UNIVERSITY OF GHANA

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

FACTORS ASSOCIATED WITH HYPERTENSIVE MEDICATION ADHERENCE AMONG ADULTS IN THE BIRIM NORTH DISTRICT

BY

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DECLARATION

I, Panyan Bodong, hereby declare that this thesis is a result of my independent work. References to other works have been duly acknowledged. I further declare that this thesis has not been submitted for an award of any degree in this institution and other universities elsewhere.

…… ……..

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DEDICATION

This study is dedicated to my brother Mr. Panyan Suukesibe Tahiru who moulded me into who I am today. I am eternally grateful for this unconditional support.

AKWOLEDGEMENT

I give thanks to the almighty Allah for the abundant grace and endurance to complete this programme.

I am forever indebted to my supervisor Dr. Chris Bambey Guure for his stewardship throughout my entire study period. I am also very grateful to Mr. Amoah and the entire School of Public Health team for their unending support.

I will also want to express my sincere gratitude to my family and friends that supported me in the various ways throughout my entire studies.

Appreciation goes to the Eastern regional health administration, Birim north district health administration, New Abirem Government hospital management and I&I clinic staff for their support.

My special thanks goes to my research team for the support in making my research a reality.

ABSTRACT

Background: High incidence of lifestyle-related illnesses and conditions create a double burden, given that the country already has a high rate of infectious diseases that require significant human and financial assets to control. High blood pressure is the main cause of cardiovascular diseases.

Objective: To determine factors that influence adherence to hypertensive medication among adults in Birim North district.

Method: A cross-sectional study was used. A sample of 244 respondents were interviewed. Data were collected using questionnaires with Morisky 8 items of medication adherence measurement with a simple random sampling method. The collected data were analyzed using STATA version 15.0 and results presented in tables and figures. Chi-square, fishers exact, binary and multiple logistic regressions were used to determine the association of hypertensive medication adherence.

Results: Prevalence of hypertensive medication adherence was 33.61% out of the 244 study participants. Average monthly income ($p<0.001$), distance from a health facility ($p<0.001$), quality of care ($p=0.009$) and longer duration on hypertensive medication were statistically significantly associated with hypertensive medication adherence. The multiple logistic regression shows that duration on hypertensive medication, availability of caregivers, distance, and quality of care were uncovered to be associated with hypertensive medication adherence among adults in Birim north district.

Conclusion: This study shows that adherence to hypertensive medication was low in Birim north district. This calls for the need for continues health education with much emphasis on the consequences of non-adherence with treatment.

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ABBREVIATIONS

BND	- Birim North District
BP	- Blood pressure
DBP	- Diastolic blood pressure
DHIMS2	- District health information management system 2
GHS	- Ghana health service
HPT	- Hypertension
NAGH	- New Abirem Government Hospital
OPD	- Out-patient department
SBP	- Systolic blood pressure
WHO	- World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Background

Globally, cardiovascular disease is the number one cause of death and has been on the rise for some time now. An estimated number of 17 million people passed on from cardiovascular diseases in 2005, representing 30% of worldwide deaths. Out of these deaths, 7.2 million was a result of a heart attack and 5.7 million were due to stroke. About 80% of these deaths occurred in low and middle-income countries (WHO, 2011). Non-communicable diseases continue to be an important public health problem in the world being responsible for sizeable mortality and disability worldwide. It is also estimated that non-communicable diseases will virtually contribute half of the global burden of diseases in developing countries (Habib & Saha, 2010).

In the past 2 decades, there has been a considerable global increase in cardiovascular diseases with hypertension remaining the most common. More than one-third of adults in Africa are hypertensive.

Hypertension is defined as a systolic blood pressure equal to or above 140mmHg and diastolic blood pressure equal to or above 90mmHg. Normal levels of both systolic and diastolic blood pressure as indicated in table 1 are particularly important for the efficient function of vital organs such as the heart, brain and kidneys (WHO, 2013).

According to the 7th Report of the Joint National Committee (JNC 7) detection, evaluation, and treatment of high BP is based on two primary values (systolic and diastolic) with a normal BP of less than 120/80 mmHg. Clinically, high blood pressure is diagnosed based on right measurement of the mean (average) of two or more readings of BP checked.

Table 1: Classification of hypertension

Category	SBP mmHg	DBP mmHg
Normal	< 120	and < 80
Pre-hypertension	120-139	or 80-89
Stage 1 hypertension	140-159	or 90-99
Stage 2 hypertension	≥ 160	or ≤ 100

(Chobanian et al., 2003)

Pre-hypertension is not a form of disease classification but rather use in the clinical field to identify who was actually vulnerable to the development of hypertension, which will enable both the patients and the health care system to be aware of the risks and appropriate measures in curbing or controlling the disease from developing. These identified groups of individuals are advised on the lifestyles practices that may have a potential danger of developing the disease later on. Most cases of high blood pressure (hypertension) are classified as essential hypertension which can be treated and cannot be cured and specific identifiable causes of secondary hypertension are known.

Primary and secondary hypertension are the main two classifications of hypertension.

Hypertension is a common disorder and a leading cause of morbidity and mortality worldwide. The majority (90%) of patients have primary or essential hypertension where no identifiable cause is found. The remaining minority (up to 10%) have secondary hypertension where a cause is identified (Ng et al., (2010).

Hypertension is the leading cause of heart failure and responsible for more than half of deaths from stroke (Tibazarwa & Damasceno, 2014).

In Ghana, the high prevalence of lifestyle-related diseases and conditions create a dual burden, given that the country already has a high number of infectious diseases that require significant human and financial resources to control. High blood pressure is the major factor of cardiovascular diseases. Health facility-based records indicate that hypertension is the leading cause of disability among adults in Ghana (Ghana Statistical Service, 2015).

Patients with chronic conditions like hypertension may experience many negative emotions which may increase their risk for the development of mental health disorders particularly anxiety and depression. Patients with hypertension experienced symptoms of anxiety (56%), stress (20%) and depression (4%) (Kretchy et al.,2014b).

Treatment of chronic illness such as hypertension commonly includes the long-term use of pharmacotherapy. Although these medications are effective in combating diseases their full benefit are often not realized because approximately 50% of patients do not take their medications as prescribed (Brown & Bussell, 2011).

Hypertension adds to the burden of heart diseases, stroke, kidney failure and premature mortality and handicap. It disproportionately affects the population in low and middle-income countries, where medicinal services frameworks are weak. There are significant health and economic gains attached to treatment and good control of hypertension. The cumulative lost of revenue in low and middle-income countries associated with non-communicable diseases is projected as US$ 7.28 trillion, the annual loss of US$ 500 billion which amount to 4% of gross domestic product with cardiovascular diseases including hypertension (WHO 2013).

1.2 Problem statement

The issue of poor adherence to hypertension medication is significant to the healthcare sector. 60% of persons with the chronic disorder are inadequately disciple to treatment (Dunbar-Jacob & Mortimer-Stephens, 2001). Half (50%) of patients with wretchedness quit taking their drug within three months and 9000 hypertensive patients die prematurely every year because of poor medication adherence (Pm et al., 2013). Patient's compliance with anti-hypertensive medication to prevent complications remain a major challenge in many developing countries. Nonadherence with treatment is the most important single reason for uncontrolled hypertension (Edo, 2009).

It is essential to control hypertension in cardiovascular diseases. Poor medication adherence is associated with poor disease outcomes, waste of health care resources and contributes to reduced blood pressure control (Yassine et al., 2016). Poor adherence to prescribed medication is a major cause of treatment failure, particularly in chronic diseases such as hypertension (Ramli et al.,2012).

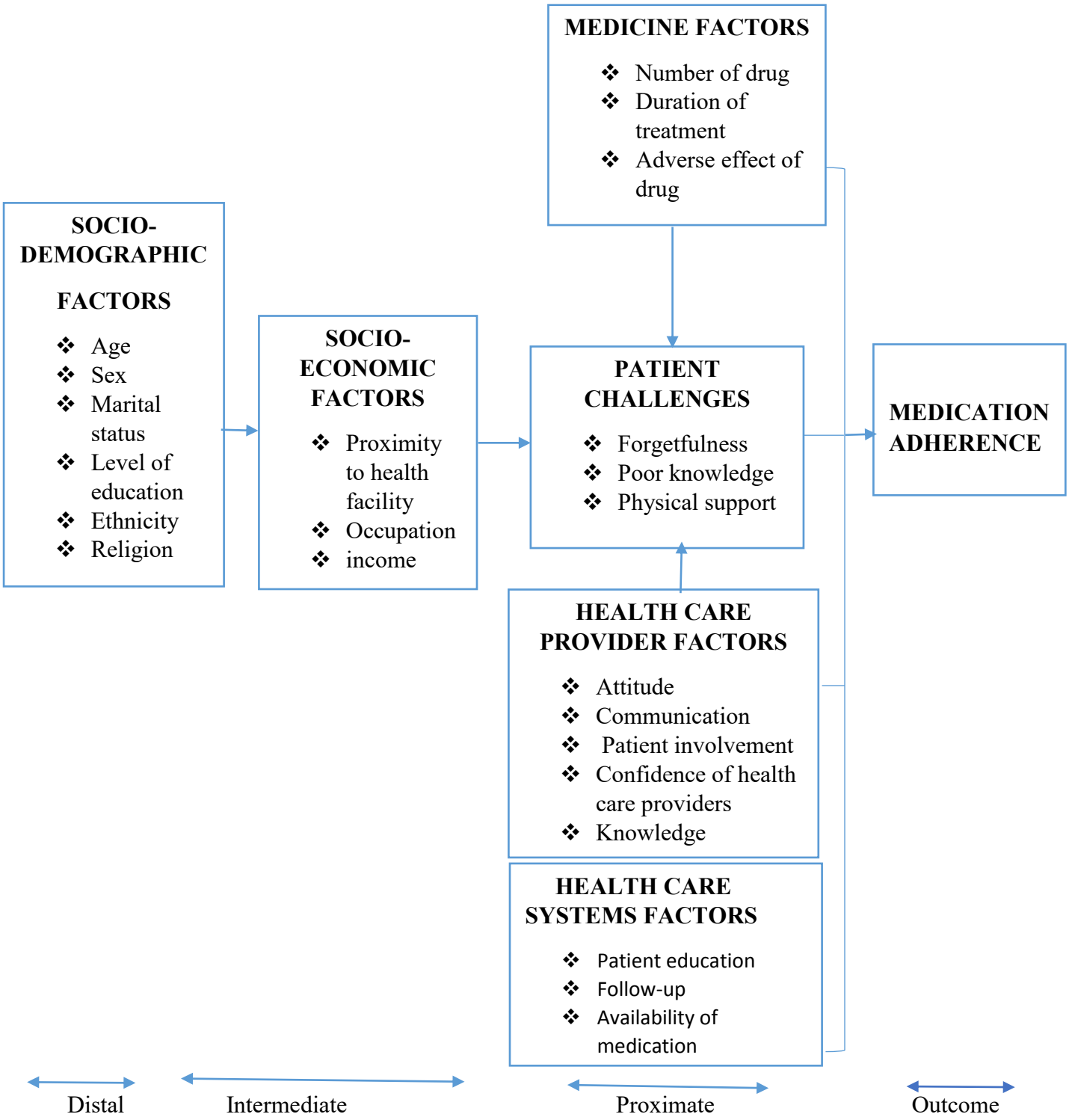
Hypertension and its related complications are major critical medical issues in Ghana and maternal deaths were inferable from hypertension disorders with case fertility rate of 3.9% (Adu-Bonsaffoh et al.., 2013). The incidence of hypertension disorder during pregnancy was 7.6% and 38.1% of hypertension-related maternal deaths (Adu-Bonsaffoh et al.., 2013). Hypertension admission at New Abirem government hospital in 2016 was 40.47% (New Abirem government annual report, 2016).

Baseline assessment at the facility level shows that 59.5% of outpatient hypertensives discontinue taking their medication and 50% of admission among hypertensives are as a result of poor adherence to medication with a monthly average cost of GH¢ 1831. Treating complication

of hypertension entails costly interventions such as cardiac bypass, surgery, carotid artery surgery and dialysis, draining individual and government budgets.

Consequences of medication non-adherence are worsening conditions such as increased comorbid diseases, increased health care cost and ultimately death (Chisholm-Burns & Spivey, 2012).

Non-compliance with anti-hypertensive medication can impact negatively on cardiovascular disease outcome such as stroke, death among other related outcome (Bilal et al., 2015). Hypertensive medication non-adherence is estimated to be 93.3% in Ghana (Kretchy et al., 2014).



Adapted from (Yap et al., 2016)

Figure 1 Conceptual framework for adherence to hypertensive medication

1.3 Narrative of the conceptual framework

This framework in figure 1 focus on the relationship between demographic, socio-economic, patients, medicine, health care provider, health care systems factors and medication adherence as a process that ultimately affects patient's health outcomes (Yap et al., 2016).

Medication adherence depends largely on the individual. Many studies have suggested that different patient's factors that may affect the individual ability and willingness to adhere to medication regimen schedule include patients' behavior, attitude, habit, knowledge, and beliefs.

Patient involvement in decision making is essential in improving medication adherence. It is vital for health care providers to identify the underlying causes of patients nonadherence to determine appropriate interventional strategy (Jimmy & Jose, 2011).

Worldwide, socio-demographic characteristics have been recognized to influence medication adherence in both developed and developing countries. The model demonstrates how the age of a patient can influence medication adherence. As age increases the tendency for patients to forget their medication schedule is very high. And the patient level of education, religion, marital status, income, occupation, larger caregiver burden, lack of caregiver for the elderly and disabled patients are all potential threat to medication adherence.

The inability for a physician to properly and clearly communicate well to patients makes it difficult for them to understand the benefit and importance of taking their medication as scheduled by the physician. Is also argued that patients who tend to have high confidence from their physicians tend to adhere properly to their medication schedules.

Medication-related factors are the duration of medication, complex medication regimen, adverse effect of the drug and financial support for the drug. The health care system factors which

include inadequate patient education, lack of follow-up and short duration of prescription can also have a negative impact on patients' medication adherence which will eventually lead to poor clinical outcomes.

1.4 Research questions

- What are the proportion and characteristics of patients with hypertensive medication adherence?
- What are patient's challenges with their hypertensive medication adherence?
- What factors influence hypertensive medication adherence?

1.5 Objectives

1.5.1 General Objective

The objective of this research is to determine factors that influence adherence to hypertensive medication among adults in Birim North district.

1.5.2 Specific objectives

- To determine the proportion and characteristics of patients on hypertensive medication adherence
- To determine patients challenges with their hypertensive medication adherence.
- To determine patients factors associated with hypertensive medication adherence

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section presents reviewed studies on anti-hypertensive drug adherence among hypertensive patients, factors that influenced adherence and ways of preventing poor adherence to hypertensive medications.

2.2 Medication adherence

Drug adherence is very predominant among adults who are self-neglecting. A study conducted in the USA revealed that adherence level of hypertensive medication is averagely around 59% among the adult population. Only ten percent were adherent to their full medication regime, and thus ninety percent were considered non-adherence to at least one medication (Turner et al., 2012).

According to the Joint National Committee, class two diseases were a set of chronic illnesses and assumed to increase pharmacy visit and total medication adherence which include migraine, other headache syndromes, chronic lower respiratory diseases, and inflammatory polyarthropathies. Class 3 diseases were also grouped as a neuro-psychiatric disease which assumed to decrease pharmacy visit and overall medication adherence. Diseases associated with this include Alzheimer's disease, mental and behavioral disorders due to psychoactive substances use, schizophrenia, schizotypal and delusional disorder, manic episode, bipolar affective disorder, depressive disorder and Parkinson's disease (JNC 6. National High Blood Pressure Education Program, 1997).

2.3 Classification of medication adherence

Medication non-adherence is usually in various forms, which include taking drugs at the incorrect time, fail to recall to take dosages, incomplete dose, inappropriate time use to take medication, stop therapy within a short time and take in things that patients are advised by physicians not to.

Patients medication adherence is classified as fully adherent (those who truly follow instruction on the exact dose and timelines of medication, things not to eat or drink and things to do), partly adherent, non-adherent, over-adherent (Ahmed, 2006).

2.4 Measurement of medication adherence

From the past decades, a lot of research work was done on how to correctly measure and quantified adherence of medication but there is no single conclusion as to which one of them is the ultimate standard measure. Various tools have been designed and validated for different situations and circumstances.

There is little principles or guideline for healthcare professionals (physicians) and researchers to choose a golden suitable adherence measure by Lam & Fresco (2015). A variety of direct and indirect methods can be used to evaluate or measure medication adherence, ranging from patient self-report to the use of sophisticated electronic medication monitors. The primary measures of adherence can be classified into: subjective, (i.e. patients or other reports); direct (i.e. measurement of drug levels in body fluids) and indirect (e.g. pill counts, prescription refills, electronic monitors or medication use). Each approach in assessing medication adherence has advantages and disadvantages.

2.4.1 Morisky 8 items scale of medication adherence

The Morisky medication adherence scale the most generally utilized tool in assessing patient medication adherence. It has the initial 7 items with a yes and no responses and the last item have never/rarely, once in a while, sometimes, usually and all the time.

The following questions were normally asked under the scale 1. Do you sometimes forget to take your medication? 2. People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past two weeks was there any day when you did not take your medicine? 3. Have you ever cut back or stopped taking your medicine 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 medicine? 5. Did you take all your medicines yesterday? 6. When you feel like your blood pressure is under control, do you sometimes stop taking your medicine? 7. Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan? 8. How often do you have difficulty remembering to take all your medications? A Yes to a negative response item was scored zero (0) while a No to a negative response item was score one (1) for item one to seven. For item 8, the response of never/rarely was score one (1) and the rest zero (0). A score of >=6 from the 8 items was adherence and less is non-adherence (Mekonnen et al., 2017).

2.5 Factors affecting medication adherence

Medication adherence is well achieved through a combination of several factors. Many studies on medication identified multiple variables that will impact patients' medication adherence. The variables that were known to be associated with medication adherence include demographic factors, socio-economic factors, patient associated factors, medicine-related factors, disease-associated factors, healthcare provider factors and healthcare system factors.

2.5.1 Demographic factors

Demographic characteristics of patients were the commonly researched and results varied between studies. Studies that identified factors affecting hypertensive medication adherence and demographic factors were considered in this review of the literature. Such factors includes gender, marital status, religion, ethnicity, level of education and patient age.

The association between socio-demographic factors and treatment compliance shows that there is a likelihood of treatment compliance in hypertensive patients as their age increases. Study participants with age less than 64 years of age and above (56.8%) had a high proportion of those who were compliant with treatment as compared to participants with 65 years of age (53.2%) (Alphonce, 2012). Females were also identified as more adherent to hypertensive treatment and their male's counterparts. Participants who are married, employed and those with low educational level are more adherent than their various counterparts (Alphonce, 2012).

2.5.2 Patients related factors

Patient-related factors represent the behavior, attitude, habit, knowledge, and beliefs. Factors identified to affect adherence in this group include patient's knowledge, belief of their sickness, forgetfulness, psychosocial stress, anxieties of possible side effects, low motivation, inadequate skills to manage the disease, self-perceived need for treatment and negative beliefs about the efficacy of treatment (Lo, 2003).

Medication self-efficacy and social support were the main determinants of adherence to lifestyle and medication. It is established that an increase in self-efficacy and fewer concern about medication use was associated with improvement in medication adherence(Meinema et al., 2015). It clearly identified that patients' medication self-efficacy positively influenced adherence to antihypertension medication (Meinema et al., 2015).

2.5.3 Healthcare system factors

Good communication and patients-prescriber relationship can result in a positive clinical outcome (improved adherence). There are other factors that have a negative impact on medication adherence, and these include inadequate patient education, lack of follow-up, and lack of medication schedule and shorter duration of prescription (Lo, 2003). In addition, poorly developed health service with insufficient or non-existent reimbursement by health insurance plans, poor medication distribution system, lack of knowledge and training for healthcare providers and managing chronic disease, overworked health care provider, short consultations, weak capacity of the system to educate patients and follow-up, inability to establish community support are possible factor that affect medication adherence (Lo, 2003).

2.5.4 Healthcare provider factors

Health care providers have a big role to play in achieving the ultimate golden standard of patients' satisfaction and better clinical outcome. Several factors have been identified to negatively affect the medication adherence in every health care system. Notably among them are poor communication, lack of patients' involvement, low confidence in healthcare provider, lack of trust, lack of review of medication and dissatisfaction with physicians. The quality of patient-provider communication is a potentially modifiable element of medical relationship that may affect health outcomes in a high-risk population (Schoenthaler et al., 2009).

2.5.5 Medicine related

Most literature from several studies identified complex regimen, a number of drugs, regularly taking of medication, duration of treatment, financial support for drug and adverse effect of drugs as possible variables that are associated with medication adherence.

Notably, the fear of side or adverse effects among younger and those in the initial stages of treatment was identified as a major problem in medication adherence during antihypertension treatment, threat or fear of adherence occurs when patients see the burden of side effects outweighs the future benefits (Burnier, 2006).

2.6 Laboratory investigations of hypertension, assessment, and diagnosis

Laboratory investigations and physical assessments are necessary to profile cardiovascular risk factors and to detect organ damage, especially in secondary hypertension. This includes blood pressure measurement by either conventional sphygmomanometer using a stethoscope or by an automatic electronic device, full blood count, urine analysis, blood urea, electrolytes, and creatinine test, blood glucose, serum lipids, hemoglobin/ hematocrit test, liver, and kidney function test (Weber et al., 2014).

2.7 Management of hypertension

Prevention and control of hypertension are complex, and demand multi-stakeholder collaboration, including government, civil society, academia and food and beverage industries.

Hypertension is basically managed by non-pharmacological and pharmacological interventions. Nonpharmacological interventions are basically lifestyle modifications while pharmacological interventions are principally the use of anti-hypertensive medications.

2.7.1 Non-pharmacological management of hypertension

Lifestyle modifications have contributed to reducing high blood pressure and has been beneficial in managing cardiovascular risk factors such as diabetes mellitus, heart failure, cardiovascular accident (stroke), end-organ damage etc. However, lifestyle modification should be seen as a

complement to pharmacological intervention instead of being seen as an alternative management of hypertension (Weber et al., 2014).

Several factors have been identified as non-pharmacological measures in managing hypertension. These include reduction in salt intake through low sodium diet, regular fruits, and vegetable consumption. Regular body exercise such as brisk walking for 30 minutes 3 times a week, use of bicycle, claiming stars, regular aerobic exercise, and reduction of animal fat intake (saturated fats). The greater amount of alcohol consumption can raise blood pressure so a reduction in alcohol consumption is beneficial in reducing blood pressure levels (Ghana health service, 2017). Cessation of smoking has also be found to be helpful in reducing or managing hypertension (Ghana health service, 2017).

2.7.2 Pharmacological management of hypertension

The ultimate goal of anti-hypertensive medication is to decrease morbidity and mortality. The use of medicines in the management of hypertension has been classified according to their mechanism of action. Alpha-adrenoceptor blocking drugs, angiotensin enzyme inhibitors, angiotensin-II receptor antagonists, beta-adrenoceptor blocking drugs, calcium-channel blockers, centrally acting drugs, diuretics, and vasodilators are commonly used oral hypertensive drugs for the management of hypertension (Ghana health service, 2017).

CHAPTER THREE

METHODS

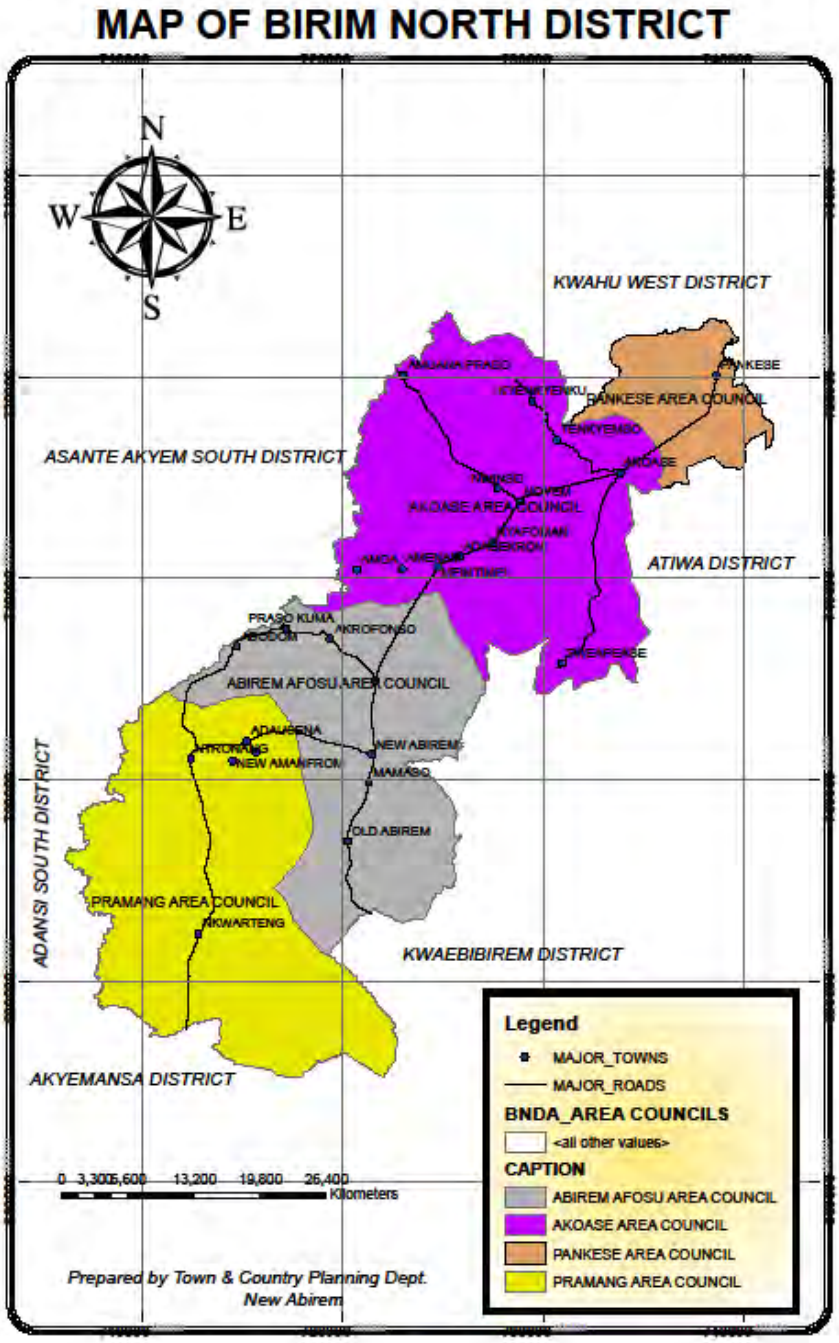
3.1 Study design

This was a quantitative cross-sectional study conducted in two healthcare facilities within Birim North district namely, New Abirem government hospital and I&I clinic. Patients who are on hypertensive medication for not less than one month and above, and 18 years and older were enrolled into the study. A structured questionnaire containing the 8 items of Morisky scale of medication adherence measurement was used to interview the patients.

3.2 Study location

3.2.1 Demographic characteristics

Figure 2 show the map of Birim North District which is among the 26 districts located in the Eastern Region of the Republic of Ghana. It was carved out of the previous Birim district council in 1987 as a major aspect of the administration's decentralization program to advance decentralized administration and accelerate the improvement of the territory. It has 78 settlements within its jurisdiction. It is mainly an agriculture economy farming. Mining employs 1% of the active labor force of the population. The district shares borders with Kwahu west and Kwahu north, Akyemansa to the south, Asante Akyem south and Adansi south to the west, and Atiwa and Kwaebibirem to the east. Basically, two settlement patterns are observed in the District. The towns show straight settlement designs though the towns with delineate scattered settlement designs in the villages. Nearly, the towns appreciate better infrastructural, portable drinking water, power, well-being, instruction, media transmission, postal administrations, among others.



Birim North Annual report, 2017

Figure 2: Map of Birim north

3.2.2 Population

Eastern region has a growth rate of 2.1 based on the 2010 population census giving a population projection of 93,178 for the year 2017.

There are three major indigenous traditional groups in the district. These are the Akim Kotokus, Akim Bosomes, and Akim Abuakwas. The Akim Kotokus dominate the population as they have more settlements than the other two divisions. The major Akim Bosome settlements are Akim Chia, Akim Adubease, and Akim Etwereso.

Other ethnic group settlers include Asantes, Kwahu, Ga Adangmes, Ewes and people of northern region.

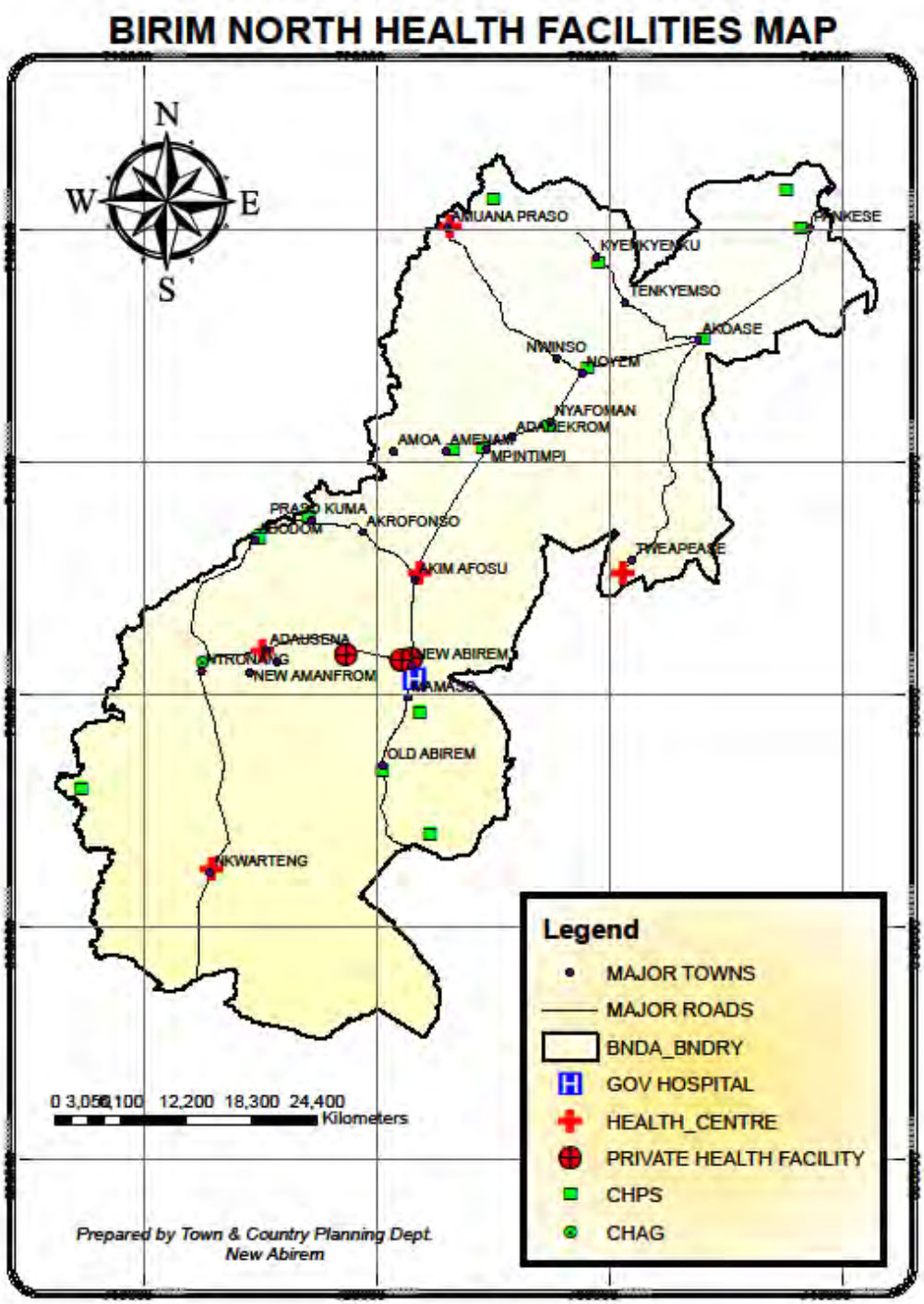
3.2.3 Economic activities and occupation

About 85.5 percent of the labor force in the district are engaged in one form of agricultural activity. The major crops cultivated in the district comprise cocoa, oil palm, citrus, maize, plantain, cassava, cocoyam, and vegetables. There are few small-scale sawmilling installations in the district processing wood to feed the furniture, construction and the building industries in the district. Miners have increased in the district both legal and illegal The Public and civil service are fairly occupied by both the indigenous and visitors, however, there are other indigenous also engaged in small business and trading.

3.2.4 Health infrastructure

The district health facilities include one government hospital at New Abirem, three private clinics, one in Afosu and two in New Abirem and five Reproductive and Child Health Centers at Nkwarteng, Adausena, Afosu, Amuana Praso and Tweapease. The district can boast of twenty-

six (26) demarcated CHPS centers with fourteen (14) operational and two under construction. Also, the district has 27 herbalist and spiritual healers.



Birim North Annual report, 2017

Figure 3: Birim north health facility map

Most cases seen at the OPD in various health facilities is malaria. Diarrhea diseases and other ARI are also on the increase indicated in table 2. The prevalence of HIV/AIDS, Teenage pregnancy and Tuberculosis are on the increase and this is attributed to the emergence of mining activities leading to an influx in the population hence an increase in irresponsible and social vice behaviors. Onchocerciasis is a predominant neglected disease in the district because of the Birim River. This has led to the biannual treatment of community members with Ivermectin.

Table 2: Top ten diseases in the Birim North District

	2014		2015		2016		2017	
Diseases	**Number**	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
Malaria	29,834	58.1	48775	64.4	35729	56.4	4967	53.4
Typhoid Fever	895	1.7	1098	1.5	1031	1.6	134	1.4
Diarrhea	4192	8.2	4775	6.3	4179	6.6	640	6.9
Intestinal worms	3364	6.5	4855	6.4	5667	8.9	800	8.6
Hypertension	1327	2.6	995	1.3	726	1.1	168	1.8
Rheumatism & other Joint Disease	7709	15.0	11476	15.2	11763	18.6	1910	20.5
Asthma	749	1.5	47	0.1	233	0.4	57	0.6
Acute Psychosis	28	0.1	2585	3.4	27	0.0	4	0.0
Acute Urinary Tract Infection	2208	4.3	1080	1.4	2734	4.3	421	4.5

Birim North Health Directorate, 2017. Note %(percentage)

3.2.6 Water and sanitation

Access to consumable water and natural neatness contributes altogether to enhancing the well-being status of the general population. The amount of water supply in the area is anything but a noteworthy issue, however, the nature of consumable water supply is poor. There are five main water supply systems: such as boreholes, waterways and streams, hand-burrowed wells, pipe-borne water frameworks, and dugouts.

Boreholes, though provide potable water, their numbers in the district are inadequate because about 55% of the settlements get their water supply from this source. WaterAid through the Community Water and Sanitation Agency (CWSA) have provided a number of water supply points within the communities but the total supply continues to be inadequate. The community water and sanitation project has made some headway in providing boreholes for some communities in the District. Unfortunately, significant proportions of some rural communities still lag behind in the supply of potable water.

Solid and liquid waste disposal is one of the major challenges confronting the Birim North District. Most homes do not have toilet facilities and community public toilets are overused and not properly maintained. It is, therefore, a common sight to see people using the bushes, the fringes of rivers as places of convenience. The District Environmental Health Department and the District Health Management Team (DHMT) is advocating for new building plans to include toilet facilities in their homes.

3.3 Study variables

3.3.1 Dependent variable

Dependent (Outcome) variable include anti-hypertensive medication (drug) adherence

3.3.2 Independent variables

Socio-demographic characteristics (i.e. age, sex, marital status, level of education, monthly income, occupation and religion), medicine-related factors (complex regime, number of drugs, take medicine regularly, duration of treatment, financial support for drug, adverse effect of medication), Physician-related factors (counselling about medication and lifestyle), Patient-related factors (self-efficacy and belief systems) as well as facility-related factors.

3.4 Study population

All hypertension patients who attend New Abirem Government Hospital and I&I clinic within the district during data collection and those who fulfill the criteria were included.

3.4.1 Inclusion criteria

- Hypertension patients who were willing to participate
- Patients above 18 years' old
- Participants who have been taking anti-hypertensive treatment for at least the past one month and come to OPD for a refill

3.4.2 Exclusion criteria

- Pregnancy-induced hypertension patients
- Patients who started anti-hypertensive medication less than a month
- Mentally unstable hypertensive patients

3.5 Sample size

Cochran's sample size formula for categorical data

$$n = \frac{(z)^2 * (p)(q)}{(d)^2}$$

$$n = \frac{(1.96)^2 * (0.687)(0.313)}{(0.05)^2}$$

$$n = \frac{(3.8416)(0.215031)}{0.0025}$$

n = 330

where

n = sample size (330)

z = 95% confidence level (1.96)

p = proportion of hypertensive medication adherence (0.687)

q = proportion of non-adherence to hypertensive medication (0.313)

d = accepted margin of error (0.05)

A study conducted by Haruna Ahmed Jambedu in 2006 at Ghana Port and Harbor Authority hospital in Takoradi show that 68.7% adhered to hypertensive medication.

3.5.1 Finite population correction factor formula

$$n_{final} = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

Where:

N = Number of hypertensive cases is 930

n_0 = sample size (330)

$$n_{final} = \frac{330}{1+\frac{(330-1)}{930}}$$

$$n_{final} = \frac{330}{1.353763441}$$

n_{final} = 244

The total sample size is 244

Number of hypertensive cases in New Abirem Government Hospital is 739

Sample size by proportion in New Abirem Government Hospital is $244*\frac{739}{930}$ = 194

Number of hypertensive cases in I&I clinic is 190

Sample size by proportion in I&1 clinic is $244*\frac{190}{930}$ = 50

3.6 Sampling method

3.6.1 Selection of health facilities.

Two health facilities (New Abirem Government Hospital and I&I clinic were purposively selected because they see more hypertensive cases than the others.

3.6.2 Selection of participants

A research assistant was stationed at the pharmacy department on daily basis to interview hypertensive patients. Participants were randomly selected each day until the desired sample size was obtained from each health facility. Thirty cards were developed with yes and no for each day and hypertensive patients who selected yes were interview each day for the study period.

3.7 Data collection techniques

A questionnaire (Appendix III) that consists of open and closed-ended questions were administered face-face to all participants who met the inclusion criteria. The interviews started each day with the signing of consent forms and the purpose of the study was well explained to them before they were allowed to complete the questionnaire.

3.8 Quality control

3.8.1 Research assistants

Four (4) research assistants, consisting of Nurses were selected to undergo data collection training. The training covered the understanding of all indicators in the questionnaire and translating of the questionnaire into a local language (Twi).

The general ethics of research, involving voluntary participation, informed consent and confidentiality were explained to them at length. The training took place at New Abirem government hospital conference room.

3.8.2 Pretest

The questionnaire was pretested at Aduasena health center to determine the accuracy and the appropriateness of each question as well as the average duration to complete the questionnaire for each participant.

3.8.3 Data processing

Data from the interview were entered into SPSS 22.0 after checking for completeness and accuracy of the information. The data was cleaned by identifying all wrong entries, and the corrections were done using the codes in the questionnaire. Data entered was saved as SPSS file and STATA file for statistical analysis.

3.9 Data analysis

All analysis were done using STATA version 15.0. Descriptive statistics was done for all the socio-demographic characteristics of respondents. Bivariate analysis was used to test for association between adherence to anti-hypertensive medication and all the independent (exposure) variables. The magnitude and strength of the association were determined in each variable and anti-hypertensive medication adherence by a simple logistics regression analysis. Multiple logistics analysis was used to determine factors influencing hypertensive medication adherence after adjusting for confounders.

3.10 Measurement of adherence with Morisky 8 items Scale

The scale has a score of 0 to 8, and mean score of ≥ 6 was used as adherence

3.11 Comorbidity evaluation

This was determined by asking patients if they have other conditions and are on medication aside hypertension

3.12 Ethical consideration

Ethical approval for the study was obtained from the Ethical Review Committee of Ghana Health Service (GHS), through the School of Public Health University of Ghana. The approval letter can be found in the Appendix.

CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter describes the outcomes of the study about adherence to hypertensive medication among adults in Birim North District. It presents the demographic variables of respondents and the proportion of medication adherence. It also covers variables associated with hypertensive medication adherence and demographic variables, the association between hypertensive medication and health care system variables, disease-related variables and quality of care with simple and multiple regression analysis for predicted variables of hypertensive medication adherence.

4.2 Socio-demographic characteristics of respondents

In this study, 244 study participants were interviewed with a 100% response rate. Majority of respondents (32.79%) were between 60 to 69 years while the least (3.9%) were between 20 to 34 years. The mean age of respondents was 60.69 years with standard deviation (SD) of ± 12.62. Most of the respondent, 231(94.67%), were Christians by religion.

With regard to the marital status of respondents, 0.41% were single, 58.61% were married, 11.07% divorced/separated and 29.92% were widowed. Majority of respondents' attained primary education (38.52%) with tertiary education been the least (4.92%). Farmers/fisherman were also dominant in the study population (63.11%) with para professional been the least occupation (0.41%). Regarding the percentage of hypertensive drugs covered by health insurance, 74.18% of respondents indicated that their drugs were covered by health insurance.

The average monthly income of most of the respondents was less than GHS200 representing 58.61%.

Table 3: Patients' demographic and socioeconomic characteristics

Characteristic	Number	Percentage (%)
Age(Years)		
20-34	9	3.69
35-49	36	14.75
50-59	58	23.77
60-69	80	32.79
Above 70	61	25
Sex		
Male	43	17.62
Female	201	82.38
Marital status		
Single	1	0.41
Married	143	58.61
Divorced/Separated	27	11.07
Widowed	73	29.92
Educational level		
No formal education	64	26.23
Primary	94	38.52
Secondary /SHS	27	11.07
Tertiary	12	4.92
J.H.S	47	19.26
Religion		
Christian	231	94.67
Muslim	11	4.51
Traditionalist	2	0.82
Occupation		
Business person	8	3.28
Farmer/Fisherman	154	63.11
Professional	8	3.28
Trader/shop assistant	39	15.98
Retired	23	9.43
Tradesman	5	2.05
Clerical worker	2	0.82
Unskilled laborer	4	1.64
Para professional	1	0.41
Average monthly income		
Less than GHS 200	143	58.61
GHS 200-GHS 600	86	35.25
GHS 700-GHS 1000	12	4.92
GHS 1100-GHS 2000	1	0.41
More than GHS 2000	2	0.82
Drugs from Health Insurance		
Yes	181	74.18
No	63	25.82

In this study, adherence to hypertensive medication was 33.61% ((95% confidence interval (CI)= 4.60 to 5.13.)).

The four most important challenges for the respondent to adhere to hypertensive medication were forgetfulness, poor knowledge about hypertension, side effects of medication experienced, and physical support to get to the facility, (Figure 5).

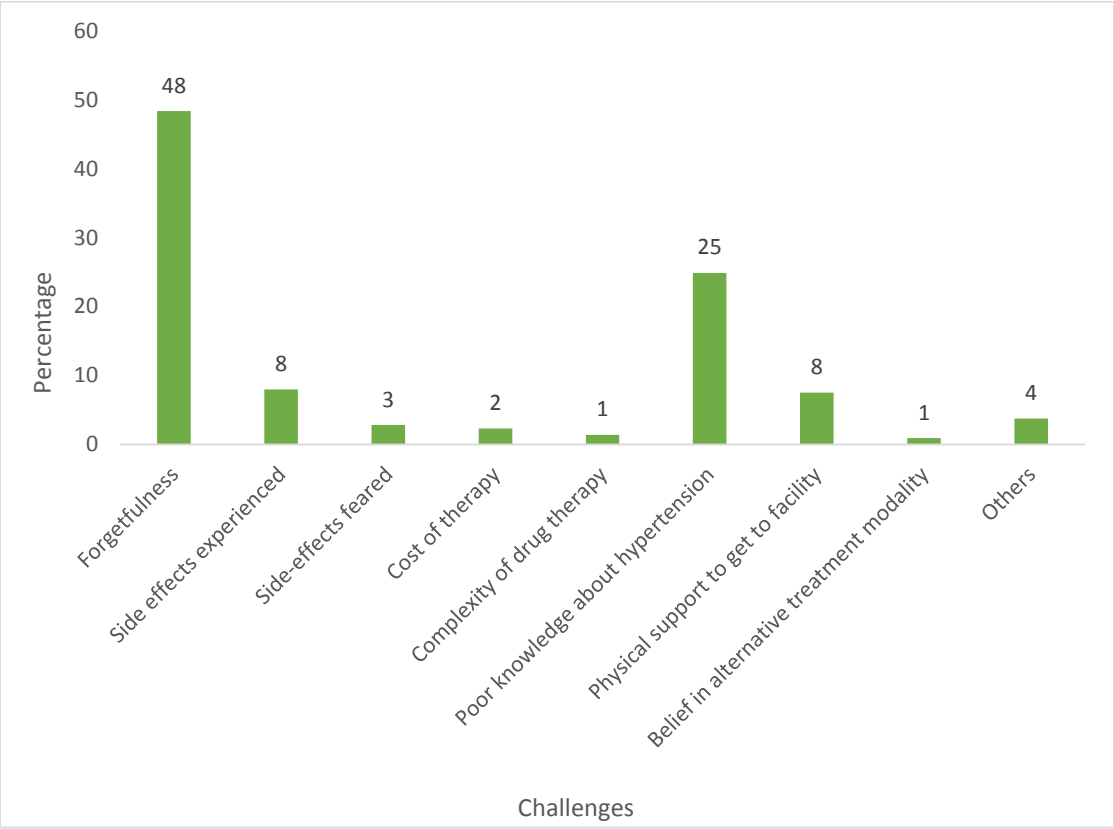


Figure 4: Patients challenges with hypertensive medication adherence

Out of the total participants, 36 (81.82%) had diabetes, 3 (6.82%) had asthma, 2 (4.55%) had stroke, 1 (2.27%) had high cholesterol, heart attack and others.

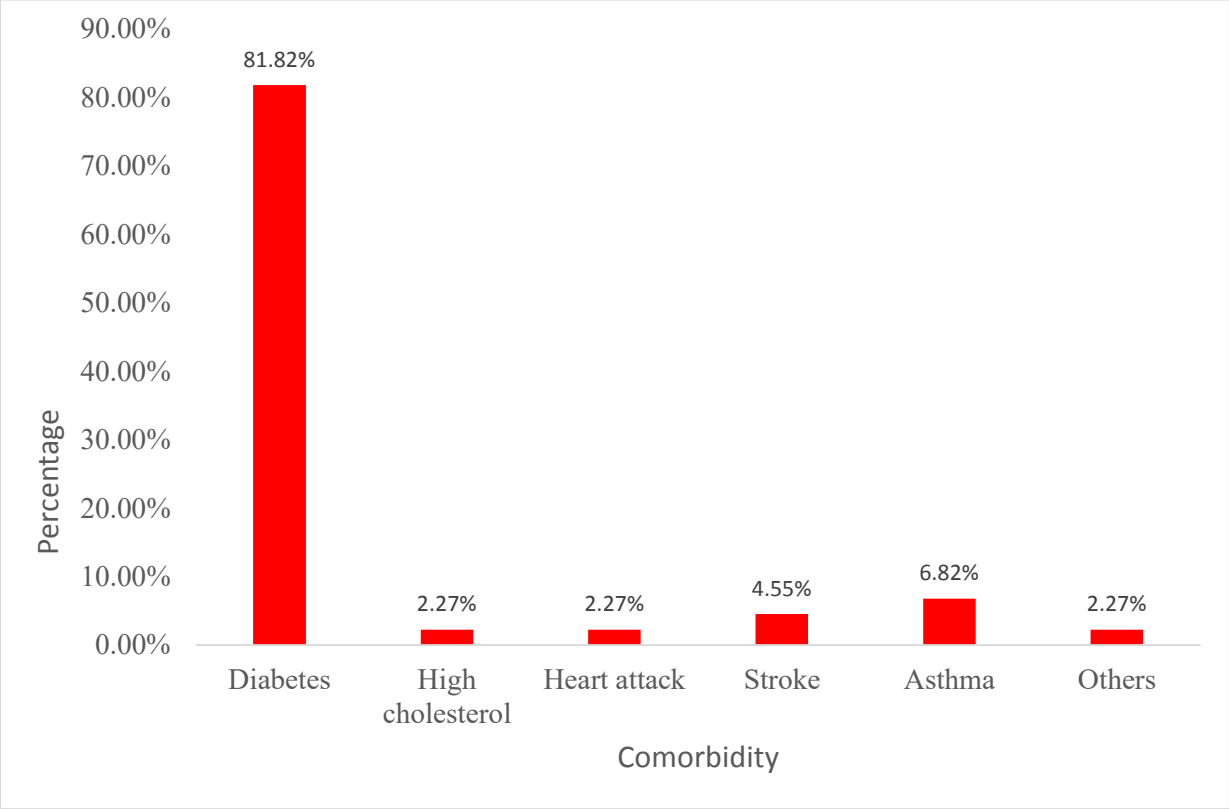


Figure 5: Comorbidity of respondents

4.4 Socio-demographic factors associated with adherence to hypertensive medication

Table 4 presents information on bivariate analysis investigating the association between Adherence to hypertensive medication and socio-demographic factors. The results indicated that average monthly income ($p<0.001$), and getting drugs from health insurance ($p=0.002$), were significantly associated with hypertensive medication adherence. However, age, marital status, educational level, employment status, religion, and occupation were not statistically associated with adherence to hypertensive medication.

Table 4: Association of medication adherence with patients sociodemographic

Characteristic	No	Yes	χ2	p-value
Age(Years)				
20-34	3(33.33)	6(66.67)	7.986	0.092
35-49	24(66.67)	12(33.33)		
50-59	38(65.52)	20(34.48)		
60-69	60(75.00)	20(25.00)		
Above 70	37(60.66)	24(39.34)		
Sex				
Male	29(67.44)	14(32.56)	0.026	0.873
Female	133(66.17)	68(33.83)		
Marital status				
Single	1(100)		0.821	0.887
Married	94(65.73)	49(34.27)		
Divorced/Separated	17(62.96)	10(37.04)		
Widowed	50(68.49)	23(31.51)		
Educational level				
No formal education	47(73.44)	17(26.56)	2.853	0.583
Primary	60(63.83)	34(36.17)		
Secondary /SHS	16(59.26)	11(40.74)		
Tertiary	9(75.00)	3(25.00)		
J.H.S	30(63.83)	17(36.17)		
Religion				
Christian	151(65.37)	80(34.63)	*	0.347
Muslim	9(81.82)	2(18.18)		
Traditionalist	2(100)			
Occupation				
Business person	7(87.50)	1(12.50)	*	0.102
Farmer/Fisherman	101(65.58)	53(34.42)		
Professional	5(62.50)	3(37.50)		
Trader/shop assistant	20(51.28)	19(48.72)		
Retired	19(82.61)	4(17.39)		
Tradesman	5(100)			
Clerical worker	2(100)			
Unskilled laborer	2(50)	2(50)		
Para professional	1(100)			
Average monthly income				
Less than GHS 200	80(55.94)	63(44.06)	*	**<0.001**
GHS 200-GHS 600	72(83.72)	14(16.28)		
GHS 700-GHS 1000	8(66.67)	4(33.33)		
GHS 1100-GHS 2000		1(100)		
More than GHS 2000	2(100)			
Drugs from Health Insurance				
Yes	130(71.82)	51(28.18)	9.263	**0.002**
No	32(50.79)	31(49.21)		

Note: *= Fisher's exact, χ2=chi-square

4.5 Healthcare systems factors

From table 4, out of the 244 respondents, 194 (79.5%) were from New Abirem Government Hospital and 50 (20.49%) from I&I clinic respectively. Majority of the respondents 217 (88.93%) indicated that the facility in which they were interviewed is their regular facility at the time of the interview. With regard to means of transport to health facility 213(88.93%) used public transport, 4 (1.65%) respondents used their own vehicles, 24 (9.92%) respondents walk to the various health facility for their hypertensive medication while 1 (0.41%) respondent used other means of transport. With regard to referral to a health facility, 10 (4.13%) respondents were referred whiles 232 (95.87%) respondents were not referred to a health facility for hypertensive medication. Majority of the respondents representing 58.61% used 5minutes to 30 minutes' drive while the least respondents representing 3.28% used one hour drive before getting to the facility. For difficulty in reaching a health facility, 173 (70.9%) respondents had difficulty while 71 (29.1%) had no difficulty in reaching the health facility for their hypertensive medication.

Table 5: Healthcare systems

Characteristic	Number (N=244)	Percentage (%)
Health facility		
New Abirem Government Hospital	194	79.51
I & I Clinic	50	20.49
Regular health facility		
Yes	217	88.93
No	27	11.07
Duration in regular facility		
1year-5years	140	57.38
6years-10years	58	23.77
More than 10years	46	18.85
Referred to this facility		
Yes	10	4.13
No	232	95.87
Reason for the referral		
Poor control of hypertension	2	33.33
For specialist care on account of complications	2	33.33
Personal request	2	33.33
Distance from a health facility		
5-10mins drive	38	15.57
10-30mins drive	143	58.61
30-60mins drive	55	22.54
More than 1hour drive	8	3.28
Means of transportation		
Own vehicle	4	1.65
Public Transport	213	88.02
Walk	24	9.92
Others	1	0.41
Difficulty reaching facility		
Yes	173	70.9
No	71	29.1
Distance difficulty		
Yes	79	32.38
No	165	67.62
Transportation at certain times difficulty		
Yes	42	17.21
No	202	82.79
Transportation fares difficulty		
Yes	50	20.49
No	194	79.51
Availability of caregivers difficulty		
Yes	11	4.51
No	233	95.49

4.6 Association of medication adherence with health care systems

Table 6 presents a measure of association on bivariate analysis investigating the association between Adherence to hypertensive medication and health care system factors. The results indicated that distance as a problem in getting to the health facility ($p=0.002$), transportation fares ($p<0.001$) and availability of caregivers ($p=0.031$) were significantly associated with hypertensive medication adherence. However, type of health facility, whether is a regular health facility, duration of regular health facility, referral, the reason for referral means of transportation and distance from a health facility were not statistically associated with adherence to hypertensive medication.

Table 6: Association of medication adherence with healthcare systems

Characteristic	No	Yes	$\chi 2$	p-value
Health facility type				
New Abirem Government Hospital	134(69.07)	60(30.93)	3.0446	0.081
I & I Clinic	28(56.00)	22(44.00)		
Regular health facility				
Yes	147(67.74)	70(32.26)	1.5982	0.206
No	15(55.56)	12(44.44)		
Duration of regular facility				
1year-5years	93(66.43)	47(33.57)	3.5682	0.168
6years-10years	43(74.14)	15(25.86)		
More than 10years	26(56.52)	20(43.48)		
Referred to this facility				
Yes	5(50)	5(50)	1.2093	0.271
No	155(66.81)	77(33.19)		
Reason for the referral				
Poor control of hypertension	1(50)	1(50)	*	1.00
For specialist care on account of complications	2(100)			
Personal request	1(50)	1(50)		
Distance from a health facility				
5-10mins drive	22(57.89)	16(42.11)	5.4867	0.129
10-30mins drive	94(65.73)	49(34.27)		
30-60mins drive	38(69.09)	17(30.91)		
More than 1hour drive	8(100)			
Means of transportation				
Own vehicle	4(100)		*	0.241
Public Transport	143(67.14)	70(32.86)		
Walk	13(54.17)	11(45.83)		
Others	1(100)			
Difficulty in reaching the facility				
Yes	116(67.05)	57(32.95)	0.1156	0.734
No	46(64.79)	25(35.21)		
Distance difficulty				
Yes	42(53.16)	37(46.84)	9.1628	**0.002**
No	120(72.73)	45(27.27)		
Transportation at certain times difficulty				
Yes	23(54.76)	19(45.24)	3.0762	0.079
No	139(68.81)	63(31.19)		
Transportation fares difficulty				
Yes	50(100)		*	**<0.001**
No	112(57.73)	82(42.27)		
Availability of caregivers difficulty				
Yes	4(36.36)	7(63.64)	4.6557	0.031
No	158(67.81)	75(32.19)		

Note: *= Fisher's exact, $\chi 2$=chi-square

4.7 Quality of care

In table 6, overall quality of care for hypertensive clients who were interviewed, 204 (83.61%) respondents were pleased with their quality of care delivered by healthcare professionals while 40 (16.39%) respondents were dissatisfied with the care they received from health care providers. Majority of respondents show that waiting time at the clinic was acceptable 170 (69.67%). With regards to doctors and other health professional showing interest during consultations 241 (98.77%) respondents said doctors and others health professionals showed interest during consultations, 2 (0.82%) respondents indicated that doctors and other health professionals do not show interest during consolation and 1 (0.41%) indicated they don't know. Out of the 244 respondents, 97.54% respondents have confidence in doctors and other health professionals in providing healthcare for hypertensive clients, 71.72% respondents spend time with doctors and other health professionals in the various health facility, 97.95% respondents were given the chance to state their problems and asked questions and 93.03% of respondents were satisfied with health information and advice provided by doctors and other health professionals.

Table 7: Quality of care

Characteristic	Number	Percentage (%)
Overall quality of care		
Dissatisfied	40	16.39
Satisfied	204	83.61
Acceptable of waiting time at the clinic		
Yes	170	69.67
No	74	30.33
Doctors and other health professionals showed interest during consultations		
Yes	241	98.77
No	2	0.82
Don't know	1	0.41
Given the chance to state your problems and ask questions about your disease		
Yes	239	97.95
No	4	1.64
Don't know	1	0.41
Satisfied with the health information and advice provided by your doctor and other health professionals		
Yes	227	93.03
No	15	6.15
Don't know	2	0.82
Spend enough time with your doctor and other health professionals during the consultation		
Yes	175	71.72
No	68	27.87
Don't know	1	0.41
Confidence in your doctor and other health professionals		
Yes	238	97.54
No	6	2.46

4.8 Association of medication adherence with the quality of care

Table 8 below shows a measure of association via bivariate analysis investigating the association between Adherence to hypertensive medication and quality of care. The results show that overall quality of care ($p<0.0001$), acceptable waiting time at the clinic ($p<0.009$) and spending enough time with doctors and other health professionals were significantly associated with hypertensive medication adherence. However, doctors and other health professionals showing interest during the consultation, given the chance to asked questions their problems, satisfaction with health information and advice provided by doctors and other health professionals, and having confidence in doctors and other health professionals were not statistically associated with adherence to hypertensive medication.

Table 8: Association of medication adherence with the quality of care

Characteristic	No	Yes	χ2	p-value
Overall quality of care				
Dissatisfied	38(95.00)	2(5.00)	17.5469	**<0.001**
Satisfied	124(60.78)	80(39.22)		
Acceptable of waiting time at the clinic				
Yes	104(61.18)	66(38.82)	6.8375	**0.009**
No	58(78.38)	16(21.62)		
Doctors and other health professionals showed interest during consultations				
Yes	159(65.98)	82(34.02)	*	0.702
No	2(100)			
Don't know	1(100)			
Given the chance to state your problems and ask questions about your disease				
Yes	157(65.69)	82(34.31)	*	0.404
No	4(100)			
Don't know	1(100)			
Satisfied with the health information and advice provided by your doctor and other health professionals				
Yes	147(64.76)	80(35.24)	*	0.149
No	13(86.67)	2(13.33)		
Don't know	2(100)			
Spend enough time with your doctor and other health professionals during the consultation				
Yes	104(59.43)	71(40.57)	*	**<0.001**
No	57(83.82)	11(16.18)		
Don't know	1(100)			
Confidence in your doctor and other health professionals				
Yes	158(66.39)	80(33.61)	*	0.989
No	4(66.67)	2(33.33)		

Note: *= Fisher's exact, χ2=chi-square

4.9 Disease and therapy-related factors

Table 9 summarizes disease and therapy related factor for adherence to hypertensive medication in Birim North District. Majority of respondents 137 (56.15%) had their hypertensive diagnosed in less than 4 years while 107 respondents representing 43.85% had their hypertensive diagnosed 4 years and above. Out of the total number of 244 respondents, 79.1% of the respondents were told they had developed complications; out of which 36.37% had ever been admitted on an account of having a very high blood pressure, 47.57% respondents were found to be consistent with their therapy at the time that there were admitted on an account of high blood pressure. For the number of anti-hypertensive drugs taken daily, 64 (26.23%) respondents take one drug per day, 150 (61.48%) respondents take two per day and 30 (12.3%) respondents take three or more drugs per day. Majority of the respondents had their medication changed since they started with the therapy (126) representing 51.64%, while 118 (48.36%) respondents said their medication had not changed since they started with anti-hypertensive medication. For the side effect of hypertensive medication, 93 (38.27%) respondents developed side effects of taking the hypertensive medication.

Diabetes had the highest response as a co-morbidity representing 81. 82%, followed by asthma and stroke with 6.82%, and 4.55% responses respectively. Heart attack and high cholesterol were the least with 2.27% responses. Taking un-prescribed medication/supplements/ mixture was high with 150(61.48%) responses whiles 94(38.52%) respondents do not take un-prescribed medications/ supplements/ mixture.

The type of un-prescribed medication/supplements/mixture taken by respondents, 62 (37.58%) were orthodox medications, 87 (52.73%) take herbal medication and 16 (9.7%) respondents take both orthodox and herbal medications.

Table 9: Disease and therapy-related factors

Characteristic	Number	Percentage (%)
Duration diagnosed as hypertensive		
<4 years	137	56.15
>=4 years	107	43.85
Told you had developed complications already		
Yes	51	20.9
No	193	79.1
Ever been admitted on account of very high blood pressures since diagnosis		
Yes	89	36.78
No	153	63.22
Consistent with therapy		
Yes	98	47.57
No	108	52.43
Total number of anti-hypertensive tablets you take daily		
One	64	26.23
Two	150	61.48
Three or more	30	12.3
Number of times a day you take your drugs daily		
Drug 1		
Once	106	95.5
Twice	5	4.5
Drug 2		
Once	215	98.17
Twice	4	1.83
Drug 3		
Once	21	100
Drug 4		
Once	39	97.5
Twice	1	2.5
Drug 5		
Once	49	100
Medications have been changed since you were started on therapy		
Yes	126	51.64
No	118	48.36

Disease and therapy-related factors (Continued)

Characteristic	Frequency (N=244)	Percentage (%)
Reason for a medication change		
Side-effects	32	24.43
Poor control	53	40.46
To help adherence	36	27.48
Others	10	7.63
Experienced any side effect to any of your medications		
Yes	93	38.27
No	150	61.73
Other chronic condition managed apart from hypertension		
Yes	46	18.93
No	197	81.07
Chronic conditions		
iabetes	36	81.82
High cholesterol	1	2.27
Heart attack	1	2.27
Stroke	2	4.55
Asthma	3	6.82
Others	1	2.27
Taken unprescribed medications/Supplements/ Mixtures		
Yes	150	61.48
No	94	38.52
Type of unprescribed meditions/supplements/misture		
Orthodox	62	37.58
Herbal	87	52.73
Both	16	9.7

4.10 Association of medication adherence and disease therapy-related factors

Table 10 presents a measure of association on bivariate analysis investigating the association between Adherence to hypertensive medication and disease therapy-related factors. The results show that duration of respondents diagnosed as hypertensive (p=0.007), why medications were changed (p=0.001) and type of un-prescribed medication/ supplements/ mixture respondent took (p=0.001) were significantly associated with hypertensive medication adherence. However, respondents who developed complications already, ever been admitted on account of a very high blood pressure since diagnosis, consistent with therapy, number of anti-hypertensive drugs taken daily side effect of medication on other chronic conditions were not statistically associated with adherence to hypertensive medication.

Table 10:Association of medication adherence disease and therapy-related factors

Characteristic	No	Yes	χ2	p-value
Duration diagnosed as hypertensive				
<4 years	81(75.70)	26(24.30)	7.3989	**0.007**
>=4 years	81(59.12)	56(40.88)		
Told you had developed complications already				
Yes	35(68.63)	16(31.37)	0.1442	0.704
No	127(65.80)	66(34.20)		
Ever been admitted on account of very high blood pressures since diagnosis				
Yes	60(67.42)	29(32.58)	0.1062	0.745
No	100(65.36)	53(34.64)		
Consistent with therapy				
Yes	67(68.37)	31(31.63)	0.0971	0.755
No	76(70.37)	32(29.63)		
Total number of anti-hypertensive tablets you take daily				
One	41(64.06)	23(35.94)	1.6504	0.438
Two	98(65.33)	52(34.67)		
Three or more	23(76.67)	7(23.33)		
Number of times a day you take your drugs daily				
Drug 1				
Once	73(68.87)	33(31.13)	*	0.319
Twice	5(100)			
Drug 2				
Once	145(67.44)	70(32.56)	*	0.462
Twice	2(50)	2(50)		
Drug 4				
Once	23(58.97)	16(41.03)	*	1.000
Twice	1(100)			
Medications have been changed since you were started on therapy				
Yes	89(70.63)	37(29.37)	2.1007	0.147
No	73(61.86)	45(38.14)		

Association of medication adherence disease and therapy-related factors (Continued)

Characteristic	No	Yes	χ2	p-value
Reason for a medication change				
Side-effects	21(65.63)	11(34.38)	16.1546	**0.001**
Poor control	47(88.68)	6(11.32)		
To help adherence	19(52.78)	17(47.22)		
Others	5(50)	5(50)		
Experienced any side effect to any of your medications				
Yes	65(69.89)	28(30.11)	0.8915	0.345
No	96(64.00)	54(36.00)		
Other chronic condition managed apart from hypertension				
Yes	34(73.91)	12(26.09)	1.4883	0.222
No	127(64.47)	70(35.53)		
Taken unprescribed medications/Supplements/ Mixtures				
Yes	98(65.33)	52(34.67)	0.1961	0.658
No	64(68.09)	30(31.91)		
Type of unprescribed medications/supplements/mixture				
Orthodox	51(82.26)	11(17.74)	14.5732	**0.001**
Herbal	46(52.87)	41(47.13)		
Both	12(75.00)	4(25.00)		

Note: *= Fisher's exact, χ2=chi-square

4.11 Simple and multiple logistic regression for hypertensive medication adherence

Table 11 summarized the association of hypertensive medication adherence using the binary and multiple logistics regression. The outcomes indicated that the odds of hypertensive medication adherence for ages between 60 to 69 years were 83.34% less than ages between 20 to 34 years (OR: 0.17; 95%CI=0.04-0.73). On the average monthly income, hypertensive clients with an average monthly income between GHS 200-GHS 600 had 75.31% reduced odds of hypertensive medication adherence compared to hypertensive clients with an average monthly income less than GHS 200 (OR:0.25; 95%CI=0.13-0.48). The odds of hypertensive medication adherence is increased 2.47 fold among hypertensive clients who do not get all their drugs covered by health insurance as compared to hypertensive clients who had all their hypertensive medication covered by the health insurance (OR: 2.47; 95%CI=1.37-4.46).

The multiple logistic regression found distance, availability of caregivers, and duration on hypertensive medication and quality of care as associated with hypertensive medication adherence after adjusting for other confounders.

Table 11: Logistic regression of factors associated with hypertensive medication adherence

Characteristic	Unadjusted		Adjusted	
	OR	95% CI	OR	95% CI
Age(Years)				
20-34	Ref			
35-49	0.250	(0.053-1.177)	0.203	(0.034-1.214)
50-59	0.263	(0.059-1.165)	0.274	(0.051-1.458)
60-69	0.167	**(0.038-0.729)***	0.176	**(0.033-0.926)***
Above 70	0.324	(0.074-1.422)	0.500	(0.088-2.856)
Sex				
Male	Ref			
Female	1.059	(0.525-2.136)	1.512	(0.530-4.311)
Marital status				
Married	Ref			
Not married	0.931	(0.542-1.598)	0.880	(0.410 -1.889)
Educational level				
No formal education	Ref			
Primary	1.567	(0.781-3.143)	2.236	(0.900-5.555)
Secondary /SHS	1.901	(0.737-4.901)	3.250	(0.818-12.912)
Tertiary	0.923	(0.223-3.811)	0.313	(0.023-4.175)
J.H.S	1.567	(0.695 -3.534)	2.437	(0.775-7.663)
Religion				
Christian	Ref			
Muslim	0.419	(0.088-1.988)	0.403	(0.063-2.572)
Occupation				
Professional	Ref			
Unprofessional	2.143	(0.891-5.155)	1.198	(0.279-5.156)
Average monthly income				
Less than GHS 200	Ref			
GHS 200-GHS 600	0.247	**(0.128-0 .478)***	0.385	**(0.169-0.874)***
GHS 700 and above	0.635	(0.207-1.952)	7.157	**(0.881-58.162)***
Drugs from Health Insurance				
Yes	Ref			
No	2.469	**(1.368-4.457)***	1.571	(0.761-3.242)
Difficulty in reaching a health facility				
Distance				
Yes	Ref			
No	0.426	**(0.243-0.745)***	0.343	**(0.150-0.781)***
Availability of caregivers				
Yes	Ref			
No	0.271	**(0.077-0.955)***	0.197	**(0.041-0.944)***
Health facility				
New Abirem Government Hospital	Ref			
I & I Clinic	1.755	(0.929-3.315)	1.768	(0.717-4.356)
Quality of care				
Dissatisfied	Ref			
Satisfied	12.258	**(2.877-52.227)***	11.803	**(2.252-61.861)***
Duration of hypertension				
<4 years	Ref			
>=4 years	2.154	**(1.234-3.763)***	2.684	**(1.358-5.3081)***

Note: $\chi 2 = 74.87$, df=20, $p<0.0001$, $R^2=0.2416$

CHAPTER FIVE

DISCUSSIONS

5.1 Introduction

This section presents the discussion of the significant discoveries from the study. The study was carried out to identify factors contributing to adherence to hypertensive medication among adults in Birim North district.

In many developing countries, maintaining good adherence to hypertensive medication remained the most important challenge. Adherence to antihypertensive medications contributes to controlled blood pressure and prevention of complications. The importance of studying hypertension medication adherence in Ghana stem from the fact that management of hypertension imposes a huge financial and economic burden for individual's immediate and extended families as well the national health care system. Though there is a lot of improvement in the country by enrolling hypertensive medication on national health insurance scheme, adherence to such medication still remain a challenge.

5.2 Hypertensive medication adherence

Hypertensive medication adherence still remains a challenge in Ghana. The results from the study show approximately thirty four percent adherent rate. A conducted in Ethiopia by Mekonnen et al., (2017), with an adherence rate of sixty seven percent contradicts this study findings. However, a study conducted by Ahmed (2006), at Ghana Port and Harbor Authority hospital in Takoradi indicates that medication adherence is low with nineteen percent clients fully adhering to hypertensive medication which were below the study result.

5.3 Socio-demographic descriptions of participant

The mean age of respondent was approximately sixty one years with standard deviation (SD) of thirteen. Most of the respondents were within the age category of 60 to 69 years.

In sum, about ninety six percent of respondents were aged 35 years and above while, only 4 percent were aged less than 35 years. This complements several studies show that hypertension is seen in most adults as compared to the younger age. According to (Edo, 2009), about eighty five percent of respondents were aged between 35 to 74 years while fifteen percent were aged less than 35 years in his study. Primary level of education was higher as compared to other levels of education in this study.

With regards to the occupational status of respondents, majority of them were farmers/fishermen. This was higher than Ghana 2010 population and housing census conducted by Ghana Statistical Service that reveals that fifty two percent of people living in Birim north district engaged in skilled agriculture activities. Adherence rate among males was forty eight percent higher as compared to female though females in the study population were higher than males.

5.4 Socio-demographic factors associated with adherence to hypertensive medication

In this study, age was found not to be associated with adherence to hypertensive medication. However, there was a significant association in the age category 60 to 69 years with an odds ratio less than one, which indicates that as one age increase his or her level of adherence decreases. This support a similar study that was conducted in Pakistan by Hashmi et al., (2007) which indicated that as one age increase the level of adherence to medication adherence also decrease.

From the study, the income level of the hypertensive clients also shows a very significant association between adherence to hypertensive medication. As one's income increases, his or her

level of adherence to hypertensive medication also increases within the income category GHS 200-GHS 600 but overall income as a variable was not associated with adherence. This supporte by Maria et al., (2007) study. In their study, they explained that socioeconomic condition can affect the health context, mainly chronic diseases such as hypertension to be precise.

The introduction of the national health insurance has drastically reduced the medical expenditure of hypertensive clients. The study reveals that the health insurance status of hypertensive clients is associated with hypertensive medication adherence. Medical cost sharing is also associated with the outcome of a systematic review conducted by Eaddy et al., (2012). In their study, eighty five percent showed that an increasing patient share of medication costs was significantly associated with a decrease in adherence.

5.5 Association of medication adherence with healthcare systems

One variable that was significant with a lower odds of adherence to hypertensive medication in the crude analysis was the availability of caregivers. In others words, the odds of hypertensive clients without caregivers is 3.7 times lower than that of hypertensive clients with caregivers, that is the odds of adherence to hypertensive medication for patients with caregivers was 73% less than hypertensive patients without caregivers. This variable is still significant after adjusting for all variables in the study. Availability of caregiver is therefore independently associated with hypertensive medication adherence.

Several studies have been conducted to determine the role of caregivers in medication adherence. A study conducted by Manuscript & Patients (2014), to determine whether having a paid as well as family guardian was associated with medication adherence in patients hospitalized for cardiovascular diseases found that, participants who reported having paid caregivers were 40%

less likely to be non-adherence to their medication compared to those without caregivers adjusting for demographic confounders and comorbid conditions.

The other factor that was significant in the crude analysis is distance. Most of the respondent's belief that distance from the health facility to their residence play a very important role in their medication adherence. Distance plays an important role in patient health-seeking behavior, and because of that Ghana health service put in place the primary health system which was adopted after the declaration of the internal conference on primary health care held in Alma Ata, Kazakhstan in 1978 (known as the "Alma Ata Declaration"). This study revealed that the odds of adherence to hypertensive medication is lower among respondents who says distance is not a problem in adherence as compared to their counterparts in the crude analysis. This was also still significant after adjusting for other variables which confirm that distance is independently associated with adherence to hypertensive medication. A similar study conducted in northwest Ethiopia by Ambaw et al., (2012) found out that respondents who stay closer to the hospital are more adherent after adjusting for confounder as compare to those who stay far.

However the type of health facility, how long they used the health facility as their regular place of seeking health care and other variable were not significant at the bivariate analysis stage.

5.6 Association of medication adherence with the quality of care

The kind of healthcare health professional given to clients usually influence the outcome of one medical condition. Measurement of quality has a lot of dimensions but most commonly used one is the perception of clients about the type of care they received. The study shows a very strong association of hypertensive medication adherence with the nature of care hypertensive clients got from health professionals in Birim north district which makes it an independent association.

Findings from a cross-section survey conducted by Zyoud et al., (2013) in Palestine also show a global satisfaction to be associated with hypertensive medication adherence.

The time patients spend to be seen is a factor that determines the utilization of health care services. Patients perceive long waiting time as a barrier in getting services and keeping patients waiting unnecessarily can cause stress for both patients and health professionals. Time spend is one of the variables under the quality of healthcare that show a very strong association between adherence to hypertensive medication in the study. According to Navya et al.,(2015), prolong waiting for consultation was significantly associated with poor adherence or moderate adherence.

5.7 Association of medication adherence disease and therapy-related factors

Duration of hypertensive medication was associated with hypertensive medication. At the binary logistic regression level, the odds of adherence to hypertensive medication increased 2.15 fold among the respondents with 4 years and above as compared to respondents who were on hypertensive medication for less than 4 years. This was still significant at the multiple logistics regression after adjusting for other confounders. This association found was higher than a similar study conducted by Mekonnen et al., (2017) with an odd ratio higher among hypertensive clients with long duration of treatment.

Un-prescribed medication/supplements/mixture was also associated with adherence to hypertensive medication while other variables like side effect of medication commodity were found not to be associated with hypertensive medication adherence. But many studies found them to be associated with hypertensive medication adherence.

Diabetes, asthma, stroke, high cholesterol, heart attack were found to the comorbidities in the study

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

The findings in the study were not much different from what is found in the literature, however, few results were the opposite of what is found in other studies. The results show low adherence to hypertensive medication.

Forgetfulness, poor knowledge about hypertension, side effect of medication and physical support were the most challenged for patients to adhere to their medications.

In the final analysis after adjusting for confounders' duration on hypertensive medication, availability of caregivers, distance, and quality of care were found to be associated with hypertensive medication adherence among adults in Birim north district.

6.2 Recommendation

Health authorities in Birim north district should intensify health education for the benefit of hypertensive medication.

The pharmacy departments in collaboration with the medical superintendent at New Abirem government hospital and I&I Clinic should identify innovative ways such as electronic reminders to improve on patient's hypertensive medication adherence.

There should be a policy for all hypertensive patients attending the clinic in the district to have a treatment supporter to help improve adherence level.

Health staff should be oriented to improve quality of care and effective communication to hypertensive clients.

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APPENDICES

APPENDIX I – RESPONDENT INFORMATION SHEET

General information

Project Title : Adherence to hypertensive medication among adults in Birim North District.

I am …….(interviewer), a student of the Department of Epidemiology and Disease Control , University of Ghana Legon pursuing a Master of Public Health Degree Programme. I am here with my research assistants to carry out a survey to find out the adherence to hypertensive medication among adults in Birim North District. This is purely for academic purposes and forms part of the requirement for the award of Master of Public Health Degree. The researcher has no conflict of interest in this study.

Procedure

The study will involve answering questions from a questionnaire about adherence to hypertensive medication. The information you provide will add to knowledge and inform policy about adherence to hypertensive medication and propose some interventions needed.

Benefits and Risks

There will be no monetary or material compensation for the study. There are also no known risks associated with this study and I am always available to assist with any questions.

Confidentiality

No name will be recorded. Your name and identity are not needed in the study. However the information you are going to provide will be coded and will be treated strictly confidential. You are assured of total confidentiality to the information you will give. Apart from the researcher and supervisor of this research, no one else will have access to information provided whether in part or whole. Data collected will be stored under lock and key then destroyed after a minimum of three years as per research protocol.

Right to refuse

Participation in this study is voluntary. You are free to answer part or the entire questionnaire. You can choose to withdraw from the study or stop the interview at any time you want. You can also choose not to answer any question(s) you find uncomfortable about. Should you choose not to not to participate, it will not affect you or your clinic in any way. However you are encouraged to participate fully in this study to help Adherence to hypertensive medication among adults in Birim North District, Ghana and beyond.

Dissemination of results

Findings and recommendations would be available at the School of Public Health and it will also be disseminated through a meeting with different stakeholders at the end of the study.

Before Taking Consent

Do you have any questions you wish to ask about the study? Yes/No

If yes, please indicate the questions below

……

……

…….....

If you have any question(s) or further clarification concerning this study and/or the conduct of the researcher and research assistants, please do not hesitate to contact the following; Panyan Bodong, School of Public Health, University of Ghana, Legon bless.panyan@gmail.com. Tel:0546391213; Mr, Chris Bambey Guure cbguure@ug.edu.gh/ bam.bey1@hotmail.com

Tel+233 (0) 206854710 / +233 (0) 242 928 284, School of Public Health, University of Ghana, Legon, Tel: 0277220276 and; Mrs. Hannah Frimpong (Administrator), Ghana Health Service Ethical Review Committee Secretariat, Accra. Tel: 0507041223/0243235225

APPENDIX II: INFORMED CONSENT

I have read the information given above, and I understand. I have been given a chance to ask questions concerning this study and questions have been answered to my satisfaction. I now voluntarily agree to participate in this study knowing that I have the right to withdraw at any time without it affecting my current or future use of health care services.

Signature/Thumb print: …… Date: ……..

Contact detail: ……...

I, the undersigned, have explained this consent to the respondent in English and Twi and that she/he understands the purpose of the study, procedures to be followed as well as the risks and benefits of the study. The participant has fully agreed to participate in the study.

Signature of interviewer:……..… Date: ……

Contact detail: ……

APPENDIX III: QUESTIONNAIRE

I am post graduate student of the School of Public Health, University of Ghana and conducting research on the topic: **Adherence to hypertensive medication among adults in Birim North District**. Participation in this study is **voluntary and withdrawal would not affect your health care**. The information that will be given shall be treated with confidentiality and for academic purposes.The aim of this research is to investigate the adherence to hypertensive medication among adults in Birim North District. **Confidentiality of the answers given is assured**. Thank you very much for your participation

SECTION A: Socio-Demographic Data

Participants ID		**Response**
Question Number	Questions	
1	What is your Gender 1. Male 2. Female	
2	What is your age	
3	What is your home address?	
4	What is your Marital status? 1. Single 2. Married 3. Divorced/Separated 4. Widowed 5. Co-habiting	
5	What is your educational level? 1. No formal education 2. Primary 3. Secondary 4. Tertiary 5. Others……	
6	What is your religion? 1. Christian 2. Muslim 3. Traditionalist 4. Others, specified……	
7	What is your nationality.	

8	What is your ethnicity, if Ghanaian.	

SECTION B: Socio-economic

Participants ID		**Response**
Question Number	Questions	
9	How many children do you have?	
10	How many children are dependent?	
11	How many children are supportive?	
12	What is your occupation? 1. Business person 2. Farmer/Fisherman 3. House wife 4. Professional 5. Trader/shop assistant 6. Retired 7. Tradesman 8. Clerical worker 9. unskilled labourer 10. para professional 11. Student 12. Unemployed	
13	What is your average monthly income? 1. Less than GHS 200 2. GHS 200-GHS 600 3. GHS 700-GHS 1000 4. GHS 1100- GHS 2000 5. More than GHS 2000	
14	How do you pay for your hypertensive drug 1. Out of pocket 2. Health insurance, specify……. 3. Others……	
15	If out of pocket, how much do you spend on your drug monthly? 1. GHS 10-20 2. GHS 20-50 3. GHS 50-100 4. GHS 100-200 5. More than GHS 200	
16	If insured, do you get all your drugs from the Health Insurance? 1. Yes 2. No	

SECTION C: Knowledge, attitude and practices about hypertension and treatment

Participants ID		**Response**
Question Number	Questions	
17	What do you think are the risk factors related to hypertension? 1. Genetics/ Family History of Hypertension 2. Ageing 3. Being obese or overweight 4. lack of exercise or physical activity 5. Too much alcohol consumption 6. Other diseases like Chronic Kidney disease, Adrenal or Thyroid disorders 7. Pregnancy 8. Spiritual 9. Other, specify …….	
18	What do you think are the complications of hypertension? 1. Stroke 2. Heart attack 3. Heart Failure 4. Kidney Failure 5. Erectile Dysfunction 6. Eye disease 7. Other, (Specify	
19	What blood pressure readings will qualify one to be treated for hypertension?	
20	What is your average blood pressure reading?	
21	Do you think it is well-controlled? 1. Yes 2. No 3. Don't know	
22	How is hypertension managed? (Tick as many) 1. With orthodox medications 2. With herbal medications 3. Dietary changes 4. Increased physical activities/ exercises 5. Other lifestyle modifications such as halting smoking, reducing alcohol intake, etc 6. With prayers 7. Other, specify ……	
23	Which ones do you think are more potent in managing hypertension? 1. Orthodox medications 2. Herbal medications 3. Others, specify ……	

24	What dietary modifications do you know about? 1. Reducing salt-intake 2. Reducing intake of fatty meals 3. Taking more vegetables and fruits 4. Drinking lots of water 5. Others, specify ……	
25	Do you feel you have any complications of hypertension? 1. Yes 2. No 3. Don't Know	
26	Do you believe the medications are effective in reducing blood pressure levels 1. Totally agree 2. Agree 3. Disagree 4. Totally disagree 5. Neither agree nor disagree	
27	Which anti-hypertensive medications do you know about? 1. Diuretics e.g. Bendroflumethiazide, Hydrochlorthiazide 2. Calcium-channel blocker e.g. Nifedipine,Amlodipine ,Felodipine 3. Beta-Adrenoceptor blocker e.g.Atenolol, Propranolol, Bisoprolol, Carvedilol 4. Angiotensin-converting enzyme inhibitors(ACE) eg. Lisinopril, Ramipril 5. Angiotensin-II-receptor blockers eg, Candesartan, Losartan ,Valsartan, 6. Centrally-acting drugs eg. Methyldopa 7. Other, Specify	
28	Do you know about any intravenous medications for hypertension management? 1. Yes 2. No	
29	Are you scared of being dependent on the medications? 1. Yes 2. No	
30	Do you know any side effects to anti-hypertensive medications? 1. Yes 2. No	
31	What are some of the common side effects to anti-hypertensive medications? 1. Headaches	

	2. Dizziness 3. Cough 4. Drowsiness/weakness 5. Nausea/Vomiting 6. Skin rash 7. Swollen lips and face 8. Swollen feet 9. Erectile dysfunction 10. Excessive urination 11. Others, specify ……	
32	Are you scared of side effects to any of the anti-hypertensive medications? 1. Yes 2. No	
33	If yes, which one particularly?	
34	Are you able to follow the advice given to you by your health professionals? 1. Yes 2. No	
35	If yes, why?	
36	If no, why?	

SECTION D: Measurement of Adherence (Moriskys 8 Item Measurement Adherence Scale)

Question number	**Question**	**Yes(1)**	**No (2)**
37	Do you sometimes forget to take your medicines?		
38	People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past two weeks was there any days when you did not take your medicine?		
39	Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?		

40	When you travel or leave home, do you sometimes forget to bring along your medicine?		
41	Did you take all your medicines yesterday?		
42	When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?		
43	Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?		

Question number	**Question**	**Response**
44	How often do you have difficulty remembering to take all your medications? 1. Never/rarely 2. Once in a while 3. Sometimes 4. Usually 5. All the time	

SECTION E: Disease and Therapy related factors

Participants ID		**Response**
Question Number	Questions	
45	How long ago were you diagnosed as hypertensive? 1. Less Than A year 2. 1year – 5years 3. 5years-10years 4. More Than 10years	
46	How was it diagnosed? 1. Through a medical screening exercise 2. During pre-employment medical assessment 3. During routine medical assessment 4. Whilst reporting at the OPD for something else 5. When I was rushed in for an emergency. Specify……	

	6. Other, specify ……	
47	Were you told you had developed complications already? 1. Yes 2. No	
48	Have you ever been admitted on account of very high blood pressures since diagnosis? 1.Yes 2. No	
49	Were you consistent with therapy at the time? 1. Yes 2. No	
50	Which oral anti-hypertensive drug are you currently taking? 1. Diuretics e.g. Bendroflumethiazide, Hydrochlorthiazide 2. Calcium-channel blocker e.g. Nifedipine, Amlodipine ,Felodipine 3. Beta-Adrenoceptor blocker e.g. Atenolol, Propranolol, Bisoprolol, Carvedilol 4. Angiotensin-converting enzyme inhibitors(ACE) e.g. Lisinopril, Ramipril 5. Angiotensin-II-receptor blockers e.g. Candesartan, Losartan ,Valsartan, 6. Centrally-acting drugs e.g. Methyldopa 7. Other, Specify	
51	What is the total number of anti-hypertensive tablets you take daily?	
52	How many times a day do you take your drugs daily? Drug 1: [1] Once [2] Twice [3] Thrice [4] More Than Thrice Drug 2: [1] Once [2] Twice [3] Thrice [4] More Than Thrice Drug 3: [1] Once [2] Twice [3] Thrice [4] More Than Thrice Drug 4: [1] Once [2] Twice [3] Thrice [4] More Than Thrice Drug 5: [1] Once [2] Twice [3] Thrice [4] More Than Thrice	
53	Have your medications been changed since you were started on therapy? 1. Yes 2. No	
54	If yes, what was the reason? 1. Side-effects 2. Poor control 3. To help adherence	

	4. Other, specify …….	
55	Have you ever experienced any side effect to any of your medications? 1. Yes 2. No	
56	If YES what did you do? 1. I rushed to the hospital and was admitted and the medications withdrawn 2. Reported to the clinician at the OPD and it was withdrawn 3. Reported to the clinician at the OPD and it was ignored 4. Reported to the Clinician at the OPD and it was maintained after education 5. I stopped/ reduced the regular intake of the drug by myself	
57	Apart from hypertension, are you being managed for any other chronic condition? 1. Yes 2. No	
58	If yes, what condition? 1. Diabetes 2. High cholesterol 3. Heart attack 4. Heart Failure 5. Stroke 6. Asthma 7. Arthritis 8. Cancer 9. Other (s) (Specify)….....	
59	If yes to Q57 what are the total number of pills you take for that/ those condition(s) in a day?	
60	Do you take unprescribed medications/Supplements/ Mixtures? 1. Yes 2. No	
61	If yes are they 1. Orthodox 2. Herbal 3. Both	

SECTION F: Health Care Systems

Participants ID		**Response**
Question Number	Questions	
62	Is this your regular health facility? 1. Yes 2. No	
63	If yes, for how long?	
64	If no, specify	
65	Were you referred to this facility? 1. Yes 2. No	
66	If yes, what was the reason for the referral? 1. Poor control of hypertension 2. Acute Complications of hypertension (as emergency) 3. For specialist care on account of complications 4. Personal request (Reason:	
67	How far is your house from the hospital? [1] 5-10mins drive [2] 10-30mins drive [3] 30-60mins drive [4] More than 1hour's drive	
68	What means of transportation do you come by? 1. Own vehicle 2. Public Transport 3. Walk 4. Other, specify ……..	
69	Any difficulty reaching facility? [ ] Yes [ ] No If yes, what are some of the reasons (tick as many) 1. Distance 2. Transportation at certain times 3. Transportation fares 4. Availability of caregivers (Aged/ other forms of dependence, like physical disabilities) 5. Other, specify ……	

SECTION G: Quality of Care

Question number	Question on Quality of care	Yes =1	No=2	Don't Know=3
70	Do you find waiting time at the clinic acceptable?			
71	Do your doctors and other health professionals show interest during consultations?			

72	Are you given the chance to state your problems and ask questions about your disease?			
73	Are you satisfied with the health information and advice provided by your doctor and other health professionals?			
74	Do you spend enough time with your doctor and other health professionals during consultation?			
75	Do you have confidence in your doctor and other health professionals?			

Participants ID		**Response**
Question Number	Questions	
76	What would you say is your single most important challenge to adherence to your medications? 1. Forgetfulness 2. Side effects experienced 3. Side-effects feared 4. Cost of therapy 5. Complexity of drug therapy 6. Poor knowledge about hypertension 7. Physical support to get to facility 8. Belief in alternative treatment modalities 9. Other, specify ……	
77	What assistance do you think you need in helping with adherence? 1. Financial aid 2. Improvement of the NHIS 3. Fewer side effects 4. More education about hypertension and therapy 5. Some form of reminder 6. Fewer drugs and times of administration 7. Improvement in health care provider attitudes 8. Other, specify ……	