financial considerations, medication side effects, and frequency of medication dosing will not relate significantly with the medication adherence behaviour of patients with hypertension.

H_A: There will be significant association between the psychosocial and pharmacologic factors, and the adherence behaviour of hypertensive patients.

The specific postulations are:

1. Locus of control would have a significant relation with adherence to anti-hypertensive medications, in that, hypertensive patients with internal locus of control will be better adherent than those with external locus of control.
2. Dimensions of spirituality/religiosity will significantly influence the adherence behaviour of hypertensive patients with the expectation that high scores of spiritual beliefs and religious practices will positively influence the decision by patients to adhere to their anti-hypertensive medications. Additionally, a noteworthy positive association between spirituality and religiosity subscales will be observed.
3. Symptoms of depression, anxiety and stress reported among hypertensive patients will be positively associated with the hypertensive medication non-adherence.
4. Complementary and alternative medicine use will differ by socio-demographic characteristics and negatively impact medicine adherence among hypertensive patients.
5. Medication side effects will be associated with non-adherence, but this association will be influenced by the personality of patients in terms of their locus of control.
6. Anti-hypertensive medication regimens of more than once-daily dosing and high dosing frequency would be associated with poorer adherence.

1.12 MAIN OBJECTIVE

The study sought to identify the roles played by psychosocial and pharmacological determinants in assessing the level of adherence or non-adherence to pharmacotherapy in hypertensive patients.

The specific objectives are:

1. To assess the level of adherence among the study participants.
2. To assess patient's locus of control and how it relates with the rate of adherence to pharmacotherapy.
3. To examine spirituality/religiosity as correlates of adherence to anti-hypertensive medications.
4. To determine possible role of the emotional state of non-adherent patients to pharmacotherapy.
5. To evaluate the role of CAM use, cost of prescribed medications and affordability of anti-hypertensive medications on adherence behaviour.
6. To assess the role of anti-hypertensive medication side effects on medication non adherence while taking into consideration the role of LoC.
7. To predict the association between anti-hypertensive medication regimens of more than once-daily dosing and adherence.
8. To establish possible relationships between demographic characteristics of patients and medication non adherence.

Chapter 2

METHODS

2.1 STUDY SITE

Patients were recruited from medical departments of Korle-Bu Teaching Hospital (KBTH), Accra and Komfo Anokye Teaching Hospital (KATH), Kumasi. The main rationale for choosing these two study sites was to recruit research participants who would fairly represent both southern and northern parts of Ghana and also allow for generalization of results.

The KBTH is the premier and largest teaching hospital in Ghana located in the Accra Metropolis District of Greater Accra Region, (projected population of 1,659,136 in 2010). It is the only tertiary hospital in the southern part of Ghana which serves the people of Accra, the surrounding urban towns as well the southern part of Ghana. The hospital has a 1600-bed capacity. It is also a teaching hospital affiliated with the medical school of the University of Ghana and has three centres of excellence, the National Cardiothoracic Centre, the National Plastic and Reconstructive Surgery and the Radiotherapy Centre. Services are for both out-patients and in-patients (<http://www.korlebuteachinghospital.org>, 2011).

The KATH in Kumasi, the Regional Capital of Ashanti Region, is the second-largest hospital in the country and the only tertiary health institution in the Ashanti Region (projected population of 3,204,609 in 2010). It is the main referral hospital for the Ashanti, Brong Ahafo, Northern, Upper East and Upper West Regions. The Directorate of Medicine was inaugurated on the 30th of October 2001 as a Clinical Directorate of

KATH. The Directorate runs both clinical out-patient and in-patient services and an appointment system widely used at all the out-patient clinics. Within the out-patient service, Special Clinics are run for medical conditions like Asthma, Chest, Diabetes, Hematology, HIV, Psychiatry, Renal, Hypertension, Gastroenterology, Dermatology, and Cardiology (<http://www.kathsp.org/aboutus1.php>, 2011).



Figure 2: A map of Ghana highlighting Korle-Bu Teaching Hospital (Accra) and Komfo Anokye Teaching Hospital (Kumasi).

2.2 STUDY PARTICIPANTS

Equal numbers of two hundred (200) hypertensive outpatients were recruited for the quantitative study from the two major teaching hospitals. Out of the above number, forty five participants were sub selected for the qualitative study involving one-on-one interviews. The minimum total sample size was determined using the statistical formula;

$$N = \frac{Z^2 P (1-P)}{d^2} = 315$$

where P is the highest hypertension prevalence rate of 28.7% (Cappucio et al, 2004), Z is the confidence level of 95% (1.96), d is the allowed error of 0.05 (Daniel, 1999, as cited in Naing, Winn & Rusli, 2006).

Study participants included male and female patients eighteen years and above, diagnosed as hypertensive only or hypertensive with other co-morbid conditions who reported for treatment at the KBTH and KATH. Additional criteria for inclusion into the study were, identified as Ghanaian, and reported prescription of at least one antihypertensive medication. In-patients, pregnant women and incapacitated people were also non participants in this study. Subjects who consented to participate in the study were compensated with handkerchiefs for their time. Participants selected for the qualitative phase were reimbursed for transportation and given refreshment.

2.3 SAMPLING TECHNIQUES

The study employed both stratified and simple random sampling techniques to recruit appropriate members. Hypertension was selected out of the different strata of diseases reported at the medical departments of both teaching hospitals and the eligible 200 par-

ticipants for the study per study site were then selected through a simple random process using the random number table for selection of research participants (Gravetter & Forzano, 2009).

2.4 STUDY DESIGN

This was a hospital-based cross-sectional study. Different methods were employed in addressing each specific objective (Table 2.1). Data were generated with one-on-one structured quantitative interviews and one-on-one semi-structured qualitative interviews. The purpose for using the mixed research methodology was to achieve both triangulation and complementarity where the study sought to converge, and enhance results from the different methods as well as clarify some results from one method with the results from the other method.

Table 2.1: Summary of data collection methods per specific research objective

Specific objectives	Data collection method
1. To assess the level of adherence among the study participants.	Quantitative method
2. To assess patient's locus of control and how it relates with the rate of adherence to pharmacotherapy.	Quantitative method.
3. To examine spirituality/religiosity as correlates of adherence to anti-hypertensive medications.	Quantitative and Qualitative (one-on-one interviews).
4. To determine possible effects of emotional state of non-adherent patients to pharmacotherapy	Quantitative method.

Specific objectives	Data collection method
5. To evaluate the effect of CAM use, cost of prescribed medications and affordability of anti-hypertensive medications on adherence behaviour.	Quantitative and Qualitative (one-on-one interviews).
6. To assess the role of anti-hypertensive medication side effects on medication non adherence while taking into consideration the role of LoC.	Quantitative and Qualitative (one-on-one interviews).
7. To predict the association between anti-hypertensive medication regimens of more than once-daily dosing, high dosing frequency and adherence.	Quantitative method.
8. To establish possible relationships between demographic characteristics of patients and medication adherence.	Quantitative method

2.5 ETHICAL CONSIDERATIONS

Ethical clearance was sought separately from the Institutional Review Boards (IRB) at the participating institutions for the study, namely, the IRB at Noguchi Memorial Institute for Medical Research for the study site at the Korle Bu Teaching Hospital, whereas the Committee of Human Research, Publications and Ethics approved that for the study site at Komfo Anokye Teaching Hospital. The study protocol and patient consent forms were reviewed, and approved by both committees. The ethical approval codes are NMIMR-IRB CPN 044/10-11 and CHRPE/AP/022/12 respectively (Appendix I). The study was strictly voluntary as participants who enrolled did so only after informed consent was

been obtained from them by signature or thumbprint after the objectives of the study had been clearly explained to them (Appendix II).

Written permission was sought from Prof. Kenneth Wallston, Prof. Pamela Reed, Dr. Peter Lovibond, and Dr. Donald Morisky to enable the research team use the Multidimensional Health Locus of Control (MHLC) form C, Spiritual Perspective Scale, Depression, Anxiety, Stress Scale (DASS-21) and Morisky Medication Adherence Scale (MMAS) respectively. Furthermore, permission was sought from each participating institution before commencement of data collection.

2.6 INSTRUMENTS

Data were collected through patient interviews using standardized quantitative assessments tools in the quantitative study (Appendix III) as well as semi-structured interview guide for one-on-one interviews in the qualitative aspect of the study (Appendix IV). The following quantitative measures were employed to elicit responses from the participants, Health Locus of Control Scale (Wallston, Stein, & Smith, 1994), Spiritual Perspective Scale (Reed, 1987), Duke Religion Index (Koenig, Meador, & Parkerson, 1997), Depression Anxiety Stress Scale – 21 (Lovibond & Lovibond, 1995a), Morisky Medication Adherence Scale (Krousel-Wood, Islam, Webber, et al, 2009) and the Hypertension Medication Side Effect Experience Scale developed by the researcher. The questionnaire consisted of five sections. The first part assessed socio-demographic/ environmental factors, such as, age, gender, ethnicity, religious affiliation, marital status, educational level, socioeconomic status, employment information, health insurance information, duration of hypertensive diagnosis, antihypertensive medication information

in terms of affordability and availability, CAM use data and information on existence of other medical conditions.

Section B was the Health Locus of Control Scale. This is an 18 item scale adopted from the form C of the Multidimensional Health Locus of Control (MHLC) Scales designed to measure Internal and External Health Locus of Control. The 18-item MHLC Form C has been designed specifically for health conditions to tap beliefs about control of one's illness or disease, and used when studying people with an existing health/medical condition such as hypertension (Wallston, 2005). Hence, the word "condition" in each item was replaced with "hypertension". The scale provided belief statements about the medical condition under study in which participants agreed or disagreed in terms of the measure of their personal beliefs. The responses ranged from strongly disagree, moderately disagree, slightly disagree, slightly agree, and moderately agree, to strongly agree. Form C has internality subscale, and three external subscales (i.e. Chance, Doctors and Other People). The reliability measure range from .76 to .81 (Wallston et al, 1994) whereas the concurrent validity of the subscales are .59, .65, .55, and .38 for internality, chance, doctors and others respectively (Wallston, 2005) and for this study coefficient of reliability was .898.

Spirituality/religiosity were assessed in the next section with self-report instruments that addressed various dimensions identified as important in patients with chronic conditions, such as spirituality, public and private religious practices, and religious coping. The first instrument was the ten-item Spiritual Perspective Scale (SPS) designed to measure participants' perceptions of the extent to which they held certain spiritual views and

engaged in spiritually-related interactions. Each of the 10 items used a 6-point Likert-type scale that was anchored with descriptive words (i.e. Strongly Disagree to strongly agree). The SPS has been used successfully in a wide variety of adult populations (Jesse & Reed, 2004). Using the Cronbach's alpha, reliability has consistently rated above .90 and average inter-item correlations range from .54 to .60 across the adult groups and in this study it was .878.

The second part of spirituality/religiosity which measured religious beliefs and religious involvement is the Duke Religion Index (DUREL), a two-item measure assessing two domains of religiosity: Organized Religious Activity, i.e., ("How often do you attend church, or religious meetings?"), and Non-organized Religious Activity, i.e., ("How often do you spend time in private religious activities, such as prayer, meditation, or Bible study?"). Responses range from 1 ("more than once a week") to 6 ("never") for the first item and 1 ("more than once a day") to 6 ("rarely or never") for the non-organized religious items. The DUREL has been validated in health research with Cronbach's alpha values ranging from .75 to .88 (Fetzer Institute, 2003; Koenig et al. 1997).

The Depression Anxiety Stress Scale (DASS) is a 21 item self-report inventory that yields 3 factors: symptoms of Depression, Anxiety and Stress. It is a set of three self-report scales designed to measure the negative emotional states of depression, anxiety and stress. Each of the three scales comprised seven items with related content. The Depression subscale measured dysphoria, hopelessness, devaluation of life, self-depreciation, and lack of interest/involvement, anhedonia, and inertia. The Anxiety

subscale measured autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious affect. The Stress subscale measured relaxation difficulty, nervous arousal, agitation, irritability and impatience. Responses ranged from “Does not apply to me at all” to “Apply to me very much, or most of the time” and participants were requested to use this 4-point severity/frequency scale to rate the extent to which they have experienced each negative state over the past week. The final score of each item group (Depression, Anxiety and Stress) is multiplied by two because the DASS 21 is a short form version of the DASS (the Long Form has 42 items). The DASS severity rating is as follows: 0-7, 8-9, 10-14, 15-19, and 20+ for normal, mild, moderate, severe and extremely severe anxiety respectively; 0-9, 10-13, 14-20, 21-27, and 28+ for normal, mild, moderate, severe and extremely severe depression respectively; and 0-14, 15-18, 19-25, 26-33, and 34+ for normal, mild, moderate, severe and extremely severe stress respectively. Reliability for the three scales is .71 for depression, .79 for anxiety and .81 for stress (Lovibond & Lovibond, 1995a). The DASS Anxiety subscale correlated .81 with the Beck Anxiety Inventory whereas the DASS Depression subscale correlated .74 with the Beck Depression Inventory (Crawford & Henry, 2003; Lovibond & Lovibond, 1995b). In this study the DASS was reliable with Cronbach’s alpha of .794.

Section E comprised the Hypertensive Medication Side Effect Experience Scale (HMSEES), where respondents assessed their rate/frequency of experiences with various possible side effects associated with different anti-hypertensive medications. Some examples of the 18 item list of side effects include fatigue, cough, headache, chest pain, difficulty breathing, increased frequency of urination, reduced sex drive and erectile dysfunction. They indicated the frequency of experiences with a 5-point frequency

response scale that ranged from never (0), rarely (1), sometimes (2), very often (3), to always (4). The HMSEES showed a good reliability coefficient of .801 in this study.

The Morisky Medication Adherence Scale (MMAS) was an 8-item scale which measured medication adherence behavior in hypertensive patients. This self-reported measure of medication taking was developed from a previously validated four-item scale and augmented with extra items relating to the circumstances that surrounded adherence behaviour in hypertension (Morisky, Green, & Levine, 1986). The 8-item self-reported MMAS is an improvement on the original 4-item Morisky scale and has shown better psychometric properties. (Sakthong, Chabunthom, & Charoervisuthiwongs, 2009). It has significantly correlated with the previously validated 4-item self-report scale at .64. The scale comprised eight questions about medication taking, which covered forgetfulness, carelessness and the stoppage of medication taking as a result of either subjectively experiencing an improvement or a deterioration in medical symptoms. Respondents' scores ranged from zero to eight and this enabled categorization into low adherence, medium adherence and high adherence on the basis of the number of positive retorts obtained. The MMAS in this study showed a good reliability coefficient of .793.

All data collection instruments were validated for use in the study. In addition, a back and forth translation of the questionnaire was done from English to Twi (the local language) and vice versa. This was to ensure that the exact meaning of words was conveyed in both languages.

2.7 PROCEDURE

Quantitative (structured one-on-one interviews) and qualitative (semi-structured one-on-one interviews) data were collected over a six month period. The quantitative data collection process for 200 hundred participants per study site took place concurrently over the first three months. A maximum of three clinic days per week were used for the interviews with an average of thirty minutes used to fully assess each participant sampled for the study.

Patients who expressed interest in being part of the qualitative research where they would have the opportunity to give detailed information about sections of the questionnaire were interviewed in the next three months. Such participants were sampled and randomly assigned to three (3) groups of fifteen for the one-on-one semi-structured interview sessions.

The first set of qualitative interviews conducted was about a thirty (30) minute semi-structured one- on-one interview with the hypertensive patients which focused on spirituality/religiosity. The interview guide consisted of five (5) major areas developed by the researcher to evaluate the role spirituality/religiosity played for hypertensive patients in coping with the chronic condition as well influencing the level of medication adherence behaviour.

Participants were asked about interview themes to cover the general use of spirituality/religiosity in relation to health (“Do you think there is any interaction between spirituality/religiosity and chronic illness, why do you think so? Can you tell me about a specific time when spiritual or religious beliefs influenced a decision you made

concerning your health?”), in relation to having hypertension (“In what ways do your spirituality/religiosity influence how you deal with having the disease hypertension?” and in relation to hypertensive medication adherence (“what about the influence of your spirituality/religiosity on how you take your hypertensive medications?”). Participants were also asked to talk about their spirituality/religiosity and healthcare (“Tell me about your view for spiritual/ religious care by healthcare providers. In what ways can your healthcare provider incorporate these beliefs and practices to improve upon your condition and medication adherence?”).

The next one-on-one qualitative interview aimed at assessing responses of participants in terms of complementary and alternative medicine use. In all participants were interviewed for about forty (40) minutes using semi-structured interview guide of nine (9) questions concentrating on themes such as CAM use before and after diagnosis of hypertension (“Tell me about the types of CAM use before and after being diagnosed as hypertensive”), rational (“What are the main reasons for using these therapies before and after your diagnosis?”), sources (“Who advises you on the use of this therapy?” and “Where do you get it from?”), beliefs (“To what extent do you believe in the effectiveness of this remedy in relation to your hypertensive condition or otherwise?”), adherence behaviour (“Does your use of these therapies have any effect on how you take the medicines your doctor has prescribed for you? Explain your answer”), adverse effects (“Are you aware or have you experienced any side-effects?”), disclosure to healthcare professionals (“Is your doctor or any of your healthcare providers aware of your use of this therapy? What are your reasons for your answer?”), and recommendation for

healthcare (“Can your doctor or any healthcare professionals play any role in advising you on the use of alternative medicine, how?”).

An exploratory interaction assessing the views of 15 participants on adherence behaviour was guided and covered by a range of five (5) questions based on themes around general medication use issues (“Is there anything about your medications you don’t like?”), its relation with medication adherence (“Why does this pose a problem to the management of your hypertensive condition?”) and recommendations for improved adherence behaviour (“In your view, what are the possible best ways to solve these problems you stated earlier?”).

All one-on-one qualitative interviews were conducted in private rooms in English by the researcher and trained research assistant, audio-taped, and then fully transcribed.

Chapter 3

QUANTITATIVE RESULTS

The key results from the quantitative phase of this study are presented in this chapter. The findings reported in text and illustrative tables show both descriptive and inferential analysis of the eight objectives guiding this study:

1. To assess the level of adherence among the study participants.
2. To assess patient's locus of control and how it relates with the rate of adherence to pharmacotherapy.
3. To examine spirituality/religiosity as correlates of adherence to anti-hypertensive medications.
4. To determine possible role of the emotional state of non-adherent patients to pharmacotherapy.
5. To evaluate the role of CAM use, cost of prescribed medications and affordability of anti-hypertensive medications on adherence behaviour.
6. To assess the role of anti-hypertensive medication side effects on medication non adherence while taking into consideration the role of LoC.
7. To predict the association between anti-hypertensive medication regimens of more than once-daily dosing frequency and adherence.
8. To establish possible relationships between demographic characteristics of patients and medication non adherence.

3.1 CHARACTERISTICS OF STUDY SAMPLE AND SUBSCALES

A summary of the socio-demographic characteristics of the study sample in relation to sex, age, marital status, educational level, employment status, average monthly income (Ghana cedis), place of residence, religious affiliation and the number of years of being diagnosed as hypertensive are presented in Table 3.1.1. Many of patients were females (62.75%), married (63.5%) and between the ages of 50 and 59 years (32.5%), who had attained a minimum of secondary school education, were Christians and had been diagnosed with hypertension for less than or equal to 10 years. Forty two percent (42%) of the patients had co-morbidities and diabetes accounted for 60% of these. The various scales (MHLC Form C, SPS, DASS, HMSEES and MMAS) showed good reliability coefficients (Cronbach's alpha) when used in this study (Table 3.1.2).

Table 3.1.1: Socio-demographic characteristics of study participants

Variable	Frequency	Percentage
Sex		
Male	149	37.25
Female	251	62.75
Age		
< 20	1	0.25
20 - 29	12	3.00
30 - 39	20	5.00
40 - 49	71	17.75
50 - 59	130	32.50
60 - 69	105	26.25
≥ 70	61	15.25
Marital status		
Single	39	9.75
Married	254	63.50
Widowed	73	18.25
Divorced/separated	25	6.25
Co-habiting	9	2.25
Education		
No formal	48	12.00
Primary	33	8.25
Secondary	217	54.25
Tertiary	102	25.50

Variable	Frequency	Percentage
Employment status		
Full time	92	23.00
Part time	23	5.75
Self employed	133	33.25
Unemployed	152	38.00
Average monthly income (Ghana cedis)		
0 - 500	8	2.00
51 - 100	45	11.25
101 - 500	81	20.25
501 - 1000	54	13.50
1001 – 2000	10	2.50
2000+	20	5.00
Others	182	45.50
Place of residence		
Rural	69	17.25
Urban	331	82.75
Religious affiliation		
Christian	358	89.50
Muslim	20	5.00
African Traditional Religion	4	1.00
Other	18	4.50
Number of years of having hypertension		
≤ 10 years	318	79.50
11 – 20 years	49	12.25
21 – 30 years	20	5.00
31 – 40 years	12	3.00
41 – 50 years	1	0.25

Socio-demographic frequency distribution (N=400).

Table 3.1.2: Characteristics of subscales

Subscale	Number of items	Reliability coefficient	Average inter-item covariance
MHLC Form C	18	0.898	0.882
SPS	10	0.878	0.351
DASS	21	0.794	0.103
HMSEES	18	0.801	0.225
MMAS	8	0.793	0.511

The various scales used in this study had reliability coefficients above 0.75.

3.2 LOCUS OF CONTROL AND MEDICATION ADHERENCE.

The results presented address the specific objective: *To assess the locus of control of patients and how it relates with the rate of adherence to pharmacotherapy.* Locus of control (Table 3.2.1.1) and medication adherence (Table 3.2.2.1) of study participants were assessed using the MHLC Scale Form C and the Morinsky Medication Adherence Scale respectively.

3.2.1 Locus of Control

The Table 3.2.1.1 describes the characteristics of the study sample (mean and standard deviations; N=400) in relation to internal and external LoC. Variations in internal and external LoC were minimal indicating a mixed LoC. Though patients demonstrated a mixed internal and external LoC orientation, an item analysis of the MHLC scale showing high scores in ‘strong agreement’ for external and internal LoC indicated that, responses were skewed towards externality particularly “doctors” (Table 3.2.1.2). Results of chi square test for LoC, sex and education are shown in Table 3.2.1.3. Comparing LoC with sex was remarkable for internal and external LoC while LoC with education was significant for external LoC and not internal LoC.

Table 3.2.1.1: LoC Characteristics of study participants (N=400)

Variable	Mean	Standard deviation
LoC Internal	1.54	0.499
LoC External	1.50	0.501

The study participants showed a blend of both internal and external LoC because of the minimum deviation from the means.

Table 3.2.1.2: Item analysis of HLoC scale indicating high scores for external and internal LoC.

Item	Description	Percentage
External		
3	<i>If I see my doctor regularly, I am less likely to have problems with my hypertension.</i>	65.75
5	<i>Whenever my hypertension worsens, I should consult a medically trained professional.</i>	73.75
14	<i>Following doctor's orders to the letter is the best way to keep my hypertension from getting any worse.</i>	70.50
18	<i>The type of help I receive from other people determines how soon my hypertension improves.</i>	31.25
Internal		
1	<i>If my hypertension worsens, it is my own behaviour which determines how soon I will feel better again.</i>	42.36
6	<i>I am directly responsible for my hypertension getting better or worse.</i>	39.25
17	<i>If my hypertension takes a turn for the worse, it is because I have not been taking proper care of myself.</i>	43.0

Though patients demonstrated a mixed internal and external LoC orientation, Table 3.2.1.2 shows skewness towards externality particularly “doctors”.

Table 3.2.1.3: Comparing LoC with sex and educational level.

LoC	Sex		Educational level	
	Male (%)	Female (%)	Higher (%)	Lower (%)
High internal	13.50	34.75	25.00	23.25
Low internal	23.75	28.00	27.50	24.25
Chi square	$X^2 = 12.9574, df = 1, p = 0.0003$		$X^2 = 4.5526, df = 1, p = 0.0329$	
High external	13.50	32.75	21.50	24.75
Low external	23.75	30.00	31.00	22.75
Chi square	$X^2 = 8.9369, df = 1, p = 0.0028$		$X^2 = 0.0273, df = 1, p = 0.8687$	

$p < 0.05$. Higher education = senior secondary and tertiary; Lower education = primary and junior secondary.

3.2.2 Medication adherence

Medication adherence was assessed using the MMAS and presented in Table 3.2.2.1. The result in Table 3.2.2.2 illustrates that 93.25% hypertensive patients poorly adhered to their medications. They had ever cut back or stopped taking their medication without telling the doctor because they felt worse when they took it, or stopped taking the medicine when they felt their blood pressure was under control.

Table 3.2.2.1: Frequency distribution for medication adherence

Question	Yes		No	
	Freq.	N (%)	Freq.	N (%)
1. Do you sometimes forget to take your hypertension medications?	282	(70.5)	118	(29.5)
2. Over the past two weeks, were there any days when you did not take your hypertension medicine?	328	(82.0)	72	(18.0)
3. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?	341	(85.25)	59	(14.75)
4. When you travel or leave home, do you sometimes forget to bring along your medications?	327	(81.75)	73	(18.25)
5. Did you take your high blood pressure medicine yesterday?	335	(83.75)	65	(16.25)
6. When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?	340	(85.0)	60	(15)
7. Do you ever feel hassled about sticking to your blood pressure treatment plan?	337	(84.25)	63	(15.75)
8. How often do you have difficulty remembering to take all your medications?	Freq.		Percentage	
○ Never/Rarely	6		1.50	
○ Once in a while	6		1.50	
○ Sometimes	34		8.50	
○ Usually	101		25.25	
○ All the time	253		63.25	

Table 3.2.2.2 Categorization of medication adherence

Level of adherence	Frequency	Percentage
Low	323	80.75
Moderate	50	12.50
High	27	6.75
Poor	373	93.25
High	27	6.75

Low and moderate adherence have been combined as poor adherence. Table 3.2.2.2 shows the majority of participants poorly adhered to their anti-hypertensive medications.

3.2.3 Relating LoC with medication non- adherence

The logistic regression model results are presented in Table 3.2.3. After controlling for demographic factors, participants with low internal LoC had a 3.12 greater likelihood of non-adherence than those with high internal LoC. Likewise, participants exhibiting low internal LoC had 5.64 times greater odds of being non-adherent than participants with low external LoC. Participants scoring high on the “others” subscale of external LoC were 5.26 times more likely not to adherence than their counterparts with low “others”.

Table 3.2.3: Logistic regression model for LoC and medication non-adherence behaviour

Variable	Odds ratio	95% CI	p value
Internal LoC: Low (ref: High)	3.12	1.05 – 9.09	0.039
External LoC: Low (ref: High)	1.56	0.47 – 5.00	0.468
Low internal (ref: Low external)	5.64	1.14 – 27.87	0.034
External “others”: High (ref: Low)	5.26	1.75 – 16.67	0.003
External “doctors”: High (ref: Low)	1.56	0.67 – 3.70	0.304
External “chance”: High (ref: Low)	1.61	0.66 – 3.92	0.296

Adjusted results after the effects of demographic and clinical characteristics were controlled.

3.3: SPIRITUALITY/ RELIGIOSITY AND MEDICATION ADHERENCE

This section shows the quantitative results of spiritual and religious beliefs of participants and how they relate with medication adherence. It addresses specific objective 3: *To examine spirituality/religiosity as correlates of adherence to anti-hypertensive medications.*

3.3.1 Spirituality

The level of spirituality of study participants was measured with the SPS and reported in Table 3.3.1.1. On the whole, most patients frequently engaged in spiritually related activities which formed significant aspects of their daily lives. The relationship between spirituality and socio-demographic characteristics (age, sex, marital status and education) was not significance (Table 3.3.1.2). A cross tabulation of spirituality and the number of years patients have had hypertension indicates a trend of increasing spirituality with increasing number of hypertensive years (Table 3.3.1.3).

Table 3.3.1.1 Frequency distribution for spirituality using SPS

Statement	Not at all	About once a year	About once a month	About once a week	About once a day
1. In talking with family and friends, how often do you mention spiritual matters	32	10	39	121	198
2. How often do you share with others the problems and joys of living according to your spiritual beliefs	12	13	31	144	200
3. How often do you read spiritually-related material	45	14	11	89	241
4. How often do you engage in private prayer and meditation	6	8	14	57	315
5. Forgiveness is an important part of my spirituality	6	7	12	52	323
6. I seek spiritual guidance in making decisions in my everyday life	7	7	21	57	308
7. My spirituality is a significant part of my life	8	6	8	59	319
8. I frequently feel very close to God or 'a higher power' in prayer, during public worship or at important moments in my life	8	12	23	43	314
9. My spiritual views have had an influence upon my life	12	4	10	84	290
10. My spirituality is especially important to me because it answers many questions about the meaning of life	6	4	10	53	327

Table 3.3.1.2: Relating spirituality and socio-demographic characteristics

Variable	X²	df	p value
Age	6.343	4	0.175
Sex	1.207	1	0.272
Marital status	0.913	4	0.923
Educational level	6.602	4	0.830

At $p < 0.05$, there was no significant association between spirituality and socio-demographic characteristics of study participants.

Table 3.3.1.3: Years of having hypertension and spirituality

Years	Low spirituality (n)	High spirituality (n)
≤ 10 years	102	219
11 – 20 years	16	32
21 – 30 years	5	13
31 – 40 years	3	9
41 – 50 years	0	1

$X^2 = 0.896$, $df = 4$, $p = 0.925$ at $p < 0.05$

Values below the mean SPS score constitute low spirituality and those above the mean SPS score, high spirituality. The association between spirituality and hypertensive years was not significant although spirituality seemed to increase with a rise in the number of years of being hypertensive.

3.3.2: Organized and non-organized religiosity

Most patients (89%) once or more than once a week attended church or other religious meetings. Likewise a high proportion (62%) daily or more than once a day engaged in non-organized religious activities like prayer, meditation or Bible study. There was no significant relationship between spirituality and religiosity (Table 3.3.2.1).

Table 3.3.2.1: Relating spirituality (SPS) with religiosity (ORA/ NORA)

Variable	X²	df	p value
ORA	4.801	1	0.91
NORA	1.409	1	0.494

At $p < 0.05$ spirituality did not significantly relate with organized and non-organized religious activities.

3.3.3 Spirituality/ religiosity and medication adherence

The relationship between spirituality, religiosity and medication non-adherence was measured with a chi-square test. After adjusting for demographic characteristics and co-morbid health conditions, spirituality, but not religiosity, was associated with medication non-adherence, although patients exhibited high levels of both spirituality and religiosity at $p < 0.05$ (Tables 3.3.3.1, 3.3.3.2, 3.3.3.3).

Table 3.3.3.1: Cross tabulation of medication adherence and spirituality

Medication adherence	Low Spirituality n(%)	High Spirituality n(%)
High	14 (51.85)	13 (38.15)
Poor	112 (30.03)	261 (69.97)

$\chi^2 = 5.558, df = 1, p = 0.018.$

The table shows a significant relationship between spirituality and medication non-adherence at $p > 0.05$. Low spirituality lies below the mean SPS score and high spirituality falls above the mean SPS score.

Table 3.3.3.2: Cross tabulation of medication adherence and organized religiosity

Medication adherence	Low ORA n(%)	High ORA n(%)
High	9 (33.33)	18 (66.67)
Poor	169 (45.31)	204 (54.69)

$\chi^2 = 1.494, df = 1, p = 0.474$

Values below the mean ORA score constitute low organized religiosity and those above the mean ORA score, high organized religiosity. A non-significant relationship between organized religiosity and medication non-adherence was observed at $p > 0.05$.

Table 3.3.3.3: Cross tabulation of medication adherence and non-organized religiosity

Medication adherence	Low NORA n (%)	High NORA n (%)
High	8 (29.63)	19 (70.37)
Poor	127 (34.05)	246 (65.95)

$\chi^2 = 0.222, df = 1, p = 0.895$

Low non-organized religiosity lies below the mean NORA score and high non-organized religiosity falls above the mean NORA score. The association between non-organized religiosity and medication non-adherence was not significant at $p < 0.05$.

Table 3.3.3.4: Logistic regression model for spirituality, organized and non-organized religiosity in relation to medication non-adherence behaviour

Variable	Odds ratio	95% confidence interval	<i>p</i> value
High spirituality (Ref: Low spirituality)	2.68	1.20 – 5.96	0.016
High ORA (Ref: Low ORA)	0.65	0.35 – 1.21	0.176
High NORA (Ref: Low NORA)	1.04	0.63 – 1.71	0.874

Spirituality, but not religiosity, was associated with medication non-adherence, although patients exhibited high levels of both spirituality and religiosity at $p < 0.05$.

3.4: EMOTIONAL SYMPTOMS (DEPRESSION, ANXIETY, STRESS) AND MEDICATION ADHERENCE

The following results address specific objective 4: *To determine possible effects of emotional state of non-adherent patients to pharmacotherapy adherence.*

Table 3.4.1 represents a chi-square test to establish a correlation between the symptoms associated with depression, anxiety and stress, and medication non-adherence. Moderate to extremely severe levels of anxiety, depression and stress symptoms were grouped as one because they merit clinical attention and qualify for possible management of anxiety, depression and stress respectively. The frequencies of these have been categorized as normal, mild, moderate, severe and extremely severe (Table 3.4.2).

Table 3.4.1: Relationship between emotional characteristics and medication non-adherence

Variable	Chi-square	df	p-value
Depression	0.004	1	0.950
Anxiety	3.887	1	0.421
Stress	5.936	1	0.037

At $p < 0.05$, stress and not depression and anxiety significantly related with medication non-adherence.

Table 3.4.2: Distribution of degree of symptoms of depression, anxiety and stress.

Emotional condition	Normal N (%)	Mild N (%)	Moderate N (%)	Severe N (%)	Extremely severe N (%)
Depression	358 (89.50)	25 (6.25)	12 (3.00)	4 (1.00)	1 (0.25)
Anxiety	129 (32.25)	46 (11.50)	140 (35.00)	44 (11.50)	41 (10.25)
Stress	259 (64.75)	59 (14.75)	52 (13.00)	26 (6.50)	4 (1.00)

A high number of patients experienced moderate to extremely severe symptoms of anxiety (225), followed by stress (82) and depression (17).

Table 3.4.3: Relating spirituality/religiosity with emotional (depression, anxiety, stress) symptoms experienced by hypertensive patients.

Variable	Depression		Anxiety		Stress	
	X²	p value	X²	p value	X²	p value
Spirituality	6.205	0.045	13.352	0.010	14.833	0.001
ORA	3.922	0.417	10.245	0.248	9.333	0.053
NORA	27.011	<0.001	8.798	0.360	3.220	0.522

$p < 0.05$

3.5: CAM USE, ANTI-HYPERTENSIVE MEDICATION AFFORDABILITY AND MEDICATION ADHERENCE.

This section of the chapter presents the quantitative outcome of the relationship between CAM use, perception on medication affordability and adherence. It addresses specific objective 5: *To evaluate the effect of CAM use, cost of prescribed medications and affordability of anti-hypertensive medications on adherence behaviour.*

3.5.1 Patterns of CAM use among study participants

Out of the 400 study participants, 78 (19.5%) reported using CAM with 65.38% of these people utilizing biological based therapies (BBT) such as herbal preparations, dandelion, moringa, garlic and bitter leaves. None of the participants were involved with energy therapies as presented in Table 3.5.1.1. In acquiring these biological based therapies, 37.25% obtained the products from farms or backyard gardens which may or may not belong to them and 21.57% purchased from the open market (Table 3.5.1.2). About 70% of participants had not disclosed their CAM use to the healthcare professionals managing their hypertension condition (Table 3.5.1.3). Fear and the lack of inquiry by these health professionals were the main reasons cited for non-disclosure (Table 3.5.1.4).

Table 3.5.1.1 Types of CAM use (n = 78)

CAM type	Frequency	Percentage
Alternative Medical Practice	16	20.51
Mind & Body interventions	10	12.82
Biological Based Therapies (BBT)	51	65.38
Manipulative & Body-based methods	1	1.28
Energy Therapies	0	0
Types of BBT (n=51)		
‘Bitter leaves’	2	3.92
Moringa	3	5.88
Garlic	5	9.80
Dandelion	4	7.84
Mahogany	3	5.88
Pear leaves	2	3.92
‘Nyame dua’ (God’s tree)	1	1.96
‘Tsotso’	1	1.96
Herbal mixtures	9	17.65
‘Bitter leaves’+ dandelion + moringa	7	13.73
Garlic + dandelion	6	11.76
Dandelion + moringa	5	9.80
Cotton plant	3	5.88

The BBTs were in varied dosage forms.

Table 3.5.1.2 Source of acquiring biological based therapies (n = 51)

Source of BBT	Frequency	Percentage
Farm/ Backyard garden	19	37.25
Purchase from:		
Market	11	21.57
Pharmacy	6	11.76
Herbalist	3	5.88
Gymnasium	3	5.88
General Clinic	2	3.92
Herbal Clinic	1	1.96
Hawkers	1	1.96
Church	1	1.96
Family/ friends	4	7.84

Table 3.5.1.3: Disclosure of CAM use by patients to their physicians (n = 78)

Disclosure status	Frequency	Percentage
Disclosed	24	30.77
Not disclosed	54	69.23

About 70% of CAM users had not revealed their CAM use to the physicians managing their hypertensive condition.

Table 3.5.1.4: Reasons for non-disclosure of CAM use (n = 54)

Reason	Frequency	Percentage
Fear	19	35.00%
Lack of inquiry	16	29.60%
Not necessary	15	27.80%
Just started CAM use	3	5.56%
Spiritual matter	1	1.85%

3.5.2 Acquisition and affordability of anti-hypertensive medication affordability

The ways by which study participants acquire (i.e. health insurance, self purchase or both) and view the degree of affordability of their medications are presented below.

Table 3.5.2: Distribution of medication acquisition and affordability (N = 400)

Variable	Frequency	(Percentage)
Nature of acquisition		
Health insurance only	194	48.50
Self only	80	20.00
Health insurance and self	125	31.25
Others	1	0.25
Medication affordability		
Very affordable	23	5.75

Variable	Frequency	(Percentage)
Quite affordable	49	12.25
Somehow affordable	59	14.75
Not so affordable	89	22.25
Unaffordable	180	45.00

About a half of the participants got their medications from health insurance, yet 67% of all participants reported difficulty with medication affordability.

3.5.3 Determinants of CAM use

The relationship between CAM use and socio-demographic variables, ability to afford medications and daily number of medication intake are presented in Tables 3.5.3.1. At $p < 0.05$, CAM use significantly associated with sex, and medication un-affordability. Males had 2.86 times greater odds of using CAM than females. Participants who had difficulty affording their medications had 3.85 times likelihood of CAM use than those who could afford their medicines. In addition, a significant relationship between CAM use and experiences of anti-hypertensive side effects was observed (Table 3.5.3.2). Place of residence, number of years of being hypertensive and number of medications did not significantly relate with CAM use.

Table 3.5.3.1: Logistic regression model for determinants of CAM use.

Variable	Odds ratio	95% C I	p value
Sex: Male/Female	2.86	1.48 – 5.52	0.002
Residence: urban / rural	0.96	0.45 – 2.04	0.913
Years of being hypertensive	1.02	0.98 – 1.07	0.253
Affordability/ un-affordability	3.85	1.15 – 12.5	0.029
Number of medications taken	0.97	0.73 – 1.29	0.853

$P < 0.05$.

Table 3.5.3.2: Relationship between experiences of anti-hypertensive medication side effects and CAM use.

Side effects	CAM use (%)	CAM non-use (%)
No/ Low	36.7	63.3
Moderate	15.6	84.4
High	55.5	44.8
Chi square	$X^2 = 25.378$, $df = 2$, $p < 0.0001$	

No = never, Low = rarely, Moderate = sometimes, High = very often and always.

At $p < 0.05$, a significant relationship was observed between side effects and the use of CAM.

3.5.4 CAM use and medication non-adherence

There was no significant association between the use of CAM and medication non-adherence [OR = 2.22 (0.70 – 7.14) $p = 0.176$].

3.6: ANTI-HYPERTENSIVE MEDICATION SIDE EFFECT AND MEDICATION ADHERENCE.

The results presented address specific objective 6: *To assess the role of anti-hypertensive medication side effects on medication non adherence while taking into consideration the role of LoC.*

The distribution of the degrees of experiences of side effects to anti-hypertensive medications is presented in Table 3.6.1.1. These experiences are categorized as no/low, moderate and high (Table 3.6.1.2). Table 3.6.1.3 show the sex differences with regards to the side effects. Generally females reported experiencing more side effects with significant associations observed between females and fatigue, headache, depressed mood, diarrhoea and flu-like symptoms.

Table 3.6.1.1 Distribution of degree of experiences of side effects to anti-hypertensive medications.

Side effect	Never n (%)	Rarely n (%)	Sometimes n (%)	Very often n (%)	Always n (%)
Dizziness	179 (44.75)	61 (15.25)	124 (31.00)	31 (7.75)	5 (1.25)
Fatigue	79 (19.75)	29 (7.25)	128 (32.00)	112 (28.00)	52 (13.00)
Cough	197 (49.25)	80 (20.00)	93 (23.25)	24 (6.00)	6 (1.50)
Headache	89 (22.25)	50 (12.50)	186 (46.50)	50 (12.50)	25 (6.25)
Confusion	201 (50.25)	102 (25.50)	88 (22.00)	8 (2.00)	1 (0.25)
Depressed mood	189 (47.25)	108 (27.00)	85 (21.25)	16 (4.00)	2 (0.50)

Side effect	Never n (%)	Rarely n (%)	Sometimes n (%)	Very often n (%)	Always n (%)
Chest pain	220 (55.00)	56 (14.00)	89 (22.25)	27 (6.75)	8 (2.00)
Difficulty breathing	251 (62.75)	49 (12.25)	75 (18.75)	17 (4.25)	8 (2.00)
Fainting	327 (81.75)	35 (8.75)	24 (6.00)	10 (2.50)	4 (1.00)
Constipation	142 (35.50)	97 (24.25)	117 (29.25)	28 (7.00)	16 (4.00)
Diarrhea	206 (51.50)	105 (26.25)	77 (19.25)	8 (2.00)	4 (1.00)
Flu-like symptoms	156 (39.00)	130 (32.50)	80 (20.00)	25 (6.25)	9 (2.25)
Swelling in ankle/ feet	206 (51.50)	51 (12.75)	77 (19.25)	47 (11.25)	19 (4.75)
Increased frequency of urination	82 (20.50)	34 (8.50)	99 (24.75)	104 (26.00)	81 (20.25)
Reduced sex drive	86 (21.50)	47 (11.75)	105 (26.25)	56 (14.00)	106 (26.50)
Erectile dysfunction (impotence)	335 (83.75)	19 (4.75)	19 (4.75)	14 (3.50)	13 (3.25)
Rash	278 (69.50)	75 (18.75)	37 (9.25)	9 (2.25)	1 (0.25)
Difficulty sleeping	167 (41.75)	50 (12.50)	111 (27.75)	36 (9.00)	36 (9.00)

Table 3.6.1.2: Experiences of side effects and anti-hypertensive medications

Experience of medication side effects	Number	Percentage
No/ Low	159	39.75
Moderate	212	53.00
High	29	7.25

No = never, Low = rarely, Moderate = sometimes, High = very often and always.

60.25% of participants experience moderate to high side effects associated with their anti-hypertensive medications.

Table 3.6.1.3 Categorization of experiences of side effects to anti-hypertensive medications by sex.

Sex	Never	Rarely	Sometimes	Very often	Always
	<i>Dizziness %</i>				
Male	47.0	12.8	33.6	4.7	2.0
Female	43.4	16.7	29.5	9.6	0.8
X ² test	$X^2=7.424, df=4, p=0.115$				
	<i>Fatigue %</i>				
Male	26.2	6.7	32.9	26.2	8.1
Female	15.9	7.6	31.5	29.1	15.9
X ² test	$X^2=9.867, df=4, p=0.043$				
	<i>Cough %</i>				
Male	54.4	16.8	23.5	4.0	1.3
Female	46.2	21.9	23.1	7.2	1.6
X ² test	$X^2=4.078, df=4, p=0.369$				
	<i>Headache %</i>				
Male	26.8	17.4	44.3	8.7	2.7
Female	19.5	9.6	47.8	14.7	8.4
X ² test	$X^2=14.693, df=4, p=0.005$				
	<i>Confusion %</i>				
Male	56.4	23.5	18.1	2.0	0.0
Female	46.6	26.7	24.3	2.0	0.4
X ² test	$X^2=4.367, df=4, p=0.359$				
	<i>Depressed mood %</i>				
Male	55.7	18.1	19.5	6.7	0.0
Female	42.2	32.3	22.3	2.4	0.8
X ² test	$X^2=16.434, df=4, p=0.002$				
	<i>Chest pain %</i>				
Male	54.4	17.4	20.1	6.7	1.3
Female	55.4	12.0	23.5	6.8	2.4
X ² test	$X^2=3.028, df=4, p=0.553$				
	<i>Difficulty breathing</i>				
Male	64.4	12.1	20.8	1.3	1.3
Female	61.8	12.4	17.5	6.0	2.4
X ² test	$X^2=5.885, df=4, p=0.208$				
	<i>Fainting %</i>				
Male	82.6	10.1	3.4	2.7	1.3
Female	81.3	8.0	7.6	2.4	0.8
X ² test	$X^2=3.567, df=4, p=0.468$				
	<i>Constipation %</i>				
Male	40.9	18.8	31.5	6.0	2.7
Female	32.3	27.5	27.9	7.6	4.8
X ² test	$X^2=6.663, df=4, p=0.155$				
	<i>Diarrhoea %</i>				
Male	61.7	18.1	16.8	0.7	2.7

Sex	Never	Rarely	Sometimes	Very often	Always
Female X ² test	45.4 <i>X²=20.405,df=4,p<0.001</i>	31.1	20.7	2.8	0.0
Male	<i>Flu-like symptoms</i>				
Female X ² test	47.7 33.9 <i>X²=17.782,df=4,p=0.001</i>	22.8 38.2	22.1 18.7	7.4 5.6	0.0 3.6
Male	<i>Swelling %</i>				
Female X ² test	57.7 47.8 <i>X²=5.769,df=4, p=0.217</i>	8.7 15.1	16.8 20.7	11.4 12.0	5.4 4.4
Male	<i>Increased urination</i>				
Female X ² test	23.5 18.7 <i>X²=1.752,df=4, p=0.781</i>	8.7 8.4	22.8 25.9	24.2 27.1	20.8 19.9
Male	<i>Reduced sex drive</i>				
Female X ² test	25.5 19.1 <i>X²=3.624,df=4, p=0.459</i>	10.1 12.7	25.2 26.7	11.4 15.5	27.5 25.9
Male	<i>Erectile dysfunction</i>				
Female X ² test	56.4 100 <i>X²=85.206,df=4,p<0.001</i>	12.8 0.0	12.8 0.0	9.4 0.0	8.7 0.0
Male	<i>Rash</i>				
Female X ² test	67.8 70.5 <i>X²=1.950,df=4, p=0.745</i>	18.8 18.7	11.4 8.0	2.0 2.4	0.0 0.4
Male	<i>Difficulty sleeping</i>				
Female X ² test	43.0 41.0 <i>X²=0.847,df=4, p=0.932</i>	12.8 12.4	25.5 29.1	8.7 9.2	10.1 8.4

Table 3.6.1.4: LoC and side effects in relation to medication non-adherence behaviour

Variable	Odds ratio	95% CI	p value
Moderate/ high SE (Ref: low SE)	4.84	1.07 – 1.85	0.04
SE and external Loc (Ref:SE and internal Loc)	2.4	0.35 – 16.31	<0.001

p < 0.05

3.7 DOSING FREQUENCY AND MEDICATION ADHERENCE

Specific objective 7: *To predict the association between anti-hypertensive medication regimens of more than once-daily dosing and adherence.*

Table 3.7.1: Dosing frequency of medications

Question	Frequency	Percentage
What is the total number of medicines you take in a day?		
1	121	30.25
2	156	39.00
3	69	17.25
4	29	7.25
5 and more	25	6.25
How many times in a day do you take your medicines?		
1	223	55.75
2	146	36.50
3	25	6.25
4	6	1.59

Generally, there was an inverse relationship between the number of hypertensive patients and the total number of anti-hypertensive medications taken daily and 39% of patients took a maximum of two tablets. Similarly, patient numbers decreased with an increase in the frequency of daily medication dosing with the majority of patients having a once daily dosing.

Table 3.7.2: Relationship between anti-hypertensive medication frequency of dosing and medication non-adherence

Variable	X²	df	p value
Number of medicines	5.396	4	0.249
Number of times taken daily	496.20	3	<0.0001

While the number of times per day for taking medicines significantly correlated with non-adherence, the number of medicines taken daily did not.

3.8 SOCIO-DEMOGRAPHIC CHARACTERISTICS AND MEDICATION ADHERENCE

The final section of this chapter shows the results addressing specific objective 8: *To establish possible relationships between demographic characteristics of patients and medication non adherence.*

A correlation between the socio-demographic characteristics (sex, age, residence and religion) using a chi-square correlation test are presented in Table 3.8.1.

Table 3.8.1: Relationship between socio-demographic characteristics and medication adherence

Variable	X²	df	p value
Sex	1.589	1	0.208
Age	7.373	4	0.288
Place of residence	0.033	1	0.857
Religious affiliation	8.964	3	0.111

p < 0.05

Chapter 4

QUALITATIVE RESULTS

In the qualitative phase of this study, the responses of hypertensive patients were utilized to explore their perception about their belief systems, complementary and alternative therapies, and pharmacologically related issues. The purpose for using the qualitative study was to triangulate and complement the quantitative phase of this study. Thematic content analysis was used to analyze the data. Statements which were irrelevant to the research question were not included in the report. The themes which emerged were the general impressions of the patients which originated from the interviews a posteriori.

4.1: RESULTS OF IN-DEPTH INTERVIEWS ON SPIRITUALITY/ RELIGIOSITY (S/R) AND HEALTH

Four themes emerged from the analysis (Table 4.1). These are *conceptualizing illness*, *supernatural healing*, *medication non-adherence* and *holistic healthcare*.

4.1.1 Conceptualizing illness:

This theme addresses participants' perceptions about the etiology of illness. Patients were clear that a relationship exists between spiritual/ religious beliefs and having hypertension. Their meaning of this relationship stems from individual beliefs and personal supernatural experiences with particular reference made to the existence of a spiritual world.

Generally participant's conception of illness was explained within the broader Ghanaian context of spiritual determinism as illustrated in the responses below:

“There is a spiritual connotation with illness and health. I had a vision where God revealed it to me before it happened. I was spending a lot of time praying and one day I had a vision; I was on the moon and I heard a voice say the first tree you see is your cure although at that time I was not sick. You see, man is both spirit and flesh and we have linkage in the spiritual realm and anybody who says there is nothing of that sort is fooling himself. There is a spiritual connotation with illness and health” (R8: male).

“When I had the hypertension I was sure it was a spiritual problem until the doctor told me it wasn’t. But I still believe there is a link between my illness and spirituality” (R11: female).

Yet some patients who initially held on to the belief of this association of spiritual manipulation and their hypertension had this conviction debunked:

“Initially I was thinking that hypertension was caused by spiritual forces because when I was not feeling well, I was having strange dreams so I thought there may be some spiritual thing backing this illness but later I realized it was not like that.” (R2: female).

Similarly, a male respondent said

“Previously I had those beliefs that hypertension was spiritual but now I don’t because we have the body and the spirit. When you fall sick it affects your body and that’s not spiritual. Because when you are sick it is physical. Sometimes people

believe sickness is linked with spirituality but now I don't because we have the spiritual entity and the physical entity. What we take in as physical is what gives us diseases just like you will never see a spirit being falling sick. But the body consists of a body and the spirit which should not be linked as people think.” (R6: male)

The participants who identified with the influence of S/R on illness proposed three reasons as the causative factors: sin of Adam and Eve, witchcraft and a marred relationship with God.

Adam and Eve's sin: Apprehension was expressed concerning the role played by biblical figures like Adam and Eve in the genesis of illness. A female patient believed that

“Illness came about when our first parents – Adam and Eve, sinned. So that link between sin and sickness has followed us till now.” (R13: female).

Witchcraft: Declaring firming, a female participant said,

“Some people are wizards and witches who want to destroy me. But Jesus will deliver me from this sickness.” (R15: female).

Marred relationship with God: Patients described messed up relationships with God as causing ill health and the need to build closer connections to revert this problem:

“I think there is a link between spirituality and hypertension because focusing on God when you are sick brings you nearer to God. When there are no problems you don't look up to God but the moment you have a problem it makes you sit up to

pray and if you only have the faith your God will hear you. Likewise sickness like hypertension, you fall sick, you go to the hospital, you take your medicines, but we do our part and God does the rest.” (R4: female).

“We fall sick because we are far away from God. Hypertension is also like that but God hears us when in trouble so when you get closer to him you tell him all your problems and He listens.” (R5: male).

4.1.2: Supernatural healing:

Patients were clear that spirituality/religiosity has a good influence on the hypertension healing process. They felt that faith and prayer were imperative to cure or achieve better health outcomes when one has been diagnosed with hypertension as demonstrated below:

Personal faith: Faith can influence the healing of hypertension because,

“I pray and believe God that the disease will eventually go.” (R2: female).

Likewise, *“I have positive thoughts about the disease. If only I will believe and ask God to heal me, God will surely heal me.” (R4: female).*

Prayer: Participants also placed emphasis on prayer in the healing process.

“I pray and believe God that the disease will eventually go” (R2: female).

“I always pray for myself and tell myself I should not be sick from hypertension and I noticed that much of the things I ask for happens. In my case I recovered quickly

because I have a team of friends including my wife who were praying for me.” (R7: male).

“Through constant prayers I will be helped spiritually to sustain my health.” (R13: female).

4.1.3: Medication adherence:

Adhering to conventional anti-hypertensive medications varied based on different ways in which patients placed prominence on spirituality and religiosity. Among participants, the concept of complementing medication with S/R and alternating medication intake with S/R seemed to play important roles in the management of hypertension.

Complementing medication with S/R: Patients effectively combined adherence with medication and prayer. This behaviour was based on the belief that the two (i.e. medication and prayer) will work synergistically for the efficient healing of hypertension. Two participants expressed this view as follows:

“I know God can do all things but I still take my medicine and ask God to heal me through my medicine.” (R4: female).

“I take my medication seriously and on time. Luckily my wife is a nurse and she applied both spirituality and medical practice. I attend a spiritual clinic and ask for deliverance and healing from Jesus Christ” (R7: male).

Alternating medication intake with S/R: Non-adherence to medications due to the influence of S/R was reported. In this case, participants had sometimes stopped taking their medications and relied exclusively on spiritual interventions with the intention of seeking permanent cure for hypertension. Admitting this view, participants stated,

“It’s been quite a number of occasions. Personally I was surprised I took those decisions. There were times I believed I could be healed without taking the drugs. That it’s not my portion to be taking the drugs. So I stopped taking the drugs for a couple of days and I think perhaps my faith was just hanging in the air so it was not working for me. I did not go to a pastor or church programme to be told to do so. I was only taking hold of the fact that I’m a Christian and that it should work that way. I was not backing it with any extraordinary biblical references. I was only working with the belief.” (R1: male).

“I pray a lot concerning my sickness. I actually stopped attending hospital and pray about my hypertension. However I got worse and had to restart seeing my doctor. But I still like the prayer than me taking the medicine. I take the drugs but sometimes I pray in place of the medicine.” (R12: female).

Another male participant who had a spiritual revelation about his herbs said,

“The time it takes for my pressure to come down with the medicine from the hospital is not as rapid as the herb that I use but because of the scarcity around here, I sometimes rely on the clinical one.” (R8: male).

4.1.4 Holistic healthcare:

Most patients acknowledged the importance of integrating spiritual and religious beliefs in healthcare and specifically in hypertension management. They encouraged health personnel to consider the role of spirituality when treating them because of the belief that God heals patients through their health providers:

“As human as we are, though we believe in God and our religions, we also are scared at times. We believe in God alright but very few of us would hold on to God till the end. You believe in God alright but if you fail to take your medications, there is another part of you that tells you are not doing the right thing. There are very few people who would just believe in God and then hold on believing that their condition would turn out otherwise. So I think in as much as I would want to tow the line of religiosity, I also would be happy to have the doctor advice me on adherence and I will take it because it is said that ‘doctor nesa yarea so Nyame nam no so na osa yarea’. So patients like me believe in God but also believe the drugs work.” (R1: male).

“Those treating us should believe in God and believe that it’s God that heals. Though they can play their part, if God is not involved it will be in vain.” (R2: female).

“Medical providers should influence us to be more spiritual. Taking the drugs and not being committed to God can lead one to behave in ways that may worsen the

condition. Spiritual people are usually righteous and will take care of themselves and live lives that will help improve their condition.” (R3: female).

Table 4.1: Coding Frame for spirituality/ religiosity and medication adherence

Thematic content analysis using inductive reasoning

This analyzed in-depth interview addresses part of specific objective 2.
 Specific objective 2: *To examine spirituality/religiosity as correlates of adherence to anti-hypertensive medications.*

Organizing Theme	Codes	Description and definition of code	Quote(s)
Conceptualizing illness	1.1 Co-existence of S/R and illness	1.1.1 The existence of a relationship between S/R and illness	<p>“To an extent. I don’t really believe it, unless it is those very terrible situations. But for most illnesses I think it has to do with we identifying the root cause but there is some amount of relationship” (R1: male)</p> <p>“There is a spiritual connotation with illness and health. I had a vision where God revealed it to me before it happened. I was spending a lot of time praying and one day I had a vision..... You see, man is both spirit and flesh and we have linkage in the spiritual realm and anybody who says there is nothing of that sort is fooling himself. There is a spiritual connotation with illness and health ” (R8: male)</p> <p>“When I had the hypertension I was sure it was a spiritual problem until the doctor told me it wasn’t. But I still believe there is a link between my illness and spirituality” (R11: female)</p> <p>“Initially I was thinking that hypertension was caused by spiritual forces because when I was not feeling well, I was having strange dreams so I thought there may be some spiritual thing backing this illness but later I realized it was not like that’ (R2: female)</p> <p>“Previously I had those beliefs that hypertension was spiritual but now I don’t because we have the body</p>
		1.1.2 Initial thoughts	

Organizing Theme	Codes	Description and definition of code	Quote(s)
	1.2 Reasons for S/R and illness	<p>1.2.1 Sin of Adam and Eve</p> <p>1.2.2 Witchcraft</p> <p>1.2.3 Marred relationship with God</p>	<p>and the spirit. When you fall sick it affects your body and that's not spiritual. Because when you are sick it is physical. Sometimes people believe sickness is linked with spirituality but now I don't because we have the spiritual entity and the physical entity. What we take in as physical is what gives us diseases just like you will never see a spirit being falling sick. But the body consists of a body and the spirit which should not be linked as people think" (<i>R6: male</i>)</p> <p>"Illness came about when our first parents – Adam and Eve, sinned. So that link between sin and sickness has followed us till now" (<i>R13: female</i>)</p> <p>"Some people are wizards and witches who want to destroy me. But Jesus will deliver me from this sickness" (<i>R15: female</i>)</p> <p>"I think there is a link between spirituality and hypertension because focusing on God when you are sick brings you nearer to God. When there are no problems you don't look up to God but the moment you have a problem it makes you sit up to pray and if you only have the faith your God will here you. Likewise sickness like hypertension, you fall sick, you go to the hospital, you take your medicines, but we do our part and God does the rest" (<i>R4: female</i>)</p> <p>"We fall sick because we are far away from God. Hypertension is also like that but God hears us when in trouble so when you get closer to him you tell him all your problems and He listens" (<i>R5: male</i>)</p>
Supernatural healing	2.1 Prayer	<p>2.1.1 Emphasis of prayer in the healing process</p> <p>2.1.2 The event where one's level of faith</p>	<p>"I pray and believe God that the disease will eventually go" (<i>R2: female</i>)</p> <p>"I have positive thoughts about the disease. If only I will believe and ask God to heal me God will surely heal me" (<i>R4: female</i>)</p>

Organizing Theme	Codes	Description and definition of code	Quote(s)
		can influence the healing of hypertension	<p>“I pray and believe God that the disease will eventually go” (<i>R2: female</i>)</p> <p>“I always pray for myself and tell myself I should not be sick from hypertension and I noticed that much of the things I ask for happens. In my case I recovered quickly because I have a team of friends including my wife who were praying for me.” (<i>R7: male</i>)</p> <p>“Through constant prayers I will be helped spiritually to sustain my health.” (<i>R13: female</i>)</p>
Medication adherence	<p>3.1 Complementing medication with S/R</p> <p>3.2 Alternating medication intake with S/R</p>	<p>3.1.1 The effective combination of both adherence to medication and prayer</p> <p>3.2.1 Non-adherence to medications due to the influence of religion</p>	<p>“I know God can do all things but I still take my medicine and ask God to heal me through my medicine.” (<i>R4: female</i>)</p> <p>“I take my medication seriously and on time. Luckily my wife is a nurse and she applied both spirituality and medical practice. I attend a spiritual clinic and ask for deliverance and healing from Jesus Christ” (<i>R7: male</i>)</p> <p>“It’s been quite a number of occasions. Personally I was surprised I took those decisions. There were times I believed I could be healed without taking the drugs. That it’s not my portion to be taking the drugs. So I stopped taking the drugs for a couple of days and I think perhaps my faith was just hanging in the air so it was not working for me. I did not go to a pastor or church program to be told to do so. I was only taking hold of the fact that I’m a Christian and that it should work that way. I was not backing it with any extraordinary biblical references. I was only working with the belief.” (<i>R1: male</i>)</p> <p>“The time it takes for my pressure to come down with the medicine from the hospital is not as rapid as the herb that I use but because of the scarcity around here, I sometimes rely on the clinical one.” (<i>R8: male</i>)</p> <p>“I pray a lot concerning my sickness. I actually stopped attending hospital and pray about my hypertension. However I got worse and had to restart</p>

Organizing Theme	Codes	Description and definition of code	Quote(s)
			seeing my doctor. But I still like the prayer than me taking the medicine. I take the drugs but sometimes I pray in place of the medicine.” (R12: female)
Holistic healthcare	Invitation for policy direction	Encouraging health personnel to consider adding spirituality to the management of hypertension.	<p>“As human as we are, though we believe in God and our religions, we also are scared at times. We believe in God alright but very few of us would hold on to God till the end. You believe in God alright but if you fail to take your medications, there is another part of you that tells you are not doing the right thing. There are very few people who would just believe in God and then hold on believing that their condition would turn out otherwise. So I think in as much as I would want to tow the line of religiosity, I also would be happy to have the doctor advice me on adherence and I will take it because it is said that ‘<i>doctor nesa yarea so Nyame nam no so na osa yarea</i>’. So patients like me believe in God but also believe the drugs work.” (R1: male)</p> <p>“Those treating us should believe in God and believe that it’s God that heals. Though they can play their part, if God is not involved it will be in vain.” (R2: female)</p> <p>“Medical providers should influence us to be more spiritual. Taking the drugs and not being committed to God can lead one to behave in ways that may worsen the condition. Sp. people are usually righteous and will take care of themselves and live lives that will help improve their condition.” (R3: female)</p> <p>“I’ve noticed that in Ghana, patients are not counseled. I read a book that suggested that most patients are spiritually sick not physically so when a patient goes to a doctor, instead writing prescriptions of antihypertensive medicines, he writes quotations from the bible as well. E.g. “I know my God is able”- having an inner belief that your God is able and combining with the medicines work.” (R4: female)</p>

4.2 RESULTS OF IN-DEPTH INTERVIEWS ON CAM USE

The analysis elicited the following themes: *combination of remedies, categorization, availability, motivation for use, perceived effect, non-disclosure, medication non-adherence and health provider involvement* (Table 4.2).

4.2.1 Combination of remedies: Two main classes of CAM use in hypertension emerged and patients conceptualized therapies as complementary or alternative.

Complementary therapies: The use of complementary therapies served as a supplement to the conventional anti-hypertensive medicine. Participants' description of complementary therapies was subcategorized into continuous and partial use. A continuous use signifies the daily use of therapy alongside conventional medications, whereas partial use is directed at combining complementary therapies with the orthodox ones on an as-and-when basis:

“I rely on what I am given from the hospital and just add the dandelion and moringa as supplement.” (R9: female).

“When I started having hypertension, I was not having much blood; I had stiff hands and pains in the leg. So I took the herbs, after a while I took another and now I take it with my hypertension medicine... I don't have too much attachment to the local herbs so I do take my medicine as usual and add the herbs when I want to”.
(R3: female).

Alternative therapies: Participants were categorized as using alternative therapies when they described utilizing other therapies in place of anti-hypertensive medications because they were dissatisfied with the slow healing pace of the conventional treatment:

“Well I don’t use the herbal medicine continuously even though the medicine from the hospital is not working very fast for me. It is like when I use it for a while and it is not working, I go back to the hospital” (R5: male).

Alternative therapies were also employed to replace the unresolved adverse drug effects of conventional medicines:

“Like I said, some of the drugs are not good for all... and so the drugs are there but not all of them are good for you so it is better to take the herbs to avoid any problems” (R7: male).

4.2.2 Categorization:

Two major types of CAM emerged and were classed into biological-based therapies (BBT) and mind-body interventions (MBI). Examples of BBTs that surfaced from the interviews included dandelion, moringa, bitter leaves, coconut juice and other herbal preparations. These products were usually domestically prepared by the patients and taken orally in various dosage forms such as liquids, solids or powders. No specific considerations were made in terms of product strength or concentration, dosage regimen, nor frequency and treatment duration. According to participants:

“I still rely on what I am given from the hospital and just add the dandelion and moringa as supplement. Before I was diagnosed I never used any alternative medicines but after I was told I have hypertension I started using dandelion and moringa. As for dandelion, I blend and take it as a drink and for moringa, I sometimes dry and use as tea. Normally I add honey.” (R9: female).

“Because I know dandelion is helpful, I put in my bread as sandwich and this moringa too I have some in the house so sometimes I use it. I cook with it. I use the bitter leaf too but my main problem is that I don’t know how low it will make my pressure go down but I know it helps to bring down my pressure” (R10: female).

Although the NCCAM catalogues spiritual interventions as part of MBIs, the role of spirituality/ religiosity strongly came into view to justify, explain and augment the use of BBTs:

“It’s only about one month that somebody, a Hausa man, gave me something and told me before using and completing it I will be healed from hypertension. Because I did not believe in it fully and I did not put my mind to it, it’s not working for me. So though I believe that God can heal me, it is gradual and not complete. I am still trusting God that someday I will be healed from my hypertension. But recently I started using moringa. I have been told that dandelion is also good for me so I am thinking of trying that one too and I pray it really helps.” (R4: male)

“Dandelion is made of herbs and anything made with herbs is good because our Lord gave it to us. Do you know that our mighty God is so powerful that he gave us even flowers, branches of trees, roots that when we are sick and we use them we will be healed?” (R12: female).

Yet the classical MBIs reported by respondents were massage, exercise and rest:

“... so he will come and massage me, he will stand on my back for some time and gradually I will feel well” (R4: male).

“... a little exercise, not strenuous and recently I moved on to swimming. I started the swimming this week... and on weekends I go to the gym. I don’t lift, I just do normal aerobics and it’s quite relieving. Sometimes when I am very bored I just take a walk around” (R13: male).

4.2.3 Availability:

Participants were clear that they could easily access CAM because it was readily available from multiple sources. The reports focused mainly on the significant roles played by external factors in recommending CAM as well as serving as a constant source of CAM supply. The influence of family, friends, traditional practitioners, strangers, print and electronic media were often referenced as the source of CAM utilization:

Family:

“So my sister told me to take Agbeve because it was good... It is my sister. She works at the market and hears a lot about these products. So she heard about how

good Agbeve was for hypertension. She decided to tell me about it and then I tried it. You see when you have a problem; people want to help when they know about your problems. That is what my sister was trying to do.” (R3: female)

Friends:

“I was using the hospital medicine but a friend of mine residing by me saw that I was not looking well. He advised me to do something about my condition by helping myself. So he advised me to try the herbs and because I want to look well I listened to him. Another friend advised me but he is dead. He himself will come and massage me, he will stand on my back for some time and gradually I will feel well. But he died and when he died I was not having anybody. My children said they can’t do it, they can’t do it. So by and by it gets bad. As for moringa, just quite recently my daughter, my elder daughter said she was at a gathering and they mentioned it. So I also went for a funeral and fortunately for me a cousin of mine told me he has so many moringa and dandelion in the house so he will try and get some for me. Fortunately, he brought them to me after the funeral. I have ground the moringa and I now use the powder for tea.” (R4: male)

Traditional practitioners:

“I get it from the herbalist himself. I go to buy it anytime what I have gets finished” (R5: male).

Strangers:

“The first time we came to the hospital, a guy was selling dandelion and convincing me to buy, so I bought just a little and it worked for me. I was feeling pains at my back and he told me it can also help with the pain apart from helping with the pressure. So he said it’s like a tea, and I have to drink it first thing in the morning and the last thing at night. When I started drinking it, I was not having diarrhea but I went to toilet frequently and everything was just coming out and then within a short time I could work. I could not feel any pain again. So I bought only one then but when it got finished I bought more and since then I have been taking it. I use it in addition to what the doctor tells me to take.” (R12: female).

Media:

“These products have been there before the Whiteman medicine..... but there is a book I read, ‘into plant medicine’. It talks about what you can take, use as tea and others. I read about it a lot and I know it works. All things being equal it’s the belief you have in it that makes it work” (R3: female).

“I saw the information on the internet and I knew it would help me” (R9: female).

4.2.4 Motivation for use:

Patients' expressed reasons and expectations of CAM use to reflect issues relating with conventional medication intake. This premise emerged from three interrelated subthemes of healing, supplement and side effects.

Healing: Although hypertension is a condition that requires long term management, participants desired to be healed completely from the condition. Patients based their belief on the synergistic positive blood pressure lowering effect of combining CAM and anti-hypertensive medications. Additionally, emphasis was placed on the role of divine influence:

“... he told me before using and completing it I will be healed from hypertension.”

(R4: male)

“Like I said, some of the drugs are not good for all... and so the drugs are there but not all of them are good for you so it is better to add the herbs to avoid any problems” ***(R7: male)***

“... also God has given us natural herbs to use to cure our sickness.” ***(R5: male)***

Supplement: Patients augmented their prescription medication with CAM to serve as back-up while avoiding becoming medication dependent. Respondents 4 and 13 reported:

“As for the massaging and moringa, they help the Doctors prescriptions. It will make the medicine the doctor gives me to work very well.” ***(R4: male)***

“Apart from it serving as a back- up for my medicines... I also believe that I can’t be so fully drug dependent. Being drug dependent is quite disturbing to think of it as such. So if I feel something is going to back up for me, yea, why not. Then if it’s the right thing then it’s ok. The only thing is that sometimes I get scared I might be doing the wrong thing... because I don’t know what could happen to me negatively” (R13: male)

Side effects: Medication side effects were thought to be a reason for the use of CAM. Patients felt that by applying CAM they could prevent or manage the negative effects associated with their conventional medications:

“...but with what the doctor gives me I have side effects. In-fact that is what really pushed me to consider the other herbal option. My wife was beginning to complain about, you know, I can’t satisfy her in bed.....” (R5: male)

“Like I said, some of the drugs are not good for all... and so the drugs are there but not all of them are good for you so it is better to take the herbs to avoid any problems” (R7: male)

CAM non-use: Alternatively, some patients did not use CAM because of prior negative occurrences. One described her fear of CAM after a near death experience:

“Several years ago, I took some herbs and I nearly died and since then I never rely on the native medicines only the doctors and their medicine.” (R8: female)

In a related response, some patients trusted their health providers for the best of care and totally relied on their prescription medications:

“I don’t use them because I am afraid. Moreover the nurses advice us on eating habits and I see improvement in my condition so I am afraid to use anything that will spoil the good thing the medicine is doing for me” (R1: female)

“Because I trust that what the doctor gives me is what will best cure me. You know the interesting point is how you trust a doctor although he may not be a Christian. But I know that God directs the doctor on what to do. So irrespective of his religion, it doesn’t really matter. So far as Christ is directing affairs I don’t need to use anything else apart from what is given me by the doctor” (R6: male).

4.2.5 Perceived effect:

Patients expressed beneficial outcomes of using CAM in relation to having hypertension. Their confidence in this constructive CAM result was intensified in the instance where CAM therapies were thought to be natural, had no side effects, and divinely inspired.

“..... rather I feel better and I think the dandelion is really working for me.... I think it’s rather helpful than harmful. Because I feel better any time I take it.” (R12: female)

“.....I have not experienced any side effects with the moringa. It is a natural product that does not have side effects” (R7: male)

“I read about it a lot and I know it works... So I know it is working well because I have some small belief that it is good... You can take an orange leaf, believe that if you make tea with it your sickness will go and it will surely go” (R3: female)

“Yes it is effective. Sometimes dandelion is made with herbs and anything made with herds is good because our Lord gave it to us.” (R12: female)

4.2.6 Disclosure:

The issue of non-disclosure of CAM use to health providers dominated among CAM users. Participants who did not inform their practitioners about their CAM behaviour cited reasons such as it being pointless or the doctors not initiating the conversation. Some however were afraid of the possible negative reactions from their doctors. A male participant said

“No my doctor is not aware. I should say there was a break in contact for a long time because he is in Kumasi and I am here ... Although I am seeing another doctor in Korle-bu, I don't discuss anything with him because perhaps I'm feeling very comfortable with it or perhaps I have not experienced any adverse effects with them. I however feel not telling the doctor is not the right thing to do because ideally before taking any extra thing or any extra load unto yourself while you are on other medications by a doctor, then you would have to consult the doctor to know if what you are doing is really right.” (R13: male).

“Hmmm, they are not aware. I don’t tell them... I don’t think it’s necessary to tell them.” (R5: male).

Similarly, a respondent indicated, *“no he is not aware. Moringa is not a medicine but a food supplement and telling the doctor is neither here nor there because I am taking in food.” (R7: male).*

According to the fifth participant

“Hmmm, they are not aware. I don’t tell them. I try the herbs myself. When it comes to me, either I continue using it or stop. I don’t think it’s necessary to tell them. In any case the doctors have never asked about it” (R5: male)

Yet a male participant expressed his desire to disclose his use of CAM when discussions about this subject are initiated by his doctor:

“The Doctor is not aware because he has not asked me about the use of the other herbal medicines but if he asks me I will tell him.” (R3: male).

Among those who were afraid to disclose their use of CAM, a female participant shared her frustration,

“...Sometimes I want to ask him but I’m afraid he will be angry with me.” (R10: female)

4.2.7 Medication non-adherence:

Adherence to conventional anti-hypertensive medications is imperative in the optimal control of blood pressure. Most participants reported regular simultaneous use of CAM and conventional treatments which negatively reflected in inconsistencies in taking their blood pressure lowering medicines:

“When I take the herbs it doesn’t have any effect on how I take what the doctor gives me. I say it doesn’t have any effect because you know, sometimes when you take the two, I mean the herbs and what the doctor gives you, you might not know which one is working but when you get well then well you take it like that. So for me, sometimes I take the two but I prefer to take the herbs alone until I begin to feel the symptoms and I change...” (R5: male).

Likewise, a male participant admitted,

“I also believe that I can’t be so fully drug dependent. Sometimes if I don’t take my drug in a day, I feel psychologically defeated and that something will go wrong but with these practices at least I feel and have a bank of assurance that something is also working somewhere else to compensate for me not taking the drug.” (R13: male).

4.2.8 Health provider involvement:

Reflecting on the importance of doctors in hypertension management with emphasis on CAM use, various participants stressed the need for good therapeutic relationships between patients and their health providers. One respondent articulated,

“If your doctor is close to you, you can open up and tell him everything about supplement medicine and maybe he can also advice. Most of the time they advice on what to do and not to.” (R5: male).

Several participants advocated that their doctors should initiate conversations on CAM usage by their patients. They perceived their doctors to have adequate knowledge about CAM use in healthcare:

“He has knowledge that not all people have. So if God has given you something you have to share it. Let’s go to scriptures. My belief in the Bible is how we should relate with one another, the doctor and patient, relate to God and relate to you and I. Therefore if God has given the doctor something, he has to share it and the doctor being a specialist on health issues, it’s not out of the blue that he gets that specialization, it’s a gift from above and he has to serve people with it. So if he has been established to have that specialty, then of course he has to tell me on everything about my health and alternative medicine”. (R7: male).

Equally, a female respondent conveyed her worries,

“I know that there are many drugs which can bring the hypertension down including herbs. Once I don’t know much about those drugs and herbs and as I take them I don’t know how low it will bring my pressure down. So if the doctor can advice me on how to take my let’s say dandelion or bitter leaf or even the moringa, I will be very happy.” (R10: female).

Conversely, a participant who believed doctors were ignorant about CAM asserted,

“You know for doctors what they study in the books is all that they know. So any other thing they may not know about. As for the doctors it is the book knowledge they go by but God has also given us herbs to use when we are sick. So if they can start looking at the use of natural herbs to add to the hospital one, I think it will be good” (R12: female)

Table 4.2: Coding Frame for CAM use and medication adherence

<u>Thematic content analysis using inductive reasoning</u>			
This analyzed in-depth interview addresses part of specific objective 4.			
Specific objective 4: <i>To evaluate the effect of CAM use, cost of prescribed medications and affordability of anti-hypertensive medications on adherence behaviour.</i>			
Organizing Theme	Codes	Description and definition of code	Quote (s)
Combination of remedies	1.1 Complementing therapies	1.1.1 Using other therapies concurrently with anti-hypertensive medications	“When I started having hypertension, I was not having much blood; I had stiff hands and pains in the leg. So I took the herbs, after a while I took another and now I take it with my hypertension medicine... I don’t have too much attachment to the local herbs so I do take my medicine as usual and add the herbs when I want to”. (R3: female)
		-Continuous use	“I rely on what I am given from the hospital and just add the dandelion and moringa as supplement.” (R9: female)
		-Partial use	“... I still take my Atacand and because the moringa and the rest are natural herbs, they don’t affect my Atacand.” (R10: female) “I use the herbs in addition to what the doctor tells me to take” (R12: female)
		1.1.2 Using other	

Organizing Theme	Codes	Description and definition of code	Quote (s)
	1.2 Alternating therapies	therapies in place of anti-hypertensive medications	<p>“I usually take the hospital drug or the herbs. Sometimes when I take the two, I mean the herbs and what the doctor gives me, I might not know which one is working but when I get well then well I take it like that... So for me, sometimes I take the two, sometimes one” (R4: male)</p> <p>“Well I don’t use the herbal medicine continuously even though the medicine from the hospital is not working very fast for me. It is like when I use it for a while and it is not working, I go back to the hospital” (R5: male)</p> <p>“Like I said, some of the drugs are not good for all... and so the drugs are there but not all of them are good for you so it is better to take the herbs to avoid any problems” (R7: male)</p>
Categorization	2.1 Use of biological based and mind-body interventions	2.1.1 Biological therapies <ul style="list-style-type: none"> — Dandelion — Moringa — Herbs — Bitter leaves — Coconut juice 	<p>“I still rely on what I am given from the hospital and just add the dandelion and moringa as supplement. Before I was diagnosed I never used any alternative medicines but after I was told I have hypertension I started using dandelion and moringa. As for dandelion, I blend and take it as a drink and for moringa, I sometimes dry and use as tea. Normally I add honey.” (R9: female)</p> <p>“Because I know dandelion is helpful, I put in my bread as sandwich and this moringa too I have some in the house so sometimes I use it. I cook with it. I use the bitter leaf too but my main problem is that I don’t know how low it will make my pressure go down but I know it helps to bring down my pressure” (R10: female)</p> <p>“I use the herbs in addition to what the doctor tells me to take” (R12: female)</p>
		2.1.2 Mind-body interventions	“... so he will come and massage me, he will stand on my back for some time and gradually

Organizing Theme	Codes	Description and definition of code	Quote (s)
		<ul style="list-style-type: none"> — Massage — Exercise — Rest 	<p>I will feel well” (R4: male)</p> <p>“.... a little exercise, not strenuous and recently I moved on to swimming. I started the swimming this week” (R13: male)</p> <p>“...and on weekends I go to the gym. I don’t lift, I just do normal aerobics and it’s quite relieving. Sometimes when I am very bored I just take a walk around” (R13: male)</p>
		2.1.3 Divine intervention	<p>“It’s only about one month that somebody, a Hausa man gave me something and told me before using and completing it I will be healed from hypertension. Because I did not believe in it fully and I did not put my mind to it, it’s not working for me. So though I believe that God can heal me, it is gradual and not complete. I am still trusting God that someday I will be healed from my hypertension. But recently I started using moringa. I have been told that dandelion is also good for me so I am thinking of trying that one too and I pray it works.” (R4: male)</p> <p>“...but I know that God directs the doctor on what to do and I trust in God to heal me through the doctor....I only rely on Jesus Christ...so far as Christ is directing affairs I don’t need to use anything else apart from what is given me by the doctor” (R6: male)</p> <p>“Dandelion is made of herbs and anything made with herds is good because our Lord gave it to us. Do you know that our mighty God is so powerful that he gave us even flowers, branches of trees, roots that when we are sick and we use them we will be healed?” (R12: female)</p>
Availability	3.1 Easy access to CAM	3.1.1 CAM availability -CAM is easily obtained from	<p>“I buy it from around. It is sold in so many places” (R9: female)</p> <p>“I get the alternative therapies from around.</p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
		various places	It's sold around" (<i>R13: male</i>)
	3.2 External influence of CAM acquisition	3.2.1 External influence of family and friends	<p>"... a friend of mine and a family member told me to try it and its going to work...So I get advice from everywhere....sometimes family members and sometimes friends." (<i>R5: male</i>)</p> <p>"So my sister told me to take Agbeve because it was good... It is my sister. She works at the market and hears a lot about these products. So she heard about how good Agbeve was for hypertension. She decided to tell me about it and then I tried it. You see when you have a problem; people want to help when they know about your problems. That is what my sister was trying to do. " (<i>R3: female</i>)</p> <p>"I was using the hospital medicine but a friend of mine residing by me saw that I was not looking well. He advised me to do something about my condition by helping myself. So he advised me to try the herbs and because I want to look well I listened to him. Another friend advised me but he is dead. He himself will come and massage me, he will stand on my back for some time and gradually I will feel well. But he died and when he died I was not having anybody. My children said they can't do it, they can't do it. So by and by it gets bad. As for moringa, just quite recently my daughter, my elder daughter said she was at a gathering and they mentioned it. So I also went for a funeral and fortunately for me a cousin of mine told me he has so many moringa and dandelion in the house so he will try and get some for me. Fortunately, he brought them to me after the funeral. I have ground the moringa and I now use the powder for tea. " (<i>R4: male</i>)</p> <p>"A friend of mine was really telling a lot about these therapies but I really read about it myself before using them" (<i>R7: male</i>)</p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
		3.2.2 External influence of herbalists	“I get it from the herbalist himself. I go to buy it anytime what I have gets finished” (R5: male)
		3.2.3 External influence of strangers	<p>“You see when you have a problem; people want to help when they know about your problems.” (R3: female)</p> <p>“a Hausa man gave me something” (R4: male)</p> <p>“With the moringa somebody told me that if you use it too much it will rather make the pressure rise so I seldom take it ... I can’t remember but I think it’s a friend who told me about it.” (R10: female)</p> <p>“The first time we came to the hospital, a guy was selling dandelion and convincing me to buy, so I bought just a little and it worked for me. I was feeling pains at my back and he told me it can also help with the pain apart from helping with the pressure. So he said it’s like a tea, and I have to drink it first thing in the morning and the last thing at night. When I started drinking it, I was not having diarrhea but I went to toilet frequently and everything was just coming out and then within a short time I could work. I could not feel any pain again. So I bought only one then but when it got finished I bought more and since then I have been taking it. I use it in addition to what the doctor tells me to take.” (R12: female)</p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
		3.2.4 information from print and electronic media — Literature — Internet	<p>“These products have been there before the Whiteman medicine..... but there is a book I read, ‘into plant medicine’. It talks about what you can take, use as tea and others. I read about it a lot and I know it works. All things being equal it’s the belief you have in it that makes it work” (R3: female)</p> <p>“Dandelion yes. Universally, I take moringa; I love moringa because of the voluminous literature I’ve read about on moringa so I use moringa. I have a plant in my house. As a matter of fact I have planted some” (R7: male)</p> <p>“I got some from the internet and for some I thought them through” (R13: male)</p> <p>“I saw the information on the internet and I knew it would help me” (R9: female)</p>
Motivation for use	4.1 CAM use externally influenced by anti-hypertensive medication related issues	4.1.1 Desire for healing -Based on synergistic effect of CAM and anti-hypertensive medications -Based on divine influence 4.1.2 Augment prescription medication -CAM serves as back-up -Avoid drug dependence	<p>I will prefer to take the two so that I heal fast”. (R3: female)</p> <p>“... he told me before using and completing it I will be healed from hypertension.” (R4: male)</p> <p>“Like I said, some of the drugs are not good for all... and so the drugs are there but not all of them are good for you so it is better to add the herbs to avoid any problems” (R7: male)</p> <p>“... also God has given us natural herbs to use to cure our sickness.” (R5: male)”</p> <p>“These products have been there before the white man medicine and God gave them to us to use when we are sick” (R3: female)</p> <p>“As for the massaging and moringa, they help the Doctors prescriptions. It will make the</p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
		4.1.3 Medication side effects	<p>medicine the doctor gives me to work very well.” (R4: male)</p> <p>“Apart from it serving as a back- up for my medicines... I also believe that I can’t be so fully drug dependent. Being drug dependent is quite disturbing to think of it as such. So if I feel something is going to back up for me, yea, why not. Then if it’s the right thing then it’s ok. The only thing is that sometimes I get scared I might be doing the wrong thing... because I don’t know what could happen to me negatively” (R13: male)</p> <p>“...but with what the doctor gives me I have side effects. Infact that is what really pushed me to consider the other herbal option. My wife was beginning to complain about, you know, I can’t satisfy her in bed...” (R5: male)</p> <p>“the drugs sometimes make me vomit and I don’t feel well at all” (R6: male)</p> <p>“Like I said, some of the drugs are not good for all... and so the drugs are there but not all of them are good for you so it is better to take the herbs to avoid any problems” (R7: male)</p> <p>“It is rather the medicine from the hospital which is a chemical that has side effects.” (R9: female)</p>
	CAM non-use: Negative outcome of CAM and reliance on conventional therapies	5.1.1 Fear of negative effect of CAM	<p>“I don’t use them because I am afraid. Moreover the nurses advice us on eating habits and I see improvement in my condition so I am afraid to use anything that will spoil the good thing the medicine is doing for me” (R1: female)</p> <p>“Several years ago, I took some herbs and I nearly died and since then I never rely on the native medicines except the doctors and their medicine.” (R8: female)</p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
		5.1.2 Absolute belief in conventional therapies	<p>“I believe in what the doctor says ...” (<i>R5: male</i>)</p> <p>“Because I trust that what the doctor gives me is what will best cure me. You know the interesting point is how you trust a doctor although he may not be a Christian. But I know that God directs the doctor on what to do. So irrespective of his religion, it doesn’t really matter. So far as Christ is directing affairs I don’t need to use anything else apart from what is given me by the doctor” (<i>R6: male</i>)</p>
Perceived effect	Positive outcome of using CAM	The instance where CAM therapies do not have side effects	<p>“.....I have not had any negative effects with the coconut and the other practices” (<i>R13: male</i>)</p> <p>“.....it doesn’t have any effect on what the doctor gives me...No I have not experienced any side effects with the complementary ...Infact, that is what really pushed me to consider the other herbal options” (<i>R5: male</i>)</p> <p>“I haven’t experienced any side effects. They are natural drugs so I don’t think they have side effects” (<i>R3: female</i>)</p> <p>“....I have not experienced any side effects with the massage. For the moringa too, I haven’t experienced any side effects.” (<i>R4: male</i>)</p> <p>“ Rather I feel better and I think the dandelion is really working for me.... I think it’s rather helpful than harmful. Because I feel better any time I take it.” (<i>R12: female</i>)</p> <p>“.....I have not experienced any side effects with the moringa. It is a natural product that does not have side effects” (<i>R7: male</i>)</p> <p>“.....it has no effect on the medicine I take from the hospital... I don’t experience any</p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
			<p>side effects with the moringa and dandelion. As I said, they are natural so they cannot cause any problems. It is rather the medicine from the hospital which is a chemical that has side effects.” <i>(R9: female)</i></p> <p>“I read about it a lot and I know it works... So I know it is working well because I have some small believe that it is good... You can take an orange leaf, believe that if you make tea with it your sickness will go and it will surely go” <i>(R3: female)</i></p> <p>“Yes it is effective. Sometimes dandelion is made with herbs and anything made with herds is good because our Lord gave it to us.” <i>(R12: female)</i></p> <p>“Because I know dandelion is helpful, I put in my bread as sandwich and this moringa too I have some in the house so sometimes I use it. I cook with it. I have the bitter leaf too” <i>(R10: female)</i></p> <p>“It is the same for the bitter leaf, I don’t know how low it will make my pressure go down but I know they help to bring down my pressure” <i>(R10: female)</i></p> <p>“Dandelion and moringa are natural so they are good. They help with the hypertension. ” <i>(R9: female)</i></p>
Non-disclosure	7.1 Doctors are not aware of the use of CAM by their patients and reasons for this action are Doctor-related.	7.1.1 Not reporting actions concerning the use of CAM	“No my doctor is not aware. I should say there was a break in contact for a long time because he is in Kumasi and I am here ... Although I am seeing another doctor in Korle-bu, I don’t discuss anything with him because perhaps I’m feeling too comfortable with it or perhaps I have not experienced any adverse effects with them. I however feel not telling the doctor is not the right thing to do because ideally before taking any extra thing or any extra load unto yourself while you are on other medications by

Organizing Theme	Codes	Description and definition of code	Quote (s)
			<p>a doctor, then you would have to consult the doctor to know if what you are doing is really right.” <i>(R13: male)</i></p> <p>“Hmmm, they are not aware. I don’t tell them... I don’t think it’s necessary to tell them.” <i>(R5: male)</i></p> <p>“I have even never asked him that I tried using herbs apart from what he has been given me.” <i>(R4: male)</i></p> <p>“No I just use the dandelion. I don’t tell him. The doctors too are not stable, they keep changing them” <i>(R12: female)</i></p> <p>“No he is not aware. Moringa is not a medicine but a food supplement and telling the doctor is neither here nor there because I am taking in food.” <i>(R7: male)</i></p> <p>“No the doctor does not know. Sometimes I want to ask him but I’m afraid he will be angry with me.” <i>(R10: female)</i></p> <p>“No I have not told him about it.” <i>(R9: female)</i></p>
		<p>7.12 Reasons for non-disclosure of CAM use</p> <p>-Doctors have not investigated the use of other therapies by their patients</p>	<p>“The Doctor is not aware because he has not asked me about the use of the other herbal medicines but if he asks me I will tell him.” <i>(R3: male)</i></p> <p>“Hmmm, they are not aware. I don’t tell them. I try the herbs myself. When it comes to me, either I continue using it or stop. I don’t think it’s necessary to tell them. In any case the doctors have never asked about it” <i>(R5: male)</i></p> <p>“It is because he also hasn’t asked me about it. If he does I will tell him.” <i>(R9: female)</i></p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
		<p>-Fear of the reaction of Doctors</p> <p>-Patients do not see it necessary to inform the Doctor</p> <p>-The lack of continuity with one particular physician</p>	<p>“...Sometimes I want to ask him but I’m afraid he will be angry with me.” <i>(R10: female)</i></p> <p>“Hmmm, they are not aware. I don’t tell them... I don’t think it’s necessary to tell them.” <i>(R5: male)</i></p> <p>“No he is not aware. Moringa is not a medicine but a food supplement and telling the doctor is neither here nor there because you are taking in food.” <i>(R7: male)</i></p> <p>“No I just use the dandelion. I don’t tell him. The doctors too are not stable, they keep changing them” <i>(R12: female)</i></p>
Medication non-adherence	8.1 Negative effect of CAM on adherence	8.1.1 Medication non-adherence as a result of CAM use	<p>“When I take the herbs it doesn’t have any effect on how I take what the doctor gives me. I say it doesn’t have any effect because you know, sometimes when you take the two, I mean the herbs and what the doctor gives you, you might not know which one is working but when you get well then well you take it like that. So for me, sometimes I take the two but I prefer to take the herbs alone until I begin to feel the symptoms and I change...” <i>(R5: male)</i></p> <p>So I bought only one then but when it got finished I bought more and since then I have been taking it. I use it in addition to what the doctor tells me to take.” <i>(R12: female)</i></p> <p>“I also believe that I can’t be so fully drug dependent. Sometimes if I don’t take my drug in a day, I feel psychologically defeated and that something will go wrong but with these practices at least I feel and have a bank of assurance that something is also working somewhere else to compensate for me not taking the drug.” <i>(R13: male)</i></p>

Organizing Theme	Codes	Description and definition of code	Quote (s)
Health provider involvement	9.1 Doctors' role has positive impact on hypertension	<p>9.1.1 Relationship with Doctor</p> <p>9.1.2 Doctors perceived to have adequate knowledge about health issues</p> <p>9.1.3 Doctors to initiate discussions about CAM</p>	<p>If your doctor is close to you, you can open up and tell him everything about supplement medicine and maybe he can also advice. Most of the times they advice on what to do and not to.” <i>(R5: male)</i></p> <p>“He has knowledge that not all people have. So if God has given you something you have to share it. Let’s go to scriptures. My belief in the Bible is how we should relate with one another, the doctor and patient, relate to God and relate to you and I. Therefore if God has given the doctor something, he has to share it and the doctor being a specialist on health issues, it’s not out of the blue that he gets that specialization, it’s a gift from above and he has to serve people with it. So if he has been established to have that specialty, then of course he has to tell me on everything about my health and alternative medicine”. <i>(R7: male)</i></p> <p>“Well if he advices me and its coming from the doctor that I can use it then I can, but from my bad experience I will never on my own get these native medicines again.” <i>(R8: female)</i></p> <p>““I know that there are many drugs which can bring the hypertension down including herbs. Once I don’t know much about those drugs and herbs and as I take them I don’t know how low it will bring my pressure down. So if the doctor can advice me on how to take my let’s say dandelion or bitter leaf or even the moringa, I will be very happy.” <i>(R10: female)</i></p> <p>“You know for doctors what they study in the books is all that they know..... As for the doctors it is the book knowledge they go by but God has also given us herbs to use when we are sick. So if they can start looking at the use of natural herbs to add to the hospital one, I think it will be good” <i>(R12: female)</i></p>

4.3 RESULTS OF IN-DEPTH INTERVIEWS ON PHARMACOLOGICAL FACTORS

The thematic content analysis revealed three main themes about the medications namely: *effect and continuance, hindrances to adherence and coping* (Table 4.3).

4.3.1 *Effect and continuance:*

This theme addresses the perception of patients about the side effects and continuous use of their medications which were their main medication issues of great concern.

Effect: They reported having negative drug effects which included palpitations, frequent urination and bouts of hunger, erectile dysfunction, dizziness, headache, cough, physical exhaustion and weakness. A female participant said,

“The drugs they gave me when I take it about 20 -30 minutes my heart will be beating fast and even my whole body will be shaking ...I urinate a lot and feel very hungry in the mornings” (R1: female).

Moreover, the concern of a male participant was expressed in the following:

“.... I lose erection...that is the main thing that is worrying me so much, sometimes you don't perform and there's a problem at home.” (R5: male).

Another participant confirmed,

“I cannot even walk. When I walk a little I feel exhausted.” (R14: male).

The participants indicated that forgetting to take their medicines, the lack of thorough laboratory investigations and the chemical composition of their medicines were the main

factors accounting for the side effects experienced. These views have been reported by the ensuing comments:

“When I sometimes forget to take the drugs I get headaches.” (R2: female).

“We don’t have funds otherwise before a medication is administered to a patient a lot of lab tests have to be done.” (R3: female).

“The drugs are not natural. They contain serious chemicals and that is why we are suffering from the effect of the chemicals.” (R5: male).

Continuance: Concerns were expressed by a majority of participants regarding taking medicines daily over a lifetime. According to a participant,

“I am saying it seriously that the doctors should tell me and the patients that we will take drugs, drugs, drugs everyday or they should find other ways to cure the disease” (R1: female).

Correspondingly, another participant said

“...I will have to take this medicine forever and ever amen. If I knew that it’s forever and ever amen, I would have made provision for something else....” (R8: male).

4.3.2 Hindrances to adherence:

The main sources of barriers to medication adherence emerged from four main subthemes of cognitive factors, social factors, media influence and attitudes of doctors.

Cognition: Cognition played a significant role in medication adherence behaviour, in that; some patients had problems with adherence because of forgetfulness. The need to remember to take one's medication is a vital tool in aiding adherence to conventional treatment. According to two respondents who shared this view:

“When I sometimes forget to take the drugs” (R2: female).

“Sometimes if I forget to take my drug in a day, I feel psychologically defeated and that something will go wrong” (R13: male).

Social factors: The desire to sexually satisfy partners came up as a hindrance to medication adherence. Some participants experienced erectile dysfunction as a result of the medication side effects. These participants tend to have difficulty adhering because of the desire to sexually satisfy their partners. The concern of a male respondent is expressed as follows:

“Sometimes I stop taking the medication because my wife is complaining I don't perform well. If the drug problem is posing problems for me in the room what do I have to do; either you stop taking it or you fall on the supplementary ones.” (R5: male).

Media influence: Some patients did not adhere as a result of information about medicines obtained from the media causing trepidation. The fears of a participant were articulated,

“I don’t take my medicine all the time because I listened to a man on Oman FM who said that some of the drugs can cause liver or kidney cancer.” (R1: female).

Attitudes of doctors: The perceived negative attitude of doctors towards patients hindered the intention of some participants to adhere to medications. A male respondent did not adhere adequately because:

“Our doctors have certain attitudes that are very obnoxious sometimes..... because if I go to a doctor and I say I think I have a problem with my medicine or say fever, he will say who told me about it, who told me I have a fever. It’s like I am a novice. I will expect the doctor who knows more to allow me to pour all the nonsense I have concerning my condition so that he will pick out what is good from the nonsense that I have said.” (R8: male).

4.3.3 Coping:

In coping with these problems associated with medication intake, three interrelated subthemes emerged from the interviews. Some patients personally adopted medication modification strategies; others espoused the use of complementary and alternative treatments, while some relied on the interventions made by their doctors.

Direct personal effort: Among patients, who took direct responsibility to manage their problems, reducing the dosage of their medications and changing the times of taking their medicines, were the main strategies they applied. By taking a lower dose of the medicine to minimize the negative effects, a female participant said,

“When the doctor told me he will not change it for me and I should still take the medicine like that, I decided to divide the tablet into two and I only take half of it”.

(R1: female).

Contrary to the information that diuretics were convenient when taken during the day, a patient thought it better to do otherwise. According to her,

“I take my medicine at night so I can go about my day’s activities without having to urinate frequently.” **(R2: female).**

CAM use: Complementary therapies were sometimes used by participants to manage the negative effects of their conventional medications:

“I take a mixture of lemon and water three hours before taking my BP medication and I also use dandelion and moringa for food to help solve my problem.” **(R1: female).**

Additionally, alternative treatments were sought to replace medications with unwanted effects. This view is explicitly provided:

“I use the natural way. I take fruits and feed myself on fruits alone for say one week without taking my medicine. When I do that I don’t feel anything. So I believe that the natural ways we were taught from the Bible saying we should take fruits helps because when I try it, it works for me. I take banana, oranges, and pineapples in the morning, maybe vegetables in the afternoon and fruits in the evening” **(R5: male).**

Intervention by doctors: Some participants further indicated the timely intervention by their doctors as serving to deal with medication challenges. Patients usually had the medications with the side effects changed by their doctors. According to one participant:

“I brought the medicine to the doctor at the next visit and he changed it for me”.

(R3: female).

Similarly, a female participant admitted,

“Formerly I was put on nifedipine and it came to a time when I take it I feel severe headache so I complained and the doctor changed it.” **(R10: female).**

Likewise, another patient said, *“I was given lisinopril and when I take it I cough a lot so I told the doctor and he changed it for me.”* **(R13: female).**

Table 4.3: Coding Frame for pharmacologic factors

Thematic content analysis using inductive reasoning

This analyzed in-depth interview addresses part of specific objectives 5 and 6.

Specific objective 5: *To assess the role of anti-hypertensive medication side effects on medication non adherence with the moderating influence of LoC*

Specific objective 6: *To predict the effect of anti-hypertensive medication regimens of more than once-daily dosing and high dosing frequency on adherence.*

Organizing theme	Codes	Description and definition of codes	Quote(s)
Effects and continuance	1.1 Side effects of medications taken by hypertensive patients	1.1.1 Types of negative effects <ul style="list-style-type: none"> — Palpitations — Frequent urination — Hunger — Erectile dysfunction — Dizziness — Headache — Cough — Physical exhaustion — Weakness 1.1.2 Reasons for the side effects	<p>“The drugs they gave me when I take it about 20 -30 minutes my heart will be beating fast and even my whole body will be shaking ...I urinate a lot and feel very hungry in the mornings” (R1: female)</p> <p>“.....I urinate a lot.” (R2: female)</p> <p>“.. I lose erection...that is the main thing that is worrying me so much, sometimes you don’t perform and there’s a problem at home” (R5: male)</p> <p>“I feel dizziness and” (R6: male)</p> <p>“..... it came to a time when I take it I feel severe headache” (R10: female)</p> <p>“..... and when I take it I cough a lot” (R13: female)</p> <p>“I cannot even walk. When I walk a little I feel exhausted.” (R14: male)</p> <p>“I feel weak when I take what the doctor gave to me....” (R15: female)</p>

Organizing theme	Codes	Description and definition of codes	Quote(s)
	1.2 Frequency and duration of taking the medicines	<ul style="list-style-type: none"> — Forgetting to take the medicines — Lack of thorough laboratory investigations due to economic factors — Chemical composition of the medicines <p>1.2.1 Frequency of taking medicines Taking the medicine(s) daily</p> <p>1.2.2 Duration of taking medications Taking the medicines for a lifetime</p>	<p>“When I sometimes forget to take the drugs I get headaches” (R2: female)</p> <p>“We don’t have funds otherwise before a medication is administered to a patient a lot of lab tests have to be done” (R3: female)</p> <p>“The drugs are not natural. They contain serious chemicals and that is why we are suffering from the effect of the chemicals” (R5: male)</p> <p>“I am saying it seriously that the doctors should tell me and the patients that we will take drugs, drugs, drugs everyday or they should find other ways to cure the disease” (R1: female)</p> <p>“...I will have to take this medicine forever and ever amen. If I knew that it’s forever and ever amen, I would have made provision for something else...” (R8: male)</p>
Hindrances to adherence	2.1 The role of cognition 2.2 The role of social factors	<p>2.1_Cognition Patients not adhering to medications because of forgetfulness</p> <p>2.2.1 Sexual partner satisfaction Patients do not take their medications as a result of complains from their sexual partners</p> <p>2.2.2 Media Patients do not adhere because of the</p>	<p>“When I sometimes forget to take the drugs” (R2: female)</p> <p>“Sometimes if I forget to take my drug in a day, I feel psychologically defeated and that something will go wrong” (R13: male)</p> <p>“Sometimes I stop taking the medication because my wife is complaining I don’t perform well. If the drug problem is posing problems for me in the room what do I have to do; either you stop taking it or you fall</p>

Organizing theme	Codes	Description and definition of codes	Quote(s)
	2.3 Attitude of doctors	<p>information about medicines obtained from the media</p> <p>2.3.1 Doctor's attitude Negative attitude of doctors towards patients hinder their intention to adhere to medications</p>	<p>on the supplementary ones" (<i>R5: male</i>)</p> <p>"I don't take my medicine all the time because I listened to a man on Oman FM who said that some of the drugs can cause liver or kidney cancer." (<i>R1: female</i>)</p> <p>"Our doctors have certain attitudes that are very obnoxious sometimes ... Because if I go to a doctor and I say I think I have a problem with my medicine or say fever, he will say who told me about it, who told me I have a fever. It's like I am a novice. I will expect the doctor who knows more to allow me to pour all the nonsense I have concerning my condition so that he will pick out what is good from the nonsense that I have said" (<i>R8: male</i>)</p>
Coping	<p>3.1 Direct personal effort.</p> <p>3.2 Complementary and alternative therapy</p>	<p>3.1.1 Reducing the dose Taking a lower dose of the tablet minimizes the negative effect.</p> <p>3.1.2 Changing the time of medicine intake Taking the medicine at a convenient time to manage the problem.</p> <p>3.2.1 The use of complementary therapies to manage negative effects — Lemon</p>	<p>"When the doctor told me he will not change it for me and I should still take the medicine like that, I decided to divide the tablet into two and I only take half of it". (<i>R1: female</i>)</p> <p>"I take my medicine at night so I can go about my day's activities without having to urinate frequently." (<i>R2: female</i>)</p> <p>"I take a mixture of lemon and water three hours before taking my BP medication and I also use dandelion and moringa for food to help solve my</p>

Organizing theme	Codes	Description and definition of codes	Quote(s)
	3.3 Intervention by doctors	<p>— Dandelion — Moringa</p> <p>3.2.2 The use of alternative therapies to replace medicines with unwanted effects</p> <p>— Fruits</p> <ul style="list-style-type: none"> - Banana - Orange - Pineapple <p>— Vegetables</p> <p>3.3.1 The medications were changed by doctors after patients had complained about the unwanted effects</p>	<p>problem.” <i>(R1: female)</i></p> <p>“I use the natural way. I take fruits and feed myself on fruits alone for say one week without taking my medicine. When I do that I don’t feel anything. So I believe that the natural ways we were taught from the Bible saying we should take fruits helps because when I try it, it works for me. I take banana, oranges, pineapples in the morning, maybe vegetables in the afternoon and fruits in the evening” <i>(R5: male)</i></p> <p>“I brought the medicine to the doctor at the next visit and he changed it for me”. <i>(R3: female)</i></p> <p>“Formerly I was put on nifedipine and it came to a time when I take it I feel severe headache so I complained and the doctor changed it.” <i>(R10: female)</i></p> <p>“I was given lisinopril and when I take it I cough a lot so I told the doctor and he changed it for me.” <i>(R13: female)</i></p> <p>I cannot even walk. When I walk a little a feel exhausted. I told the doctor and he changed it.” <i>(R14: male)</i></p>

Chapter 5

DISCUSSION, LIMITATIONS, CONCLUSIONS AND RECOMMENDATIONS

The study set out to understand the factors that were associated with medication adherence behaviour of hypertensive patients in Ghana. The factors predisposing non-adherence outcomes observed from both quantitative and qualitative analysis are discussed under the following subtitles: psychological, cultural, socio-economic and pharmacological determinants. The limitations from this study are also acknowledged and recommendations regarding a context specific adherence model, research and clinical practice are mentioned.

5.1 DISCUSSION

As a prelude, a brief discussion on the adherence behaviour of hypertensive patients is as follows. A very high proportion of patients (93.25%) did not adhere to their medications. This corroborates findings from a previous study by Buabeng et al. (2004) that observed non-adherence rates by hypertensive patients to be essentially the same (93%), but is double the worldwide rate of 50% estimated by the WHO. High rates of medication non-adherence negatively impact health outcomes and contribute considerably to worsening of disease, increased health care costs, and eventually death. These results underscore the need for interventions to improve adherence to therapy.

There was no significant relationship between the socio-demographic characteristics of participants in this study in terms of sex, age, place of residence and religious affiliation,

and medication adherence (Table 3.8.1). These findings corroborate earlier studies (Ekedahl & Mansson, 2004; Granger, Ekman, Granger et al., 2009; Osamor & Owumi, 2010) and is in contrast with previous studies (Anaam et al., 2013; Briesacher, Gurwitz, Soumerai, 2007; Lummis, Sketris, Gubitz et al., 2008; Wilson, Rogers, Chang et al., 2005) showing some relationship between demographic characteristics and adherence.

The findings from both quantitative and qualitative phases of this study have revealed that psychological, cultural, socio-economic and psychopharmacological factors were responsible for the high non-adherence rate observed among hypertensive patients in Ghana. This is likely to be the first time a study on medication adherence among Ghanaian hypertensive patients that has been examined from a comprehensive Biopsychosocial perspective using a mixed method approach and contextualized specifically in Ghana. Each variable and how it related with medication non-adherence is discussed in subsequent sections.

5.1.1 Psychological determinants

5.1.1.1 Locus of control

The study examined the association between personality characteristics (LoC) and medication adherence behaviour. The health LoC construct has been one of the most widely considered predictors of health-related behaviour of patients. Previous research on medication adherence provides evidence linking internal LoC with adherence (Omeja & Nebo, 2011) and non-adherence (Azlin et al 2007). The HLoC results from this study showed that hypertensive patients exhibited a blend of LoC. However, though the responses of patients indicated for both internal and external orientations, the pattern was

skewed towards externality particularly, “doctors”. It is possible that although patients feel that they are responsible for their health, they also attribute health-related outcomes to doctors. This leads to the belief that the health of hypertensive patients is controllable, either by themselves or doctors, and is not a result of chance, fate or luck (Wallston & Wallston, 1982). Patients who are internally-driven have a sense of self-responsibility in following recommendations made by health professionals. According to Wallston and Wallston (1982), mixed LoC could be a helpful coping mechanism for patients with chronic conditions and successful management of hypertension may mean patients encouraging themselves to adhere to their doctors’ recommended regimen. In general, there is a paucity of information on the relationship between bilocal LoC and medication adherence behaviour although the general evidence from other studies predominantly associates bilocal LoC with positive attributes and behaviours (April et al. 2012; Masthoff, 2002).

The presence of characteristics associated with low internal LoC and high external “others” accounted for the non-adherence observed. That is, patients with low internal LoC are less likely to take full responsibility for their illness and health behaviours. Additionally, having a high external LoC makes patients more likely to attribute their health actions to external forces instead of taking personal responsibility. Therefore observing a significant relationship between the variables and non-adherence confirmed that patients had a reduced tendency to adhere to prescribed treatment regimen, because they believed they could not affect their own health behaviours. These findings are similar to studies by Combes and Feral (2011) and Omeje and Nebo (2011).

Though only marginally significant, results showed that women were more inclined towards internal LoC than males. This result contradicts the belief that females are less likely to possess internal LoC than males (Holland et al, 2010; Jain & Singh, 2008) while corroborating findings by Hamedoğlu et al (2012) as well as Sarıçam et al (2012). Internality was also associated with higher education. It can possibly be due to the fact that males and females do not differ much in LoC because of some educational intervention programs which aim generally at reducing gender inequalities. In Ghana for example, the Ministry of Education, Girls education unit of Ghana Education Service and other Non-Governmental Organizations have various Girl-child educational programmes intended for females to have accessible quality education.

5.1.1.2 Emotional symptoms (depression, anxiety, stress)

5.1.1.2.1: Depression

Depression is increasingly being researched because of its impact on the global disease burden. It is currently ranked fourth of all causes of global disease burden, and is projected to rise to second by the year 2020 (Vettath, et al., 2012). This study has shown that moderate to extremely severe levels of depressive symptoms which merit clinical attention were found in about 4% of the study population (Table 3.4.2). Consistent with previous findings on depression and hypertension, the diagnosis of depression was not included in the co-morbid health conditions that were reported (Bane, Hughes & McElnay, 2006). This may partly be due to the allegation that depression is rarely diagnosed in hypertension or may partially be due to the lack of adequate medical information being given to the patients. This finding is however interpreted bearing in mind the limitation that patient

information regarding co-morbidities were not obtained from the clinicians or from the patients' health records. Contrary to other studies which observed participants with depression exhibiting higher likelihood of medication non-adherence, this association was not observed in the current study. This result compares with studies by Schweitzer et al. (2007) and Corvera-Tindel et al. (2004) that showed no relationship between the two variables among patients with chronic heart failure. The outcome of a relationship between depression and non-adherence is likely to be inconclusive due to the small number of participants in this study exhibiting symptoms of depression. However, it is essential for clinicians to pay attention to these negative emotional symptoms because overlooking them may further decrease attempts to manage the global burden of chronic diseases.

5.1.1.2.2: Anxiety

Moderate to extremely severe anxious symptoms were recorded in 57% of the study participants with 41 of them reporting extreme symptoms indicative of the diagnosis of anxiety. Anxiety is noted to be common among hypertensive patients and this result is consistent with the high prevalence of anxiety found among hypertensive patients in South Africa, China and Argentina (Grimsrud, Stein, Seedat et al., 2009; Han, Xu, Hong et al., 2008; Vetere, Ripaldi, Ais et al., 2007). In line with the above studies, the various reports from Africa, Asia and Southern America, shows the presence of anxiety on hypertension in spite of cultural variability; yet anxiety was not mentioned as part of the medical information gathered on the diagnosed co-morbid health conditions. This shows a great discrepancy between the number of reported co-morbidities probably undiagnosed by clinicians. It is however important to note that this finding is interpreted with some degree

of caution, in that, the co-morbidities were self reported from the patients' perspective. The study did not obtain relevant health information from clinicians or from the patients' health records. However, if left unmanaged, the presence of anxiety in hypertension could result in a higher risk of morbidity and mortality as a result of hastened cardiovascular events (Roest, Martens, de Jone et al., 2010).

Though it was not measured in the scope of the present study, the anxiety may, in part, be specifically related to the medications or to the chronic health condition (Kasahara, Ohno & Sugo, 2002). Additionally, previous studies carried out in this area showed anxiety was correlated with medication non-adherence (De Jong, et al, 2008; Schweitzer et al., 2007; Walsemann & Perez, 2006) and adherence (Kim et al., 2010). The present study did not observe any significant association between anxiety and adherence; nonetheless, the findings on the prevalence of anxiety support the need for clinicians to take critical action in addressing the negative emotional needs of anxious hypertensive patients.

5.1.1.2.3 Stress

One important finding in this study relate stress and medication adherence in this group of patients. The study reported about 20% of patients exhibiting moderate to severe high scores of stress symptoms which may require clinical attention and management. In the case of hypertension, stress is noted to stimulate the production of vasoconstriction hormones by the nervous system to further elevate blood pressure. This could additionally affect treatment outcomes and achieve poor blood pressure controls. Similar to earlier studies on HIV/AIDS (Leserman, 2008) and acute coronary syndrome (Molloy, Perkins-Porras, Strike & Steptoe, 2008), high stress scores on the DASS were found to be

associated with medication non-adherence among the study participants. A probable explanation is that patients showing stress symptoms may be more susceptible to the negative effects of their medications and as a result may discontinue taking them.

Studies on emotional determinants of medication adherence have focused primarily on depression and anxiety symptoms; however significant stressful events have been reported to be responsible for hypertension (Higginbottom, 2008; Spencer, Phillips & Ogedegbe, 2005). Although stress is an inevitable aspect of life, the current study has brought the importance of not ignoring it as it can serve as a critical pointer of a relationship between stressful events and medication adherence in hypertension. This observation further supports the need for health providers in this area to pay particular attention to medication adherence in patients who are stressed or those who could potentially be affected by stress.

5.1.1.2.4 Relationship between spirituality/religiosity and emotional (depression, anxiety, stress) symptoms

From this study, spirituality related significantly with symptoms of all three emotional experiences, while, the role of non-organized religious activity was significant for depressive symptoms. The significant association of spirituality with emotional characteristics as demonstrated by this study shows that the more spirituality was important in the lives of patients, the less they exhibited symptoms of depression, anxiety and stress. A similar result was observed for non-organized religious activity and depression. These strong spiritual and religious attributes enabled patients cope better with the emotional features of having a chronic condition like hypertension. Greater spiritual well-being has

been found to be associated with fewer symptoms of depression, anxiety and stress (Koenig, 2002; McClain, Rosenfeld & Breibart, 2003; McCoubrie & Davies, 2006; Rodin, Lo, Mikulincer et al., 2009). Most of these studies relate to terminally ill patients yet, the outcome from this study has demonstrated a confirmation of the alleviating role of spirituality in emotional experiences that can be applicable to hypertensive patients and by extension, patients with other chronic conditions.

5.1.2 Cultural determinants

5.1.2.1 Spirituality/ Religiosity

The study has demonstrated a high sense of spiritual belief among hypertensive patients (Table 3.3.1.1). Of the 400 hypertensive patients, about 90% were Christians, 5% were Muslims, while 1% identified with the Traditional religion. This trend is comparable to findings from the national population census in 2010, in which approximately 71%, 18% and 5% of the Ghanaian population were Christians, Muslims, and Traditionalists respectively. Similarly, a great proportion (88.5%) of patients regularly (once or more than once a week) attended church or other religious meetings, and a major percentage (62%) of the patients frequently (daily or more than once a day) engaged in non-organized religious activities like prayer, meditation, or Bible study (Tables 3.3.2.1, 3.3.2.2). It was also apparent from the Spiritual Perspective Scale that very high proportions of patients frequently engaged in spiritually related activities. These spiritual activities formed noteworthy aspects of their daily lives. Though the study expected that spirituality would relate significantly with religiosity, our postulation was not supported. This trend was observed among respondents who had exhibited high beliefs in spirituality as well as increased involvement in religious activities. The variation implies that although

spirituality and religiosity are divinely closely interwoven, they can be distinguished as two-dimensional constructs as proposed by Pearce et al (2003). The participants associated spirituality and religiosity with different domains of their lives. Hence one could be spiritual and not commit to any organized or non-organized routine of divine activities. Similarly, a religious person may not exhibit high spiritual beliefs.

Studies examining differences in spirituality and religiosity by age, sex and religious affiliations have given varied reports. Yet, generally, high spirituality has been observed among females compared to males, and Protestants (Smith, 2005) but found to decline with age (Wallace et al., 2003). Results of the present study indicated an insignificant relationship between spirituality and age, sex and religious affiliation. This could mean that, high spiritual and religious levels exist among hypertensive patients irrespective of their diverse demographic characteristics.

With respect to the number of years of being hypertensive, association between spirituality and hypertensive years was not significant. Yet among patients, the relationship was linearly upward where spirituality increased with increasing years of hypertension. In part this might be a reflection of patients' belief in the co-existence of a relationship between spiritual beliefs and having hypertension. This theme of illness conceptualization addressed participants' perceptions about the etiology of hypertension. Generally participant's conception of hypertension and illness was explained within the broader Ghanaian context of spiritual determinism. This conviction was based on individual beliefs and personal supernatural experiences with the spiritual world. Similar to other studies, while some

patients had a revelation about their condition, others saw hypertension as a spiritual problem stemming from sin and witchcraft (King, 2012; Osamor & Owumi, 2010).

It is also possible that patients had some difficulty in understanding the concept of hypertension as a chronic condition. Usually, patients seek medical care with the hope of getting a cure for their disease. They would explore other avenues when the healing is not forthcoming. As the hypertension persists for years, patients may hope for spiritual intervention. Their level of spirituality may increase because of the belief that an inextricable interconnectivity exists between spirituality and cure of hypertension.

The mounting spirituality with years of hypertension could also reflect a way of coping with the chronicity of the condition. It was obvious that spirituality had a good influence on their general well-being with particular emphasis on the role of faith and prayer as imperative to cure or achieve better health outcomes. Consistent with earlier studies, spirituality/ religiosity has served as a pertinent resource to cope with chronic diseases (Büssing et al., 2010; Lewis, 2011).

With regard to establishing a relationship between spirituality/ religiosity and anti-hypertensive medication adherence, we observed that while spirituality significantly influenced non-adherence, organized and non-organized religiosity did not. Likewise, after controlling for demography and co-morbidities, patients with high spirituality were 2.68 times more likely to be poorly adherent than patients who place lower emphasis on the association between spirituality and health. This means that the lower likelihood of adhering to treatment was a result of high spiritual beliefs of patients and not behavioral

religious characteristics. These outcomes directly contradict our postulation that *'spirituality/religiosity will significantly influence medication adherence positively'*. The results also contradict findings by Simoni, Frick, and Huang (2006) and Raghavan et al (2013) whose studies have shown a positive impact of spirituality/ religiosity on medication adherence. It is worth noting that these studies were not conducted with a sub-Saharan African population. Spirituality/religiosity is an important component of the cultural beliefs of Africans, but to date there is little information examining how sub-Saharan Africans, and specifically Ghanaian adults with hypertension, relate spirituality/religiosity to medication adherence.

For example, consistent with a study which examined barriers to antiretroviral therapy (ART) adherence in Uganda, Wanyama et al (2007) noted that some patients discontinued ART because of a belief in spiritual healing. In this study, it has been demonstrated that although hypertensive patients exhibited high spiritual beliefs and engaged in frequent religious activities, spirituality and not religiosity influenced medication non-adherence. Thus, beliefs and practices can be treated as separate domains.

These results seem to suggest that hypertensive patients related more to experiences of peace, and reverence or attachment with a Supreme Being (Johnstone et al., 2008). Potentially, they may place more trust in the divine expectation of healing and not on conventional orthodox medications. The patients may tend to believe in God or a Supreme Being for possible healing, knowing the chronic and in most cases incurable nature of hypertension (Wanyama et al., 2007). This further suggests that some patients would risk

not taking their medications while anticipating divine healing outcomes. The observation is in line with spiritual causal theories strongly underlining chronic conditions in Ghana (de-Graft Aikins, Anum, Agyemang et al., 2012). In a related study on medication adherence among persons with mental illness in Ghana, a similar trend was observed. Patients and their families sought spiritual interventions for their mental illness because they perceived the conventional antipsychotic medications failed to achieve complete cure (Read, 2012). It is thus imperative for health professionals to be holistic in their approach to healthcare by taking into consideration the importance of the spirituality of their patients while providing care. Most patients acknowledged the importance of their health providers integrating spiritual beliefs in their hypertension management due to the belief that God heals patients through their health providers.

5.1.3 Socio-economic determinants

5.1.3.1 CAM use

The study has provided one of the first reports on CAM use among hypertensive patients in Ghana. While documented evidence suggesting that CAM use is common among hypertensive patients, results from this study revealed that 78 (19.5%) out of the 400 hypertensive patients who participated in the study used CAM alongside conventional medical treatment. This study has shown a relatively lower rate of CAM use among hypertensive patients than rates of 29% and 39.1% reported in Nigeria by Osamor & Owumi (2010) and Amira & Okubadejo (2007) respectively. It is however higher than a rate of 7.8% reported in the USA by Bell et al (2006) and falls within the range of 2% - 46% in patients with cardiac diseases as shown by Grant et al., (2012).

Patients' use of complementary therapies was conceptualized as continuous and partial (Link et al., 2013). While 'continuous' signifies the daily use of therapy alongside conventional medications, 'partial' use was directed at combining complementary therapies with the orthodox ones on an as-and-when basis. Some participants replaced their anti-hypertensive medications with the alternative therapies because the pharmacologic treatments did not satisfactory control the blood pressure. They attempted to avoid or manage the side effects of these pharmacologic agents, and to augment the effect of the prescription medications in order achieve better holistic therapeutic outcomes (Osamor & Owumi, 2010; Shorofi, 2011; Ventola, 2010). One possible explanation why patients used CAM is that they probably had difficulty understanding the concept of hypertension being a "chronic condition" with no apparent cure. Thus, some patients decided to explore alternatives to their western medications for a possible cure.

The perception that biological based products are natural, less toxic, with relatively little or no side effects may have accounted for their significant use among the study participants. Additionally, compared with other types of CAM therapies, patients may believe that these biological based treatments are more effective for the management of hypertension. The commonly utilized biological based therapies were garlic, moringa, dandelion, 'bitter leaves', pear leaves, cotton plant, and herbal preparations obtained from herbalists (Table 3.5.1.1). Consistent with other findings, some of these therapies were purchased or self formulated by the patients and usually taken orally in various dosage forms such as liquids, solids or powders (Fakeye, 2009). The CAM users minimally considered the CAM

products in relation to product strength or concentration, dosage regimen, frequency and treatment durations.

Generally, acquisition of such products was easy. The majority of participants easily obtained them from farms and backyard gardens, a considerable proportion of patients reported purchasing these readily available products from places such as the market, herbal centres, pharmacies, gym, and the church (Table 3.5.1.2). It will be difficult for these products to be effectively monitored and controlled by the appropriate regulatory bodies because of their easy availability. Moreover, there is the lack of comprehensive guidelines for the preparation, distribution and utilization of CAM practice in Ghana. A common feature in Ghana is the ease with which people display and sell their CAM/TM products and practices within the community, moving from house to house, in public transportations, on the streets, schools and even health centres. Regulating such practitioners and practices becomes quite difficult.

There is no single, adequately functional body responsible for the control, information, catalogue, in depth research and validation of safety and efficacy of all CAM/ TM. Ghana has a Traditional Medicine Practice Act, Act 595 which established a Council to regulate the licensing and practice of traditional medicine practitioners and the preparation and sale of herbal medicines (Kwete, 2006). Yet, the role of this council is not considerably recognised. Additionally, one of the objectives of the Food and Drugs Authority in Ghana is to regulate all foods, drugs and cosmetics including those that fall under herbal preparations. Yet, the realization of this mandate is far from optimal and does not include all forms of CAM/TM.

This study has revealed a critical patient perspective of how CAM is viewed and categorized. According to the NIH and NCCAM, CAM is classified into the following: alternative medical practices (e.g. acupuncture, ayurveda, homeopathy, and traditional oriental medicine), mind-body interventions (e.g. hypnosis, meditation, relaxation techniques, spiritual healing and prayer), biological based therapies (e.g. herbal medicine, vitamin and mineral dietary supplements, natural products, and special diets), manipulative and body-based methods (e.g. chiropractic medicine, massage, and osteopathic medicine), and energy therapies (e.g. biofield or bio-electromagnetic based interventions like Reiki therapy) (Chang, Wallis, & Tiralongo, 2007). Until now, spiritual interventions were cataloged as part of mind-body interventions. Yet, the role of spirituality strongly came into view to justify, explain and augment the use of the biological-based therapies. By focusing on God while using CAM, patients perceived these biological-based products as good and natural interventions coming from God to be used to treat illnesses. This further substantiates the role of patients' belief systems in hypertension management.

These findings reinforce those of previous studies in which patients perceive CAM to produce beneficial lowering effect on blood pressure (Nahas, 2008; Rabito & Kaye, 2013). With the recurring theme that CAM therapies were natural, had no side effects, and were divinely inspired, the confidence in this positive CAM outcome was intensified.

A substantial number of study participants had not disclosed their use of CAM to their healthcare providers, similar to findings from related studies (Alshagga 2011; Davis et al., 2012; Khalaf & Whitford, 2010). Likewise, the main reasons for the non-disclosure

included the perception that informing the health providers was irrelevant, the fear of health providers getting angry about CAM use and the lack of interest shown by the providers in knowing about the use of alternative remedies among their patients. This suggests that the non-disclosure by patients was logical considering their perception that CAM therapies were natural products with minimum or no adverse effects.

While noting the relevance of CAM use to hypertensive patients, inadequate information flow between the patient and the healthcare provider may be problematic in patient management. Such information on CAM use is important for health professionals because they require assessing patient needs in relation to treatment outcomes, medication adherence behaviours, and possible drug interactions. The lack of such monitoring may predispose patients to the risk of developing complications as a result of poor blood pressure control with its associated high incidence of cardiovascular morbidity and mortality. Additionally, the lack of disclosure of CAM use could possibly reflect the negative therapeutic consequences associated with inadequate practitioner-patient relationships in healthcare. This view was articulated when participants stressed the need for good relationships between them and their health providers.

In this study, males were about three times more likely to use CAM than females. The findings are in line with previous studies reporting CAM use dominantly among males (Elkins, Rajab & Marcus, 2005) and at the same time contradicting what has been reported by other researchers (Aziz & Tey, 2009). This study also revealed a significant association between the experiences of anti-hypertensive medication side effects and CAM use.

Generally, the side effects that characterize some anti-hypertensive medications relate to erectile dysfunction and other sexual performance difficulties. It is also worth noting that in Ghana and commonly Africa, issues about sexuality constitute cultural constructs that predominantly express masculine worth, dominance and fertility (Swartz, 2003). Therefore, it is plausible that the male study participants may have relied on CAM instead of their conventional medicines or used CAM to help alleviate the potential side effects associated with their anti-hypertensive medications.

Although CAM use was insignificantly associated with medication non-adherence behaviour, we note the fact that CAM users were more than twice as likely as those who did not use CAM to be non-adherent. This information is undoubtedly valuable for designing intervention programmes to enhance patient medication adherence and health outcomes.

5.1.3.2 Anti-hypertensive medication affordability

Inability to afford medications was found to be a significant determinant of CAM use. A previous study identified inability to afford anti-hypertensive medications as the main reason for the high medication non-adherence rates among hypertensive patients in Ghana (Buabeng et al., 2004). While the current study does not directly address this trend, the focus was on identifying a potential association between affordability and CAM use which has been noted in past studies as providing cheaper alternatives to hypertension management. The findings from this study suggest that these patients sought less expensive

options of hypertension management because they had difficulty acquiring conventional anti-hypertensive medications.

5.1.4 Pharmacological determinants

5.1.4.1 Anti-hypertensive medication side effects

Medication side effects were observed to be a potential factor that could repress adherence. The majority (60%) of hypertensive patients pointed out that they experienced moderate to high side effects which included difficulty sleeping, erectile dysfunction, reduced sexual drive, constipation, chest pain, depressed mood, headaches, cough, fatigue and dizziness (Tables 3.6.1.1, 3.6.1.2). These symptoms are consistent with what has been previously reported and clearly outlined in medical literature (BNF, 2013). In terms of sex differences, associations were observed for fatigue, depressed mood, diarrhea and obviously erectile dysfunction. Medication side effects as a significant major cause of non-adherence are well-documented (Ho et al., 2006; Morgado, Rolo, Macedo et al., 2010, Osterberg & Blaschke, 2005; Recker et al., 2005).

The main reasons participants gave for the side effects experienced were, forgetting to take their medicines, the lack of thorough laboratory investigations and the chemical composition of the medicines. The former response seems to suggest that some participants thought their treatment was essential and asymptomatic, thus forgetting to take the medicines was the actual cause of the side effects they experienced.

In comparison with earlier investigations on medication side effects, the current study has also shown that the roles of cognition, society, the media and the attitude of clinicians were important in medication adherence behaviour (Proulx, Leduc, Vandelac et al., 2007;

Viswanathan & Lambert, 2005). First, remembering to take one's medication is a vital tool in aiding adherence to conventional treatment (Nair, Belletti, Doyle et al., 2011). Second, there is the heightened need for clinicians to consider educating sexual partners of male respondents who stop taking their medications because they want to avoid the problem of erectile dysfunction.

Media censoring can help to curb the influence of incomplete health information on the adherence behaviour of patients. Listening to information on medication and their side effects led to non-adherence among some participants. Yet the media could be probably explored as a helpful tool to send important information highlighting medication adherence (Goodfellow et al., 2013). To reduce medication side effects, some participants were motivated to modify the dose or the timing of medication intake. On the other hand some patients sought to use CAM therapies while others had their medications amended by their clinicians.

External LoC did not considerably influence medication adherence yet when employed, external LoC significantly played a role in the relationship between side effects and adherence. The study showed that, external LoC on its own may not be a true predictor of adherence behaviour, but, in the presence of barriers to medication intake such as side effects, the role of external LoC was highly important. In contrast, higher internal locus of control was found to be beneficial when barriers to medication adherence were low, but at high perceived barriers, internal locus of control played a lesser role in medication adherence among hypertensive veterans in the U.S.A. (Hong et al., 2006). However, the

possibility of patients managing high external LoC and employing an enhanced internality as an underlining preserve in managing experiences of side effects associated with medications can still be suggested. With the existence of barriers to medication intake, intervention programmes for non-adherence can be directed towards a greater involvement of personality characteristics such as LoC. Similarly, experiences of medication side effects had psychosocial underpinnings. For example, though the feeling of erectile dysfunction is a biological issue, the thought of becoming impotent has a strong psychological impact on a man within the African cultural context (Swartz, 2003). Socially, the need to be able to satisfy sexual partners would be an issue of concern.

5.1.4.2 Dosing frequency and medication adherence

In exploring the relationship between frequency of medication dosing and medication adherence, varied findings have emerged. While Shalansky and Levy (2002) observed lower adherence rates with fewer medications as against better adherence among patients on chronic cardiovascular regimens with frequent dosing regimen; evidence from a meta-analysis of eight studies showed that adhering to once daily dosing was significantly higher than that for multiple daily dosing (Iskedjian, Einarson, MacKeigan et al., 2002). Some studies have not found any association between the two variables (Hassan, Hasanah, Foong et al., 2006). The current study noted that while the number of times per day for taking medicines significantly correlated with non-adherence the number of medicines taken daily did not. One explanation for this observation is that the number of medicines taken per day was not as important to the patients as the number of times they took the medicines in a day. Thus patients would comfortably take multiple regimens so long as they could be

taken once daily. Psychologically, patients may view the frequency of taking medicines as denying them of some form of personal freedom. Life may be perceived as regimented with a sense of lost control of own self when emphasis is placed on organizing one's daily routine by incorporating repeated intake of medications.

5.2 LIMITATIONS OF THE STUDY

Some limitations of this study are acknowledged. First, although participants were selected from tertiary institutions that serve a diverse population, results may not be widely generalizable. This is because hypertensive patients access and are managed in other hospitals in Ghana other than just these two teaching hospitals. Second, by using self-reported measures of medication adherence recall bias, providing socially acceptable responses and wrong adherence estimation may be inevitable. Another limitation of this study is the lack of obtaining relevant health information from clinicians or from the patients' health records particularly on co-morbid health conditions which were primarily from the patients' standpoint.

5.3 CONCLUSIONS

Medication non-adherence in relation to chronic disease management is a major health problem in Ghana. The results of this study bring to bear a persistent problem of non-adherence to anti-hypertensive medication among the Ghanaian population as a result of psychological, cultural, socio-economic and psychopharmacological factors. There is therefore the need to highlight these variables in intervention programmes to improve adherence to pharmacotherapy.

The LoC construct has been one of the most widely considered predictors of health-related behaviour among patients. This study showed that hypertensive patients exhibited a mixed LoC referred to as “bilocal” LoC. Yet this mixed orientation was skewed towards externality.

Furthermore, the study filled the knowledge gap in relation to establishing an association between spirituality/ religiosity and medication adherence among hypertensive patients in Ghana and by extension sub-Saharan Africans. The study outcome has demonstrated that while high spiritual and religious beliefs form core components of the lifestyles of hypertensive patients, spirituality related directly to medication non-adherence. Thus, religiosity ought not to be equated to spirituality. The results from this study suggest that the reverence, experiences, and attachment of patients with a supreme being may potentially increase their trust or expectation of divine healing to the detriment of reliance on conventional orthodox anti-hypertensive medications.

The study observed that some patients experienced symptoms of anxiety, followed by stress and depression. Stress was associated with medication non-adherence among hypertensive outpatients thus there is the need for clinicians to pay attention to this aspect of patient care. Further, spirituality/ religiosity helped patients cope with the emotional burden of having a chronic condition. The suggestion is that attention should be directed toward the use of spirituality as a possible mechanism by which negative emotions could be managed among hypertensive patients.

The present study has reported CAM use among hypertensive patients in Ghana. The majority of CAM users relied on biological based therapies such as garlic, moringa, dandelion, bitter leaves, pear leaves, and herbal preparations. The main determinants of CAM use inability to afford anti-hypertensive medications, being a male and side effects of conventional medicines. The majority of CAM users had not disclosed their CAM utilization to their healthcare providers. The main reasons for the non-disclosure were that informing the health providers was irrelevant, the fear of clinicians getting angry about CAM use and the lack of interest shown by the providers in knowing about the use of alternative remedies among their patients. Although no significant association between CAM use and medication adherence was observed, participants who used CAM had a greater likelihood of non-adherence than those who did not use CAM.

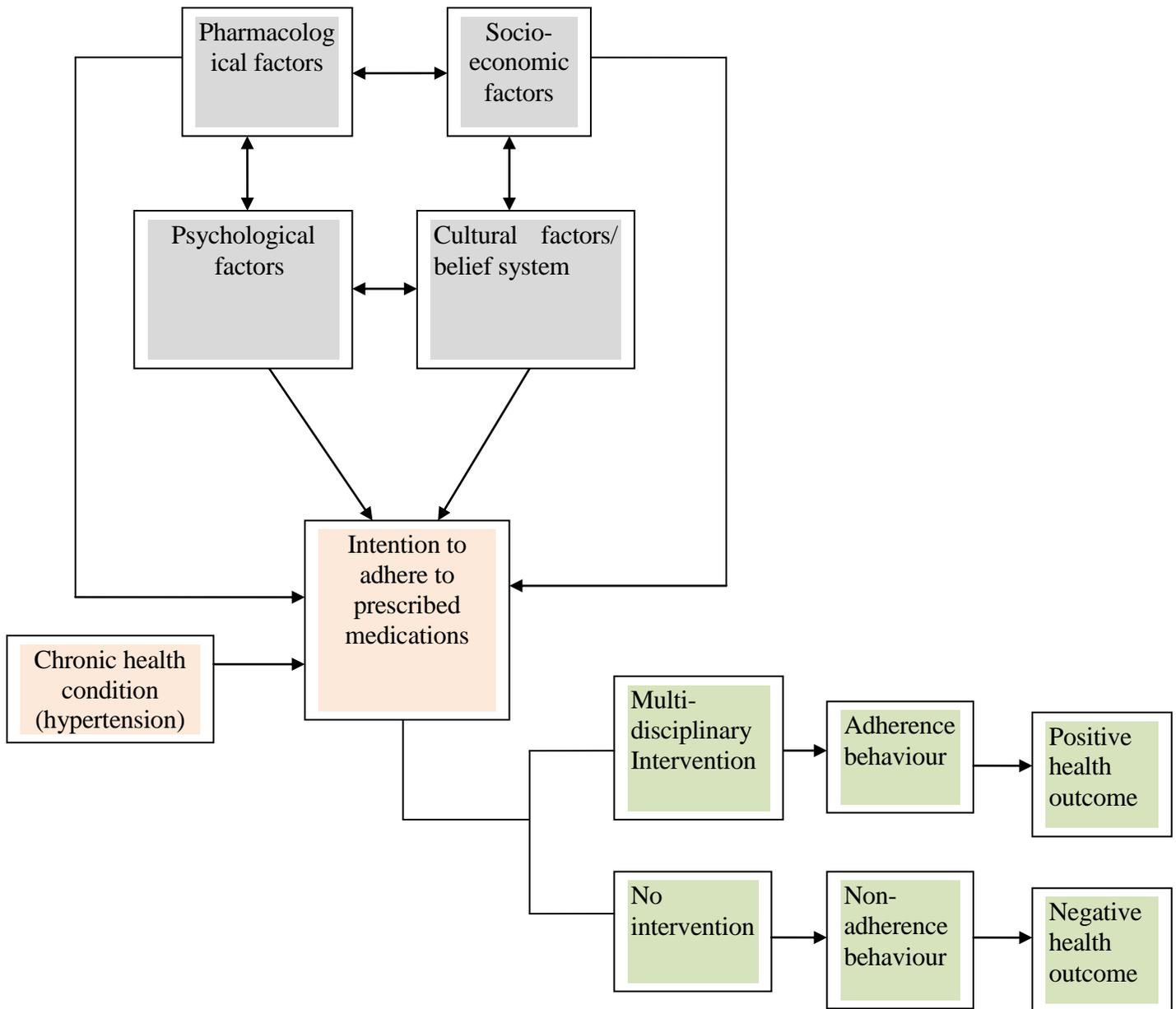
Antihypertensive medication side effects and the number of times these medicines are taken in a day should be considered as possible causes of medication non-adherence among hypertensive patients. Addressing these determinants in any intervention may improve adherence and invariably control blood pressure.

5.4: RECOMMENDATIONS FOR MEDICATION ADHERENCE MODEL, IMPLICATIONS FOR CLINICAL PRACTICE AND INTERVENTION, AND HEALTH RESEARCH.

5.4.1 Proposed theoretical model for medication adherence

Based on the findings from this current study, a theoretical model on determinants of medication adherence among hypertensive patients is recommended for healthcare practitioners involved in the management of hypertension. Non-adherence issues were influenced by an inter-play of psychological, cultural, socio-economic and pharmacological factors. However, the dynamics of this interaction is such that the psychological and belief system dominated in interacting with the other factors in addition to relating with non-adherence. This model has connotations for scientific research and clinical purposes in enhancing medication adherence among hypertensive patients.

Figure 3: A model representing the theoretical framework for Biopsychosocial determinants of anti-hypertensive medication adherence and non-adherence behaviour



Source: Author's construct, based on the health belief model and results from field work on Biopsychosocial determinants of medication adherence.

5.4.2 Implications for clinical practice

This study has shown that medication non-adherence among hypertensive patients remained a foremost health problem in Ghana. Biopsychosocial factors related significantly with adherence. There is the need for a multifaceted intervention programme which would take these biological, social and psychological factors into consideration. This work has also shown that there is the need for the multi-disciplinary approach to healthcare where all forms of expertise are incorporated into health provision and patient care. The involvement of clinicians, pharmacists, clinical/ health psychologists, religious leaders, and nurses is very important to remedy the problem of non-adherence and invariably improve the quality of life outcomes of patients. Efforts should be in place to set up specialized clinics within the hospitals where hypertension and other chronic disabilities could be managed from a multi-disciplinary perspective.

In the domain of psychological and mental health, the management of hypertension in Ghana clearly requires the services of Psychologists. Clinical/ health psychologists' role will focus on early screening of co-morbid mental health problems, personality modifications and stress management. Inferring from the fact that stress is manageable and LoC can be modified due to personality trait - environment interaction, significant input could be made by the psychologists to manage these factors which negatively affected the adherence behaviour of participants.

The study further suggests that when treating patients or implementing medication non-adherence intervention programmes, considerable emphasis should be on the dynamics of the effects of spirituality mainly and religiosity minimally. Healthcare providers should

recognize the importance of a significant relationship between spiritual beliefs and practices that are likely to shape adherence behaviour. Thus health providers should engage their patients and offer resourceful approaches to manage non-adherence while encouraging meaningful spiritual beliefs and religious practices. This submission is also based on the added advantage of the role spirituality and religiosity played in helping patients cope with the negative emotional burden of having hypertension. Additionally, trained religious leaders could be contacted for their expertise.

It is also imperative that clinicians understand the patterns and determinants of CAM use among their patients in order to incorporate intervention programmes to enhance health outcomes. Most CAM users had not disclosed their CAM behaviour to their clinicians. One probable approach to resolve this problem is to strengthen the trust patients have in their clinicians and reinforce positive therapeutic communication in a patient-clinician relationship. Clinicians are encouraged to engage their patients and increase patient involvement whilst managing their hypertension.

Socio-economic factors predisposed patients to CAM use because of the difficulty with anti-hypertensive medication affordability. This information has a policy implication with the suggestion that medications for hypertension and other chronic conditions could be subsidized to an easily affordable rate.

Considerable attention need to be given by health providers in educating patients on potential medication-related side effects which may decrease adherence to anti-hypertensive medications. Clinicians could further make a positive impact by adjusting

doses or prescribing substitute medications. Correspondingly, emphasis could be placed on reducing the frequency medicines are taken daily. Similarly, the feelings of the side effects are further enhanced when negative emotions are present. Hence when the symptoms of anxiety, depression and stress are managed by Clinicians or Psychologists, there could be a corresponding reduction in the adverse experiences associated with the medications.

5.4.3 Suggestions for further studies

1. In order to make the results of related studies generalizable, further studies should include hypertensive patients who would be recruited from primary and secondary health institutions. Such patients whose health conditions may not merit referrals to tertiary hospitals would be the target.
2. There is the heightened need for the introduction of pharmacy mechanical refill devices, electronic medication monitors, and physiological markers which would enable the health professional, particularly, clinicians, pharmacists and nurses to evaluate levels of medication adherence. Future studies can then supplement patients' report on adherence with what would be obtained from the health providers in order to get more dependable adherence measures.
3. In subsequent related studies, specific information on co-morbid health conditions may be sought from the clinicians or from the clinical records of patients. The misrepresentation of such germane medical information from the patients' perspective alone may be avoided.
4. High levels of medication non-adherence among hypertensive patients could negatively impact health outcomes leading to considerable worsening of disease, increased health care

costs, and eventually death. In future, medical assessments, quality of life appraisals, as well as socio-economic outcome measures may well be incorporated into related studies.

5. Finally, the findings from this study may have some relevance for other chronic health conditions such as diabetes and depression. The study could possibly be replicated to cover other chronic conditions whose strict adherence to medications impact proportionally on health outcomes.

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APPENDIX I

Ethical clearance letters from,

1. Committee of Human Research, Publications and Ethics of Komfo Anokye Teaching Hospital
2. Institutional Review Board (IRB) of the Noguchi Memorial Institute for Medical Research.



KWAME NKURUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES



SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/022/12

24th January, 2012.

Mrs. Irene M. Akwo-Kretchy
Department of Clinical & Social Pharmacy
KNUST

Dear Madam,

LETTER OF APPROVAL

Protocol Title: *"Factors Associated with Adherence and Non-Adherence in the Use of Medications in the Management of Hypertension."*

Sponsor: University of Ghana, Office of Research, Innovation and Development.

Proposed Site: *Department of Medicine, Komfo Anokye Teaching Hospital, Kumasi and Department of Medicine, Korle Bu Teaching Hospital, Accra.*

Your submission to the Committee on Human Research Publication and Ethics on the above named protocol refers.

The Committee reviewed the following documents:

- A completed CHRPE Application Form.
- Research Proposal.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, renewable annually thereafter. The Committee may however, suspend or withdraw ethical approval at anytime if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you Madam, for your application.

Yours faithfully,

Osomfuor Prof. Sir J. W. Acheampong MD, FWACP
Chairman

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH
Established 1979 *A Constituent of the College of Health Sciences*
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INSTITUTIONAL REVIEW BOARD



Post Office Box LG 581
Legon, Accra
Ghana

My Ref. No: DF.22
Your Ref. No:

6th July, 2011

ETHICAL CLEARANCE

FEDERALWIDE ASSURANCE FWA 00001824

IRB 00001276

NMIMR-IRB CPN 044/10-11

IORG 0000908

On 6th July 2011, the Noguchi Memorial Institute for Medical Research (NMIMR) Institutional Review Board (IRB) at a full board meeting, reviewed and approved your protocol titled:

TITLE OF PROTOCOL : **Factors associated with adherence and non-adherence in use of medications in the management of hypertension**

PRINCIPAL INVESTIGATOR : **Irene M. Akwo Ktrechy**

Please note that a final review report must be submitted to the Board at the completion of the study. Your research records may be audited at any time during or after the implementation.

Any modification of this research project must be submitted to the IRB for review and approval prior to implementation.

Please report all serious adverse events related to this study to NMIMR-IRB within seven days verbally and fourteen days in writing.

This certificate is valid till 5th July, 2012. You are to submit annual reports for continuing review.

Signature of Chairman: 
Rev. Dr. Samuel Ayete-Nyampong
(NMIMR – IRB, Chairman)

cc: Professor Alexander K. Nyarko
Director, Noguchi Memorial Institute
for Medical Research, University of Ghana, Legon

APPENDIX II

STUDY PARTICIPANTS INFORMATION SHEET AND INFORMED CONSENT FORM

Title of Research

Biopsychosocial determinants of medication adherence among hypertensive patients in Ghana.

Principal Investigator

Irene M. A. Kretchy, Department of Clinical and Social Pharmacy,
Faculty of Pharmacy and Pharmaceutical Sciences, Kwame Nkrumah University of
Science and Technology, Kumasi.
Phone number: 0244217845

General Information about Research

As part of the requirement for a PhD degree in Social Pharmacy, I am undertaking this research on the topic 'Psychosocial and Pharmacologic Determinants of Adherence to Hypertension Medication'. The study seeks to identify the roles played by psychological, social and pharmacologic factors in assessing the level of adherence or non-adherence to medication use in hypertensive patients and to predict the outcome and possible intervention strategies.

If you agree to participate in the study, you will spend about thirty (30) minutes to complete the questions.

If you are interested in being part of an interview on the same research work where you would have the opportunity to freely express yourself in detail, please inform me so I can arrange to interview you on a later date.

Possible Risks and Discomforts

There is an emotional component of the study and some questions may remind you briefly of some emotional challenges.

Possible Benefits

Results from the study will help patients, healthcare professionals and inform policy makers in improving the life of hypertensive patients and minimize hypertension complications through enhanced adherence behavior to medication use.

Confidentiality

In participating in this study, you are assured of strict confidentiality and anonymity with regard to any information you given. Your name would not be needed and would therefore not appear in any published research, neither will it be associated with any statement or information given in this study.

Right to Participate

Please note that your participation is voluntary and you may wish to stop being a participant at any time. You can also choose to skip any question you do not wish to answer although I will be grateful if you attempt almost all questions. The study does not have any direct link with the hospital so you are assured that the services you receive from this facility will not be affected in anyway.

Ethical Approval

This research has been reviewed and formally approved by the Committee for Human Research, Publications and Ethics at KNUST & KATH (Kumasi) and Institutional Review Board of Noguchi Memorial Institute for Medical Research (Accra).

If you have any questions about your rights as a research participant you can contact the IRB Office of NMIMR (Accra) through the landline 0302916438 or CHRPE (Kumasi) on 0322063248.

VOLUNTEER AGREEMENT

I have read the information describing the benefits, risks and procedures for the research.

I have been given an opportunity to have any questions about the research answered to my satisfaction. I agree to participate as a volunteer.

Date

Signature of volunteer

APPENDIX III

QUANTITATIVE RESEARCH QUESTIONNAIRE

SECTION A – BACKGROUND INFORMATION

1. Sex

Male [] Female []

2. Age

<20 [] 20-29 [] 30-39 [] 40-49 [] 50-59 []
60-70 [] (exact age)

3. Marital status

Single [] Married [] Widowed [] Divorced/ Separated [] Co-habiting
[]

4. Education

None [] Non formal education [] Primary [] Middle School []
O Level [] A Level [] JSS [] SSS [] Training college []
Vocational college [] Polytechnic [] University []

5. Employment

Full time [] Part time []

6. Self- employed [] Unemployed []

7. Type of work (specify)

.....

8. Monthly income (Ghana cedis)

0 – 50 [] 51- 100 [] 101-500 [] 501-1000 [] 1001-2000 []
2000+ [] N/A [](specify)

9. Place of residence

Rural [] Urban []

.....(specify)

10. Religion

Christian (spiritual eg MDCC) []

Christian (Charismatic/Pentecostal eg Assemblies of God) []

Christian (Orthodox eg Roman Catholic) []

Muslim []

African Traditional Religion []

Other (specify)

.....

11. How long have you been hypertensive?

.....

12. What is the total number of hypertension medicines you take in a day

1 [] 2 [] 3 [] 4 [] 5 and more []

13. How many times in a day do you take your medicines

1 [] 2 [] 3 [] 4 [] 5 []

14. How do you get/buy your medicines

Health insurance only [] Self only [] Health insurance and self []

Friends and family [] Other (specify).....

15. If you have to buy your medicine, how affordable is it

Very affordable [] Quite affordable [] Somehow affordable []

Not so affordable [] Unaffordable []

16. Apart from your medications, do you use any other product or practice to help manage your hypertension?

Yes [] No [] If No, why?

17. If 'Yes' specify

A M P (e.g. Ayuverda, acupuncture) []

MB I (e.g. meditation, hypnosis, spiritual healing, prayer) []

..... B B T (e.g. herbal preparations, dietary supplements, special diet) [].....

M B B M (e.g. chiropractic, massage) []

E T (e.g. touch, bioelectric) []

Other (specify)

18. How do you get the product/ service

.....

19. Why do you use these?

.....

.....

.....

20. Is your doctor aware of this product? Why?

.....

21. What has been the effect on your hypertension?

.....

.....

22. Do you have any other health condition? Yes [] No []

23. If yes specify

24. How many medicines are you taking for this condition?

SECTION B - HLOC

Please indicate (by ticking in the box) the extent to which you agree or disagree with each statement. Please note there are no right or wrong answers. The rating scale is as follows

1=Strongly Disagree

2=Moderately Disagree

3=Slightly Disagree

NO	STATEMENT	Strongly Disagree (1)	Moderately Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Moderately Agree (5)	Strongly Agree (6)
1.	If my hypertension worsens, it is my own behaviour which determines how soon I will feel better again						
2.	As to my hypertension, what will be will be						
3.	If I see my doctor regularly, I am less likely to have problems with my hypertension						
4.	Most things that affect my hypertension happen to me by chance						
5.	Whenever my hypertension worsens, I should consult a						

NO	STATEMENT	Strongly Disagree (1)	Moderately Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Moderately Agree (5)	Strongly Agree (6)
	medically trained professional						
6.	I am directly responsible for my hypertension getting better or worse						
7.	Other people play a big role in whether my hypertension improves, stays the same, or gets worse						
8.	Whatever goes wrong with my hypertension is my own fault.						
9.	Luck plays a big part in determining how my hypertension improves						
10.	In order for my hypertension to improve, it is up to other people to see that the right things happen.						
11.	Whatever improvement occurs with my hypertension is largely a matter of good fortune.						
12.	The main thing which affects my hypertension is what I myself do.						
13.	I deserve the credit when my hypertension improves and the						

NO	STATEMENT	Strongly Disagree (1)	Moderately Disagree (2)	Slightly Disagree (3)	Slightly Agree (4)	Moderately Agree (5)	Strongly Agree (6)
	blame when it gets worse.						
14.	Following doctor's orders to the letter is the best way to keep my hypertension from getting any worse.						
15.	If my hypertension worsens, it's a matter of fate.						
16.	If I am lucky, my hypertension will get better.						
17.	If my hypertension takes a turn for the worse, it is because I have not been taking proper care of myself						
18.	The type of help I receive from other people determines how soon my hypertension improves.						

SECTION C 1 - SPS

In answering the following statements, please indicate your opinion (by ticking in the box)

the extent to which each statement describes you. Note there are no right or wrong answers.

The rating scale is as follows

- 0 = Not at all 3 = About once a week
 1 = About once a year 4 = About once a day
 2 = About once a month

Statement	Not at all (0)	About once a year (1)	About once a month (2)	About once a week (3)	About once a day (4)
1. In talking with family and friends, how often do you mention spiritual matters					
2. How often do you share with others the problems and joys of living according to your spiritual beliefs					
3. How often do you read spiritually-related material					
4. How often do you engage in private prayer and meditation					
5. Forgiveness is an important part of my spirituality					
6. I seek spiritual guidance in making decisions in my everyday life					
7. My spirituality is a significant part of my life					
8. I frequently feel very close to God or 'a higher power' in prayer, during public worship or at important moments in my life					
9. My spiritual views have had an influence upon my life					
10. My spirituality is especially important to me because it answers many questions about the meaning of life					

SECTION C 2 - DUREL

1. How often do you attend church or other religious meetings?

1. More than once/week
2. Once a week
3. A few times a month
4. A few times a year
5. Once a year or less
6. Never

2. How often do you spend time in private religious activities, such as prayer, meditation or Bible study?

1. More than once a day
2. Daily
3. Two or more times/week
4. Once a week
5. A few times a month
6. Rarely or never

SECTION D – DASS -21

Please read each statement and indicate (by ticking in the box) the extent to which each statement applies to you. The rating scale is as follows:

0 = Does not apply to me at all

1= Apply to me to some degree, or some of the time

2= Apply to me to a considerable degree, or a good part of time

3= Apply to me very much, or most of the time

No.	Statement	Does not apply to me at all (0)	Apply to me to some degree (1)	Apply to me to a considerable degree (2)	Apply to me very much (3)
1.	I find myself getting upset by trivial things				
2.	I am aware of dryness of my mouth				
3.	I cannot seem to experience any positive feeling at all				
4.	I experience breathing difficulty (eg, excessively rapid breathing, breathlessness)				
5.	I just cannot seem to get going				
6.	I tend to over react to situations				
7.	I have a feeling of shakiness (eg, legs going to give way)				
8.	I find it difficult to relax				
9.	When I find myself in situations that make me so anxious I am mostly relieved when they end				

No.	Statement	Does not apply to me at all (0)	Apply to me to some degree (1)	Apply to me to a considerable degree (2)	Apply to me very much (3)
10.	I feel that I have nothing to look forward to				
11.	I find myself getting upset rather easily				
12.	I feel that I am using a lot of nervous energy				
13.	I feel sad and depressed				
14.	I find myself getting impatient when I am delayed in any way (eg, lifts, traffic lights, being kept waiting)				
15.	I have a feeling of faintness				
16.	I feel that I have lost interest in just about everything				
17.	I feel I am not worth much as a person				
18.	I feel that I am rather touchy				
19.	I perspired noticeably (eg, hands sweaty) in the absence of high temperatures or physical exertion				
20.	I feel scared without any good reason				
21.	I feel that life is not worthwhile				

SECTION E - HMSEES

Please indicate (by ticking) the frequency of your experiences with any of the side effects associated with your hypertensive medication(s).

	Experience	Never	Rarely	Sometimes	Very often	Always
1.	Dizziness					
2.	Fatigue					
3.	Cough					
4.	Headache					
5.	Confusion					
6.	Depressed mood					
7.	Chest pain					
8.	Difficulty breathing					
9.	Fainting					
10.	Constipation					
11.	Diarrhoea					
12.	Flu-like symptoms					
13.	Swelling in ankle, feet					
14.	Increased frequency of urination					
15.	Reduced sex drive					
16.	Erectile dysfunction (Impotence)					
17.	Rash					
18.	Difficulty sleeping					

SECTION F - MMAS

People have identified several issues regarding their medication-taking behaviour and I am interested in your experiences. There is no right or wrong answer. Please answer each question based on your personal experience with your hypertension medication.

Question	Yes	No
1. Do you sometimes forget to take your hypertension medications?		
2. Over the past two weeks, were there any days when you did not take your hypertension medicine?		
3. Have you ever cut back or stopped taking your medication without telling your doctor because you felt worse when you took it?		
4. When you travel or leave home, do you sometimes forget to bring along your medications?		
5. Did you take your high blood pressure medicine yesterday?		
6. When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?		
7. Do you ever feel hassled about sticking to your blood pressure treatment plan?		

8. How often do you have difficulty remembering to take all your medications?

- Never/Rarely
- Once in a while
- Sometimes
- Usually
- All the time

9. Who is responsible in making you adhere to your hypertension medication?

.....

APPENDIX IV

QUALITATIVE RESEARCH INTERVIEW GUIDE I

Spirituality/Religiosity

1. Do you think there is any interaction between Spirituality/Religiosity and illness, and why do you think so?
2. Can you tell me about a specific time when religious or spiritual beliefs influenced a decision you made concerning your health?
3. In relation to having hypertension, in what ways do your religious/spiritual beliefs influence how you deal with having the disease?
4. What about the influence of your religiosity/spirituality on how you take your hypertensive medications?
5. Tell me about your view for spiritual/ religious care by healthcare providers. In what ways can your healthcare provider incorporate R/S beliefs and practices to enhance your condition and medication adherence?

QUALITATIVE RESEARCH INTERVIEW GUIDE II

Complementary and Alternative Medicine use

1. Tell me about the types of CAM use before and after being diagnosed as hypertensive.
2. What are the main reasons for using these therapies before and after your diagnosis?
3. Who advises you on the use of this therapy?
4. Where do you get it from?
5. To what extent do you believe in the effectiveness of this remedy in relation to your hypertensive condition or otherwise?
6. Does your use of these therapies have any effect on how you take the medicines your doctor has prescribed for you? Explain your answer.
7. Are you aware or have you experienced any side-effects?
8. Is your doctor or any of your healthcare providers aware of your use of this therapy? What are your reasons for your answer?
9. Can your doctor or any healthcare professionals play any role in advising you on the use of alternative medicine, how?

QUALITATIVE RESEARCH INTERVIEW GUIDE III

Pharmacologic factors – focus group (explorative qualitative study)

1. Is there anything about your medications you don't like?
2. Why does this pose a problem to the management of your hypertensive condition?
3. In what ways can the problems you stated affect your medication adherence?
4. What are the steps you take to solve/ manage the problem?
5. In your view, what are the possible best ways to solve these problems?