SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA

FACTORS ASSOCIATED WITH ADHERENCE TO ANTIHYPERTENSIVE THERAPY AMONGST OPD ATTENDANTS OF THE TEMA GENERAL HOSPITAL.

BY

AMOS AMOAKO - ADUSEI

(10416094)

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DECLARATION

I, Amos Amoako – Adusei, do hereby declare that with the exception of references to the literature and works of other researchers which have been duly acknowledged, this proposal is the result of my original work undertaken under supervision.

…….

Amos Amoako – Adusei

(Student)

Date: ……

……

Prof. Francis Anto

(Academic Supervisor)

Date: ……

DEDICATION

I would like to dedicate this work to the Almighty God for His mercies and strength throughout this project. Without God on my side, I would not have successfully completed this work. I am forever grateful to Him.

I dedicate this research work to my mum Mrs. Paulina Amoako – Adu, my lovely siblings Stella Amoako – Adu, Emmanuel Amoako – Adu, Joel Amoako – Adu, my grandfather Mr. Alfred Effah Adusei and my entire family for their love, support and for the many sacrifices until now.

I also dedicate this work to all my friends particularly Priscilla B. Otu, Mrs. Mavis Danso, Mrs. Mabel Amoh, Dr. Melvin Agbogbatey and to all my loved ones.

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ABSTRACT

Background: Cardiovascular related diseases and its deaths have increased over the years with hypertension being a precursor to these diseases. Proper management of the condition has proven to increase the life expectancy of patients. Adherence appears to be one of the important factors that influence the outcome of therapy greatly. Poor medication adherence is associated with poor disease outcomes, waste of health care resources and contributes to reduced blood pressure control.

Objectives: This study sought to determine the level of adherence and the factors associated with adherence to antihypertensive therapy OPD attendants of the Tema General Hospital

Method: A hospital-based cross-sectional study was carried out at the Tema General Hospital. Patients who have been on antihypertensive medication for more than a month and aged 18 years and above were randomly sampled from among OPD attendants on daily basis. Data were collected using a structured questionnaire based on the eight-item Morisky scale of medication adherence to determine their level of adherence to treatment. Factors likely to influence adherence was elicited from the patients. Data collected were analyzed using STATA version 15.0. Descriptive statistics was done for all the socio-demographic characteristics of respondents. A Chi-squared test was used to test for association between adherence to anti-hypertensive medication and all the independent variables. The magnitude and strength of the association was determined for each variable and anti-hypertensive medication adherence by a simple logistics regression analysis. Multiple logistics model was used to determine factors influencing hypertensive medication adherence after adjusting for confounders.

Results: Out of the 342 participants who took part in this study (age range 28-95years, mean age 55.10 $\pm$ 10.42), 13.16% had medium level of adherence and 86.84% had low level of adherence. The cost of therapy was the single challenge most of the participants faced with regards to adherence and diabetes was the most common co-morbidity amongst the participants. After adjusting for confounders, the odds ratio and confidence interval of factors that were significantly associated with medium level of adherence to antihypertensive medication were acceptability of waiting time at the hospital 0.04 (0.01 – 0.23) and difficulty in reaching the hospital 3.52 (1.50 – 8.27).

Conclusion: The level of adherence amongst residents in the Tema General Hospital was thirteen percent which represents only medium level of adherence. Acceptability of waiting time at the hospital and difficulty in reaching the hospital were the factors significantly associated with adherence.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 Background

In recent times, deaths resulting from cardiovascular diseases have been on the rise and has become one of the leading causes of death on the global scale (World Health Organization, 2018). About 18 million people pass on annually from cardiovascular diseases, constituting about 31% of all deaths globally. Over 75% of these deaths are recorded in developing countries. Cardiovascular diseases like stroke and heart attack contribute to about 85% of the deaths (World Health Organization, 2018). Cardiovascular diseases being part of non – communicable diseases are becoming serious public health issues affecting the world now. It causes death and leaves others disabled for the remainder of their lives on earth (Habib & Saha, 2010).

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 are particularly important for the efficient function of vital organs such as the heart, brain and kidneys (WHO, 2018).

According to the 8th Report of the Joint National Committee (JNC 8) 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, hypertension is diagnosed based on right measurement of the mean (average) of two or more readings of BP checked.

According to Whelton et al., 2018, the new blood pressure categories are:

- Normal: Less or equal to 120/80 mm Hg;
- Elevated: Systolic between 120-129 *and* diastolic less than 80;
- Stage 1: Systolic between 130-139 *or* diastolic between 80-89;

- Stage 2: Systolic at least 140 *or* diastolic at least 90 mm Hg;
- Hypertensive crisis: Systolic over 180 and/or diastolic over 120, with patients requiring immediate changes in medication if there are no other indications of problems, or immediate hospitalization if there are signs of organ damage.

Elevated blood pressure previously called 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 notice 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.

Hypertension is a common disease 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 (Park et al, 2014).

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, Owusu-Daaku, & Danquah, 2014).

Management of chronic diseases including hypertension usually requires the use of pharmacotherapy for a long period. Although the medicines used in management are effective in tackling diseases, their maximum benefits are usually not seen since about 50% of patients do not take their medications as prescribed (Brown & Bussell, 2011).

1.2 Problem Statement

Death due to hypertension has increased drastically over the last few decades. Uncontrolled hypertension can in itself lead to several complications which decreases the life expectancy of the patient. Complications that can result from hypertension include kidney disease, stroke, heart failure, myocardial infarction among others. Diseases (e.g. diabetes), obesity, age , race and lifestyle – smoking, alcoholism, sedentary lifestyle – are factors that can predispose an individual to becoming hypertensive and influence the progression of hypertension (WHO, 2013).

The cost of healthcare product and services for the management and prevention of hypertension is high making it difficult for low- and middle-income countries to effectively manage and reduce the prevalence of hypertension. This in effect increases the global economic burden posed by hypertension (Kearney et al., 2005).

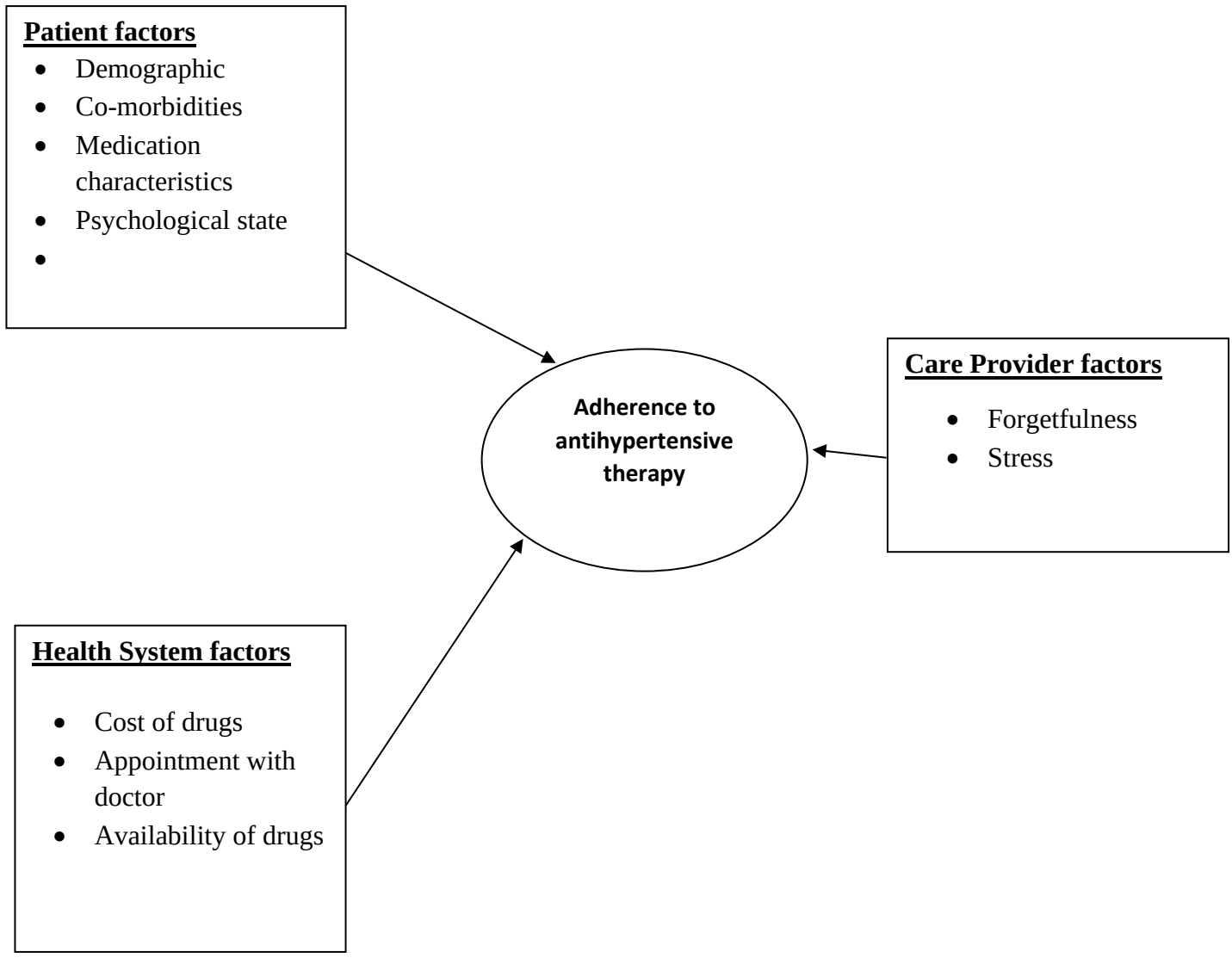
Every healthcare system is focused on improving the patient's quality of life. In as much as this is their focus, the patient factors that influence the outcome of therapy cannot be overemphasized. Non-adherence to medication and medical advice can greatly contribute to the progression of hypertension (Sarfo et al., 2018). 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).

Therefore, this study sought to investigate factors that influence adherence to antihypertensive therapy among OPD attendants of the Tema General Hospital.

1.3 Justification

The issue of poor adherence to hypertension medication is significant to the healthcare sector. Sixty percent of persons with the chronic disorder are inadequately disciplined when it comes to their treatment (Dunbar-Jacob & Mortimer-Stephens, 2001). Half (50%) of patients quit taking their drug within three months and 9000 hypertensive patients die prematurely every year because of poor medication adherence (Sarfo et al., 2018). 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 (Sarfo et al., 2018).

1.4 CONCEPTUAL FRAMEWORK



Author's own construct.

Figure 1: Conceptual Framework for Adherence to Antihypertensive therapy

NARRATIVE OF CONCEPTUAL FRAMEWORK

Adherence to antihypertensive therapy has relevant implications on developing countries such as Ghana. Patient factors such as demographic characteristics (i.e. age, sex, educational level, socioeconomic status), psychological state and presence of co-morbidities may influence the adherence of a patient to therapy (Jimmy & Jose, 2011).

The type of healthcare system available to patients has its own way of influencing adherence to therapy. The availability and affordability of drugs makes it easier for patients to easily adhere to their medications. The frequency of doctor's appointment or reviews tend to positively affect the level of adherence to medication (Yap et al, 2015).

In addition to the above, the caregiver or care provider plays a role in the adherence to medication therapy in many illnesses, hypertension inclusive. Social support systems help in recovery from illnesses and increase the life expectancies of patients with chronic diseases (Sarfo et al., 2018). The level of adherence to antihypertensive therapy has a great toll on the effectiveness of the management of hypertension.

1.5 Research Questions

1. What is the level of adherence to antihypertensive therapy amongst OPD attendants of the Tema General Hospital?
2. Which patient factors are associated with adherence in participants?
3. Which healthcare system factors are associated with adherence in participants?
4. Which healthcare provider factors are associated with adherence in participants?

1.6 Objectives

1.6.1 General Objective

To determine factors associated with adherence to antihypertensive therapy amongst OPD attendants of the Tema General Hospital.

1.6.2 Specific Objectives

1. To determine the level of adherence to antihypertensive therapy amongst OPD patients of the General Hospital.
2. To determine patient factors associated with adherence in participants.
3. To determine healthcare system factors associated with adherence in participants.
4. To determine healthcare provider factors associated with adherence in participants.

CHAPTER 2

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

Low drug adherence is very predominant among adults who are not so much concerned about their health. A study conducted in the USA revealed that adherence level to hypertensive medication is averagely around 59% among the hypertensive patients. Only ten percent were adherent to their full medication regime, and thus ninety percent were considered non-adherence to at least one medication (Roger et al., 2012).

According to the Joint National Committee, there various classes of diseases; 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 adherence is usually in various forms, which include taking drugs at the correct time, recalling to take dosages, incomplete dose, inappropriate time used to take medication, stopping 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 (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 (Lam & Fresco, 2015). Various tools have been designed and validated for different situations and circumstances (Lam & Fresco, 2015).

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 (Morisky, Green, & Levine, 1986).

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 (Jin, Sklar, Min Sen Oh, & Chuen Li, 2008). 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 associated with adherence which are commonly researched vary between studies. Studies that identified factors affecting hypertensive medication adherence and demographic factors were considered in this review of the literature. Such factors include gender, marital status, religion, ethnicity, education level and patient age.

The association between socio-demographic factors and treatment adherence 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%) (Joho, 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 (Joho, 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. 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 healthcare provider factors have been identified to negatively affect the medication adherence. 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 – healthcare 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 (Weber et al., 2014). This includes blood pressure measurement by either conventional sphygmomanometer using a stethoscope or by an automatic electronic device, full blood count, urine analysis, blood glucose, serum lipids, liver, and kidney function test (Weber et al., 2014). Patients who are adherent to therapy usually have results within the acceptable ranges for these tests (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 been 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 3

METHODS

3.1 Study Design

A hospital-based cross-sectional study was carried out at the Tema General Hospital. Patients who have been on antihypertensive medication for more than a month and aged 18 years and above were randomly sampled from among OPD attendants on daily basis. Data were collected using a structured questionnaire based on the eight-item Morisky scale of medication adherence to determine their level of adherence to treatment. Factors likely to influence adherence was elicited from the patients.

3.2 Study Area

Tema metropolis is one of the cosmopolitan districts in the Greater Accra Region and is a vibrant commercial and industrial city. Tema Metropolis is a coastal district which lies about 30 kilometers to the East of the nation's capital, Accra. It shares boundaries with the Dangme West District, with Ledzokuku Krowor Municipal, Adentan Municipal and Ga East Municipal, Akuapim South District and Gulf of Guinea on the northeast, south-west, north-west, north and south respectively. The Ashaiman Municipality is an enclave within the Tema Metropolis. The Metropolis spans over an area of about 87.8 km with Tema as its capital. The metropolis lies along the coast of Ghana. The Greenwich Meridian (i.e. Longitude 0º) passes through the Metropolis, which meets the equator or latitude 0° in the Ghanaian waters of the Gulf of Guinea.

The population of Tema Metropolis, according to the 2010 Population and Housing Census, is 292,773. It is made up of people from different ethnic and religious backgrounds. Most people are either unemployed or self-employed with a few professionals.

Tema General Hospital was constructed in 1954 by J.W Harrow and Sons Ltd and was handed over to the government of Ghana in 1965. The Tema General Hospital (TGH), located in the Tema Metropolis and serves as the major referral centre for all other clinics in the metropolis. However, the only major constraint to this strength is the erratic rain fail pattern in the region. The Tema General Hospital is the largest Public Health Institution in Tema Metropolis, which promotes, protect and ensure good health and well- being of clients and the community at large. The geographical location of the Hospital is surrounded by road networks, making the Hospital the major referral point for all other clinics/ hospitals, public and private in and around the Metropolis. The catchment area includes the whole of Tema metropolis, its satellite town and villages. The Tema General Hospital has ten (10) wards and 280 to 300 bed capacity. There are several departments at TGH of which Diabetes unit is included in the medical department. Other departments include Surgical, Dental, Physiotherapy, and Eye. The hospital delivers medical services to both in- patients and outpatients. It renders services to all the communities within the Tema including Nungua, Teshie, Spintex, Sakumono, Tema New town, Manhean, Ashaiman and Afienya, among others (Ghana Statistical Service, 2014).

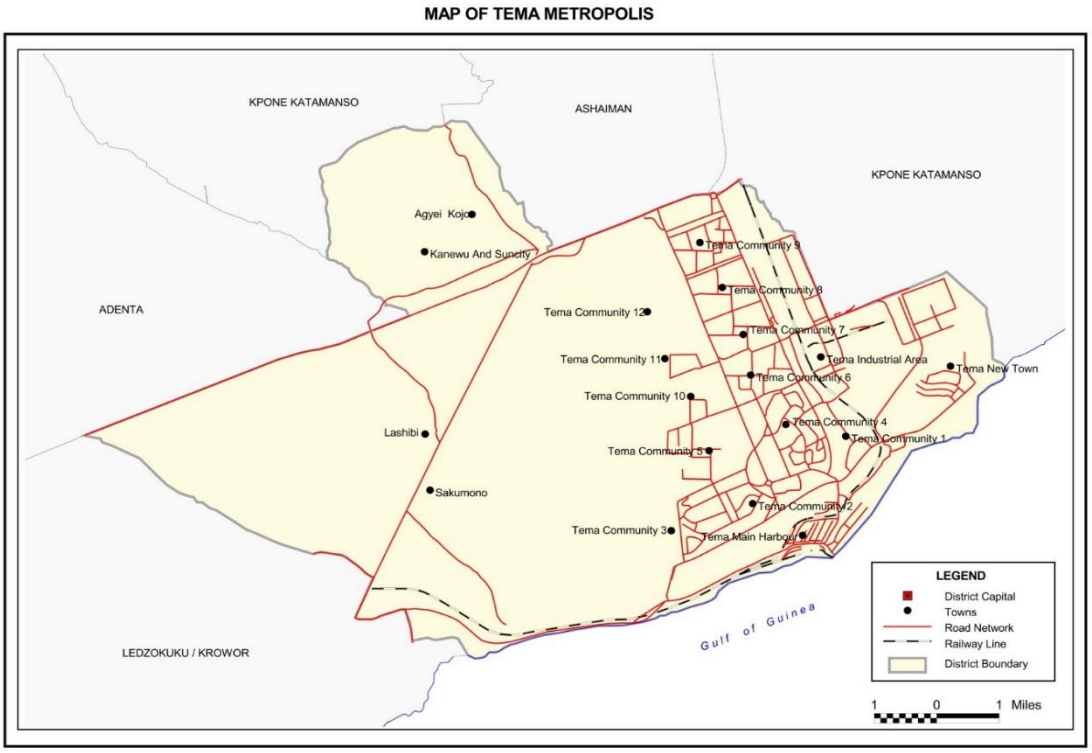


Figure 2: Map of Tema Metropolis

3.3 Study variables

Table 1: Study Variabes

Dependent Variable	Independent Variables
Anti-hypertensive medication adherence	Patient factors (i.e. demographics characteristics, co-morbidities, medication characteristics, psychological state), Health system factors (i.e. cost of drugs, appointment with doctor, availability of drugs), Care Provider factors (i.e. forgetfulness, stress).

3.4 Study population

All hypertension patients who attend the Tema General Hospital in the Tema Metropolis during data collection and those who fulfill the criteria was included.

3.4.1 Inclusion criteria

i. Hypertension patients who are willing to participate
ii. Patients aged ≥18 years.
iii. 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

i. Pregnancy-induced hypertension patients
ii. 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 = 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 showed that 68.7% adhered to hypertensive medication was used as the proportion (p) in the calculation of the sample size.

3.6 Sampling method

3.6.1 Selection of health facility.

The Tema General Hospital was used for this study because it is the district hospital that serves the entire Tema Metropolis and sees more hypertensive cases than the other health facilities.

3.6.2 Selection of participants

A research assistant was stationed at the pharmacy department on daily basis to collect data from hypertensive patients reporting at the department to collect drugs. Participants were consecutively recruited on daily basis into the study until the desired sample size is obtained. The words “Yes” and “No” were written on pieces of papers and folded. Each patient at the pharmacy who meets the study criteria was given the opportunity to pick one of the papers after the latter were shaken between the palms. Anyone who picked “yes” was recruited to be part of the study.

3.7 Data collection techniques

A questionnaire that consists of open and closed-ended questions was administered face-face to all participants who met the inclusion criteria. The interviews were started with the signing of consent forms and the purpose of the study was properly articulated to the participants before they were allowed to complete the questionnaire. Hypertensive patients

who visit the pharmacy department for their drugs were administered questionnaire and was given time to complete before leaving the facility.

3.8 Data processing

Data from the interview were entered into Microsoft Excel 2016 after checking for completeness and accuracy of the information. The data were cleaned by identifying all wrong entries, and the corrections were done using the codes in the questionnaire. Data entered were saved as Microsoft Excel file and exported to STATA 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. A Chi-squared test was used to test for association between adherence to anti-hypertensive medication and all the independent (exposure) variables. The Morisky Medication Adherence Scale categorizes adherence into three levels; low, medium and high levels. The responses from participants indicated only two levels of adherence were present and as such it as treated as a binary outcome using simple logistic regression analysis to determine the magnitude and strength of association between each variable and anti-hypertensive medication adherence. Multiple logistics model 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 >2 = low adherence, 1 or 2 = medium adherence and 0 = high adherence. It is measured based on the following questions: “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 response to a question m was scored one (1) while a No to a question was score for item one to seven zero (0). For item 8, the response of never/rarely was score one (1) and the rest zero (0). A score of >2 from the 8 items was adherence and less is non-adherence" (Mekonnen et al, 2017).

3.11 Ethical consideration

Ethical approval for the study was obtained from the Ethical Review Committee of the Ghana Health Service (GHS), through the School of Public Health University of Ghana with the number GHS-ERC029/02/19.

3.11.1 Privacy/Confidentiality

All information gathered in relation to the participant's participation was kept confidential and was not revealed to anyone. Identities were not be revealed in reports or publications that will result from the study while the data, both in hard copy and digital format, collected was kept for the purpose of analyses only.

3.11.2 Voluntary withdrawal

The decision of each participant in this study to participate was entirely voluntary. He/she was allowed to ask as many questions as possible until a better understanding is achieved.

A participant was also allowed to withdraw participation at any time as he/she wished without the need for any explanation.

3.11.3 Consenting process

For every participant, he or she was taken through the consenting process that is, what the study was about and what we seek to achieve, the benefits of the study to the community and nation as well as the potential risk involved. He/she was made aware that it is entirely voluntary and thus can decide to stop at any time in the process. To prove consent, every participant either signed or thumb printed the consent form before the questionnaire was administered.

3.11.4 Data storage and usage

It was explained to every participant that all the information obtained was stored in files and put under lock and key. At the end of the study any personal identifying information was also destroyed beyond identification by anybody else.

CHAPTER 4

RESULTS

4.1 Participants' Demographics

In this study, questionnaires were administered to 342 study participants with a response rate of 100%. One hundred and seventeen of the respondents (34.2%) were aged between 51 and 60 years whilst two (0.6%) were below 30 years. The mean age and standard deviation of respondents was 55.10 ± 10.42 years. There were 171 (50%) each of males and females. Majority of the respondents were Christians (78.01%) (Table 2).

Regarding the marital status of respondents, 5.0% were single, 71.4% were married, whilst 13.16% were divorced/separated. One hundred and forty-nine of them had attained Secondary education (43.6%) with education at the tertiary level being 12.28%. One hundred and thirteen (33.0%) of the respondents were businesspersons with clerical work being the least occupation (1.2%) (Table 3).

The average monthly income of 38.6% of the respondents was between GH₵201 - GH₵600. One hundred and seventeen (34.2%) of respondents obtained their hypertensive medications using health insurance whilst 65.8% (225) indicated that they paid for their medications out of pocket (Table 3).

Table 2: Participant Demographics characteristics

Characteristic	Number	Percentage (%)
Age(Years)		
≤ 30	2	0.58
31-40	23	6.73
41-50	106	30.99
51-60	117	34.21
61-70	77	22.51
Above 70	17	4.97
Sex		
Male	171	50.00
Female	171	50.00
Marital status		
Single	17	4.97
Married	244	71.35
Divorced/Separated	45	13.16
Widowed	36	10.53
Educational level		
No formal education	80	23.39
Primary	71	20.76
Secondary /SHS	149	43.57
Tertiary	42	12.28
Religion		
Christian	266	78.01
Muslim	59	17.30
Traditionalist	14	4.11
Other	2	0.58

Table 3: Participant socioeconomic characteristics

Characteristic	Number	Percentage (%)
Occupation		
Businessperson	113	33.04
Farmer/Fisherman	11	3.22
Housewife	31	9.06
Professional	59	17.25
Trader/shop assistant	45	13.16
Retired	42	12.28
Tradesman	13	3.80
Clerical worker	4	1.17
Unskilled laborer	9	2.63
Unemployed	15	4.39
Average monthly income		
Less than GH₵ 200	21	6.14
GH₵ 201-GH₵ 600	132	38.60
GH₵ 601-GH₵ 1000	113	33.04
GH₵ 1001-GH₵ 2000	73	21.35
More than GH₵ 2000	3	0.88
Payment of drugs		
Health Insurance	117	34.21
Out of pocket	225	65.79

4.2 Level of Adherence

The adherence level in this study was categorized into low, medium and high levels according to the Morisky 8-item adherence scale. Two hundred and ninety-seven (86.84%) showed low levels of adherence, forty-five (13.16%) medium level but none of the respondents showed high level of adherence (Table 4).

Table 4: Respondents level of adherence to antihypertensive medication

Adherence level	Morisky Score	Number	Percentage
High	0	0	0
Medium	1 – 2	45	13.16
Low	> 2	297	86.84

4.3 Socio-demographic factors associated with adherence to hypertensive medication

Tables 5 and 6 give information on the bivariate analysis on the association between Adherence and socio-demographic factors. The results indicate that age (p=0.009), marital status (p=0.014) (Table 5), occupation (p=0.038) and obtaining drugs using health insurance (p=0.001) (Table 6), were significantly associated with adherence to hypertensive medication. However, sex, educational level, religion, and average monthly salary were not significantly associated with adherence to hypertensive medication statistically.

Table 5: Association of medication adherence with participant demographics

Characteristic	Adherence level (%)		$\chi 2$	p-value
	Low	Medium		
Age(Years)				
≤ 30	0 (0.00)	2 (100)	15.2936	0.009
31-40	22 (95.65)	1 (4.35)		
41-50	92 (86.79)	14 (13.21)		
51-60	103 (88.03)	14 (11.97)		
61-70	66 (85.71)	11 (14.29)		
Above 70	14 (82.35)	3 (17.65)		
Sex				
Male	154 (90.06)	17 (9.94)	3.0963	0.078
Female	143 (83.63)	28 (16.37)		
Marital status				
Single	13 (76.47)	4 (23.53)	10.5982	0.014
Married	216 (88.52)	28 (11.48)		
Divorced/Separated	42 (93.33)	3 (6.67)		
Widowed	26 (72.22)	10 (27.78)		
Educational level				
No formal education	65 (81.25)	15 (18.75)	7.7911	0.051
Primary	66 (92.96)	5 (7.04)		
Secondary /SHS	133 (89.26)	16 (10.74)		
Tertiary	33 (78.57)	9 (21.43)		
Religion				
Christian	233 (87.59)	33 (12.41)	3.3450	0.341
Muslim	51 (86.44)	8 (13.56)		
Traditionalist	12 (75.00)	4 (25.00)		

Table 6: Association of medication adherence with participant socioeconomic status

Characteristic	Adherence level (%)		$\chi 2$	p-value
	Low	Medium		
Occupation				
Businessperson	104 (92.04)	9 (7.96)	17.7472	0.038
Farmer/Fisherman	11 (100.00)	0 (0.00)		
Housewife	23 (74.19)	8 (25.81)		
Professional	52 (88.14)	7 (11.86)		
Trader/shop assistant	39 (86.67)	6 (13.33)		
Retired	37 (88.10)	5 (11.90)		
Tradesman	9 (69.23)	4 (30.77)		
Clerical worker	2 (50.00)	2 (50.00)		
Unskilled laborer	7 (77.78)	2 (22.22)		
Unemployed	13 (86.67)	2 (13.33)		
Average monthly income				
Less than GH₵ 200	18 (85.71)	3 (14.29)	3.9439	0.414
GH₵ 201-GH₵ 600	120 (90.91)	12 (9.09)		
GH₵ 601-GH₵ 1000	94 (83.19)	19 (16.81)		
GH₵ 1001-GH₵ 2000	62 (84.93)	11 (15.07)		
More than GH₵ 2000	3 (100.00)	0 (0.00)		
Payment of Drugs				
Health Insurance	92 (78.63)	25 (21.37)	10.4896	0.001
Out of pocket	205 (91.11)	20 (8.89)		

The three most important challenges to adherence to hypertensive medication as indicated by respondents were cost of therapy, forgetfulness and poor knowledge about hypertension (Fig. 3).

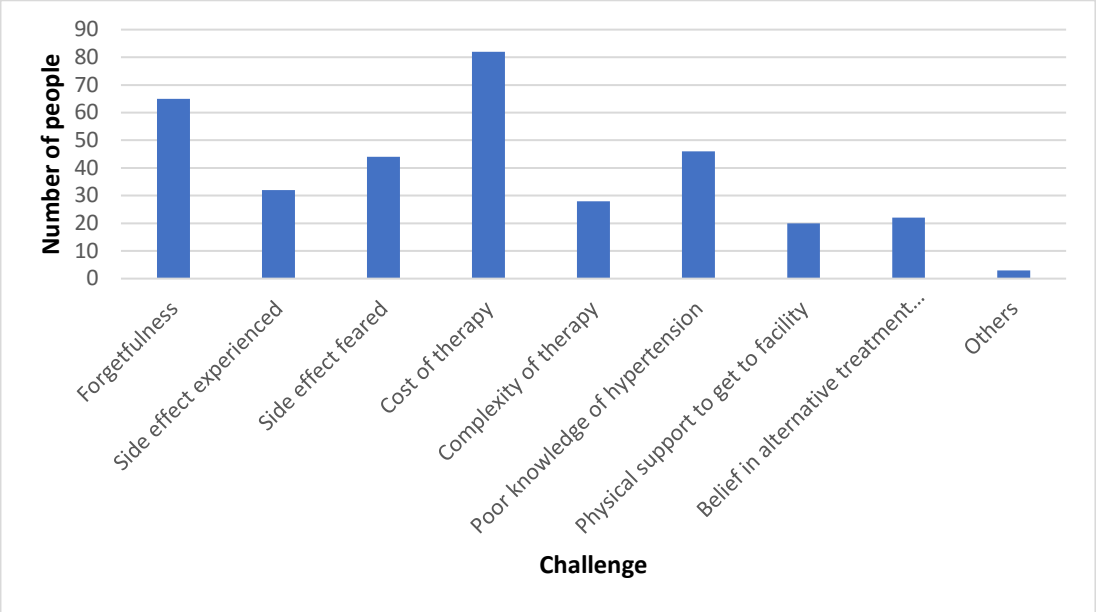


Figure 3: Challenges associated with adherence to hypertensive therapy.

Most of respondents were people with diabetes, high cholesterol and may have suffered a heart attack before (Fig. 4).

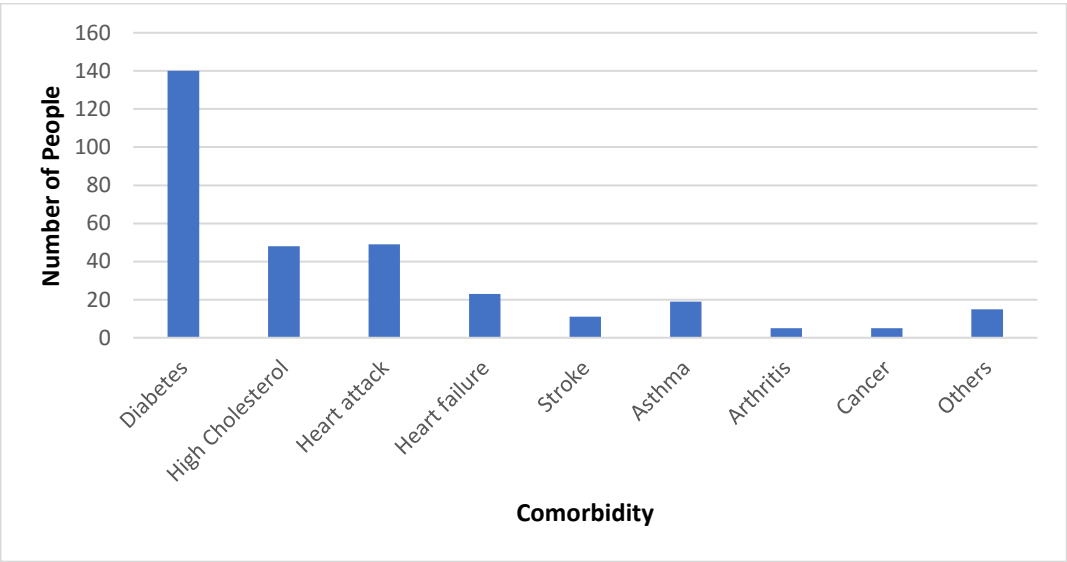


Figure 4: Comorbidity among the participants

4.4 Healthcare system related factors

One hundred and seventy-six of the respondents 176 (51.5%) indicated that Tema General Hospital was their regular facility at the time of the study, and it had been the regular facility for most of them for over 10 years. Regarding referral to the hospital, 130 (38.0%) were referred with 39 (30.0%) as a result of poor control, 30 (23.1%) as a result of acute complications, 58 (44.6%) for specialist care and 3 (2.3%) on personal request. About their means of transport to the hospital, 209 (61.1%) used public transport, 62 (18.1%) used their own vehicles, 71 (20.8%) walked to the health facility for their hypertensive medication. One hundred and forty (40.9%) of the respondents travel over 5.1 - 10km to the hospital while 3.5% travel over a distance of more than 10 km before reaching the hospital. For difficulty in reaching a health facility, 179 (52.3%) indicated that they have difficulty in reaching the health facility for their medication (Table 7).

Table 7: Healthcare system related factors

Characteristic	Number	Percentage (%)
Regular health facility		
Regular	176	51.46
Not regular	166	48.54
Duration in regular facility		
1year-5years	55	31.25
6years-10years	53	30.11
More than 10years	68	38.64
Referred to this facility		
Referred	130	38.01
Not referred	212	61.99
Reason for the referral		
Poor control	39	30.00
Acute complications	30	23.07
For specialist care	58	44.62
Personal request	3	2.31
Distance from a health facility		
≤ 1km	73	21.35
1.1-5km	117	34.21
5.1 - 10km	140	40.94
More than 10km	12	3.51
Means of transportation		
Own vehicle	62	18.13
Public Transport	209	61.11
Walk	71	20.76
Difficulty reaching facility		
Have difficulty	179	52.34
Have no difficulty	163	47.66
Distance as a difficulty		
Have difficulty	127	37.13
Have no difficulty	215	62.87
Transportation at certain times as a difficulty		
Have difficulty	64	18.71
Have no difficulty	278	81.29
Transportation fares as a difficulty		
Have difficulty	83	24.27
Have no difficulty	259	75.73
Availability of caregivers as a difficulty		
Caregivers available	20	5.85
Caregivers unavailable	322	94.15

4.5 Association of medication adherence with health care systems factors

Table 8 shows a measure of association on bivariate analysis investigating the association between Adherence to hypertensive medication and health care system factors. The results indicate that whether the hospital is their regular health facility (p=0.001), duration of use as regular health facility (p<0.001), whether the respondent was referred to the hospital (p=0.008) with its reasons (p=0.045) and the distance to the hospital (p=0.001) were significantly associated with adherence. Difficulty in reaching the hospital (p=<0.001) with reasons being distance (p<0.001), transportation (p=0.008) and transportation fares (p=0.001) were also significantly associated with hypertensive medication adherence. However, means of transportation and availability of caregivers were not statistically associated with adherence to hypertensive medication.

Table 8: Association of medication adherence with healthcare systems

Characteristic	Adherence level (%)		$\chi 2$	p-value
	Low	Medium		
Regular health facility				
Regular	142 (80.68)	34 (19.32)	12.0425	0.001
Not regular	155 (93.37)	11 (6.63)		
Duration of regular facility				
1year-5years	204 (92.31)	17 (7.69)	16.3507	<0.001
6years-10years	41 (77.36)	12 (22.64)		
More than 10years	52 (76.47)	16 (23.53)		
Referred to this facility				
Referred	121 (93.08)	9 (6.92)	7.1345	0.008
Not referred	176 (83.02)	36 (16.98)		
Reason for the referral				
Poor control	38 (97.44)	1 (2.56)	9.7623	0.045
Acute complications	28 (93.33)	2 (6.67)		
For specialist care	53 (91.38)	5 (8.62)		
Personal request	2 (66.67)	1 (33.33)		
Distance from a health facility				
$\leq$ 1km	62 (84.93)	11 (15.07)	15.4175	0.001
1.1-5km	92 (78.63)	25 (21.37)		
5.1 - 10km	133 (95.00)	7 (5.00)		
More than 10km	10 (45.45)	12 (54.55)		
Means of transportation				
Own vehicle	50 (80.65)	12 (19.35)	2.9850	0.225
Public Transport	186 (89.00)	23 (11.00)		
Walk	61 (85.92)	10 (14.08)		
Difficulty in reaching the facility				
Have difficulty	154 (94.48)	9 (5.52)	15.8937	<0.001
Have no difficulty	143 (79.89)	36 (20.11)		
Distance as a difficulty				
Have difficulty	121 (95.28)	6 (4.72)	12.5744	<0.001
Have no difficulty	176 (81.86)	39 (18.14)		
Transportation at certain times as a difficulty				
Have difficulty	62 (96.88)	2 (3.13)	6.9358	0.008
Have no difficulty	235 (84.53)	43 (15.47)		
Transportation fares as a difficulty				
Have difficulty	81 (97.59)	2 (2.41)	11.0806	0.001
Have no difficulty	216 (83.40)	43 (16.60)		
Availability of caregivers as a difficulty				
Caregivers available	20 (100.00)	0 (0.00)	3.2185	0.073
Caregivers unavailable	277 (86.02)	45 (13.98)		

4.6 Healthcare provider factors

In table 9, majority of respondents indicated that the waiting time at the hospital was acceptable (53.22%). With regards to doctors and other health professional showing interest during consultations, 293 (85.67%) respondents said doctors and others health professionals showed interest during consultations. Out of the 342 respondents, 81.52% were given the chance to state their problems and ask questions, 85.09% of respondents were satisfied with health information and advice provided by doctors, 78.59% respondents indicated that they spend enough time with doctors and other health professionals at the hospital, and 76.90% respondents have confidence in doctors and other health professionals in providing healthcare for hypertensive them.

Table 9: Healthcare provider related factors

Characteristic	Number	Percentage (%)
Acceptable of waiting time at the hospital		
Acceptable	182	53.22
Not acceptable	160	46.78
Doctors and other health professionals showed interest during consultations		
Show interest	293	85.67
Show no interest	49	14.33
Given the chance to state your problems and ask questions about your disease		
Given chance	278	81.52
Not given chance	63	18.48
Satisfied with the health information and advice provided by your doctor and other health professionals		
Satisfied	291	85.09
Dissatisfied	51	14.91
Spend enough time with your doctor and other health professionals during the consultation		
Enough time	268	78.59
Time not enough	74	21.41
Confidence in your doctor and other health professionals		
Confident	263	76.90
Not confident	79	23.10

4.7 Association between Healthcare provider related factors and participant medication adherence

Table 10 below presents a bivariate analysis showing the association between Adherence to hypertensive medication and healthcare provider related factors. The results show that acceptability of waiting time at the hospital ($p<0.001$), doctors and other health professionals showing interest during the consultation ($p=0.003$), being given the chance to asked questions about their medication/health ($p=0.034$) and having confidence in doctors and other health professionals ($p<0.001$) were significantly associated with hypertensive medication adherence. However, satisfaction with health information and advice provided by doctors and other health professionals and spending enough time with doctors and other health professionals were not statistically associated with adherence to hypertensive medication.

Table 10: Association between Healthcare provider related factors and participant medication adherence.

Characteristic	Adherence Level (%)		$\chi 2$	p-value
	Low	Medium		
Acceptability of waiting time at hospital				
Acceptable	177 (98.33)	3 (1.67)	45.1816	<0.001
Not acceptable	118 (73.75)	42 (26.25)		
Doctors and other health professionals showed interest during consultations				
Show interest	248 (84.64)	45 (15.36)	8.6658	0.003
Show no interest	49 (100.00)	0 (0.00)		
Given the chance to state your problems and ask questions about your disease				
Given chance	235 (84.53)	43 (15.47)	6.7846	0.034
Not given chance	61 (96.83)	2 (3.17)		
Satisfied with the health information and advice provided by your doctor and other health professionals				
Satisfied	250 (85.91)	41 (14.09)	1.5937	0.451
Dissatisfied	47 (92.16)	4 (7.84)		
Spend enough time with your doctor and other health professionals during the consultation				
Enough time	230 (85.82)	38 (14.18)	1.2098	0.546
Time not enough	67 (90.54)	7 (9.46)		
Confidence in your doctor and other health professionals				
Confident	219 (83.27)	44 (16.73)	12.7144	<0.001
Not confident	78 (98.73)	1 (1.27)		

4.8 Disease and therapy related factors

Table 11 summarizes disease and therapy related factors for adherence to hypertensive medication at the Tema General Hospital. Majority of respondents 189 (55.26%) had their hypertension diagnosed within the last 5 years while 153 (44.74%) had the diagnosis for more than 5 years now. Out of the total number of 342 respondents, 34.9% of the respondents were told they had developed complications; out of which 54.25% had ever been admitted on an account of having a very high blood pressure, 53.80% respondents were found to be consistent with their therapy at the time that they were admitted on an account of high blood pressure. For the number of anti-hypertensive drugs taken daily, 309 (90.35%) respondents take one drug per day, 27 (7.90%) respondents take two per day and 6 (1.75%) respondents take three or more drugs per day. Majority of the respondents (222, 64.91%) said their medication had not been changed since they started with anti-hypertensive medication, while 120 (35.09%) respondents have had their medication being changed since they started with the therapy. For the side effect of hypertensive medication, 93 (38.27%) respondents experienced side effects after taking the hypertensive medication.

Taking unprescribed medication/supplements/ mixture was appreciably high with 180 (52.63%) respondent indicating that they do take unprescribed medication. Out of the 180 respondents who take unprescribed medications, 45 (25%) take orthodox medications, 38 (21.11%) take herbal medication and 97 (53.89%) respondents take both orthodox and herbal medications.

Table 11: Disease and therapy related factors

Characteristic	Number	Percentage (%)
Duration diagnosed as hypertensive		
≤ 5 years	189	55.26
> 5 years	153	44.74
Told you had developed complications already		
Developed complications	119	34.90
Developed no complications	222	65.10
Ever been admitted due to hypertension		
Admitted	185	54.25
Not admitted	156	45.75
Consistent with therapy		
Consistent	184	53.80
Not consistent	158	46.2
Number of anti-hypertensive tablets taken daily		
One	309	90.35
Two	27	7.90
Three or more	6	1.75
Medications have been changed since you were		
Changed	120	35.09
Not changed	222	64.91
Reason for a medication change		
Side-effects	25	20.83
Poor control	47	39.17
To help adherence	48	40.00
Experienced any side effect to any medications		
Experienced	142	41.52
Not experienced	200	58.48
Presence of co-morbidity		
Present	194	56.73
Absent	148	43.27
Taken unprescribed medications		
Takes unprescribed medicines	180	52.63
Does not take unprescribed medicines	162	47.37
Type of unprescribed medications		
Orthodox	45	25.00
Herbal	38	21.11
Both	97	53.89

4.9 Logistic regression of factors associated with hypertensive medication adherence

Table 12 shows the summarized association of hypertensive medication adherence using the simple and multiple logistics regression. The use of a Health insurance in obtaining drugs, difficulty in reaching facility, whether the respondents were referred, whether the hospital is their regular health facility, experiencing complications, admission due to hypertension, presence of co-morbidity, acceptability of waiting time at the hospital, respondent having the chance to state their problems and confidence in the health professionals were found to be significantly associated with adherence to antihypertensive therapy.

The multiple logistic regression found difficulty in reaching the hospital and the acceptability of the waiting time at the hospital to be significantly associated with adherence to antihypertensive therapy after adjusting for other confounders.

Table 12: Logistic regression of factors associated with hypertensive medication adherence

	Unadjusted		Adjusted	
Characteristic	**OR (95% CI)**	**p-value**	OR (95% CI)	p-value
Obtain drugs using Health Insurance			Ref	
Out of pocket	**Ref**			
Health Insurance	**2.785 (1.473-5.268)**	**0.002***	1.186 (0.554-2.541)	0.660
Difficulty in reaching a health facility	**Ref**		Ref	
No difficulty				
Difficulty	**4.308 (2.004-9.258)**	**<0.001***	3.518 (1.497-8.270)	0.004
Referral				
Not referred	**Ref**		Ref	
Referred	**2.750 (1.278-5.917)**	**0.010***	2.306 (0.781-6.806)	0.130
Regular Health Facility				
Not Regular	**Ref**		Ref	
Regular	**3.374 (1.647-6.910)**	**0.001***	1.089 (0.375-3.164)	0.875
Experienced any complications	**Ref**		Ref	
Not experienced				
Experienced	**0.437 (0.203-0.945)**	**0.035***	1.649(0.613-4.431)	0.322
Ever been admitted due to hypertension				
Not admitted	**Ref**		Ref	
Admitted	**0.515 (0.272-0.976)**	**0.042***	0.579 (0.257-1.302)	0.186
Presence of Co-morbidity				
Absent	**Ref**		Ref	
Present	**0.509 (0.270-0.961)**	**0.037***	0.540 (0.250-1.167)	0.117
Acceptability of waiting time				
Not acceptable	**Ref**		Ref	
Acceptable	**0.047 (0.014-0.156)**	**<0.001***	0.040 (0.007-0.233)	<0.001
Given the chance to state your problems and ask questions about your disease				
Not given chance	**Ref**		Ref	
Given chance	**5.489 (1.293-23.304)**	**0.021***	0.265 (0.031-2.236)	0.222
Confidence in your doctor and other health professionals				
Not confident.	**Ref**		Ref	
Confident	**15.671 (2.123-115.667)**	**0.007***	2.966 (0.289-30.469)	0.360

CHAPTER 5

DISCUSSION

The study was carried out to identify factors associated with adherence to antihypertensive medication amongst OPD attendants of the Tema General Hospital. In many low- and middle - countries, keeping up with adherence to antihypertensive medication remained the most important challenge. Adherence to antihypertensive medications contributes to well controlled blood pressure and prevention of complications (Mobula et al., 2018). The relevance of studying hypertension medication adherence in Ghana originates from the fact that the cost of management of hypertension burdens the individual, his or her immediate and extended families and the nation's healthcare system financially. Adherence to therapy remains an issue of great concern though there has been several improvements in the country regarding the management of hypertension through the enrollment of antihypertensive medication on the National Health Insurance Scheme (Mobula et al., 2018).

5.1 Antihypertensive medication adherence

Adherence to antihypertensive therapy is still an issue of concern in Ghana (Ahmed, 2006). The results obtained from this study show that approximately thirteen percent have medium level of adherence. A study conducted by Mekonnen et al, (2017), with an adherence rate of sixty seven percent is different from the findings of this study. Notwithstanding, a similar study conducted by Ahmed (2006), at Ghana Port and Harbor Authority hospital in Takoradi showed that medication adherence was low with only nineteen percent of the clients being fully adherent to their antihypertensive therapy which is not so different from what was observed in this study.

The mean age of respondent was approximately fifty-five years with standard deviation (SD) of eleven. Thirty four percent of the respondents were within the age category of 51 to

60 years being the relatively largest age group. In total, about ninety three percent of respondents were aged above 40 years while, only seven percent were below 40 years. This supports the fact that hypertension is common among older adults than the younger ones as seen in many studies.

In the bivariate analysis of this study, under the sociodemographic characteristics of participants, age, marital status, occupation and the use of health insurance in getting antihypertensive medications were found to be associated with adherence to antihypertensive medication. There was a relatively high percentage of participants in almost all the age groups having low level of adherence to their antihypertensive medications with participants between the ages of 31 and 40 having the highest (96%). This is similar to what is seen in the study conducted by Shah et al., (2018).

5.2 Factors associated with antihypertensive medication adherence

For healthcare system factors, whether the hospital is the regular health facility for the participants and the number of years it has been their regular facility were associated with adherence. Referral along with its reasons, distance covered by participants before reaching the hospital, difficulty in reaching the hospital with accompanying reasons such as distance, transportation and transportation showed significant associations with adherence to antihypertensive therapy. Sarfo et al., (2018) and Nwabuo et al, (2014) indicated in their studies that the healthcare system also has a role to play in the level adherence as well as poorly controlled hypertension stating that accessibility to health facility contributes to adherence.

Regarding healthcare provider related factors, acceptability of waiting time at the hospital, health professionals showing interest during consultation, being given the chance to state one's problems and ask questions about their disease and confidence in health professionals

were significantly associated with patient adherence (Lo, 2003). Healthcare providers essential to increasing the ability of patients to adhere to their medications. Mekonnen, Gebrie, Eyasu, & Gelagay, (2017) stated in their study that good provider-client relationship is key in increasing adherence.

From the logistic regression model, the odds of participants who obtain their medications using the health insurance being adherent was 2.79 times the adherence amongst those who paid for their drugs out of pocket. This may be due to the fact that the use of a health insurance reduces the financial burden of medical expenses as well as increases the ease of obtaining medications (Iuga & McGuire, 2014).

The odds of participants who had difficulty in reaching the hospital being adherent was 4.31 times the adherence amongst those who had no difficulty in reaching the hospital in the crude analysis. Difficulty in accessing a health facility has an essential role in the health-seeking behavior of individuals, and this has influenced the Ghana Health Service to put in place the primary healthcare system, a concept adopted after the declaration of Alma Ata at the international conference on primary health care held in Almaty, Kazakhstan in 1978 (known as the “Alma Ata Declaration”). According to Ambaw et al, (2012), respondents who had ease in accessing a health facility are more likely to be adherent after adjusting for confounders as compared to those who do not have any difficulty. This may be as a result of individuals trying to avoid the hustle of going to the hospital so will opt to adhere to their medications. The odds of participants who were referred to the hospital being adherent was 2.75 times the adherence amongst those who were not referred. Referrals may lead to further education and management of disease conditions which gives patients more concrete reasons for them to adhere to their medication (Jones et al., 2014).

The odds of participants who have the hospital as their regular facility being adherent was 3.37 times the adherence amongst those who do not have the facility as their regular facility.

Visiting a facility regularly tends to increase the chances of individuals adhering to their medication because their improvement or progress of their diseases are closely monitored, and intervention put in place to address any issues (Jones et al., 2014).

The odds of participants who have not experienced any complication being adherent was 0.56 times the adherence amongst those who have experienced any complications. This was lower than the findings from the study conducted by (Shameena, Sanjeev, & Nanjesh, 2017) which indicated that adherence was appreciably high among patients who perceive their condition is worsening whenever they have a complication. This may be due to differences in the cultural backgrounds of the participants in both studies (Årestedt, Benzein, & Persson, 2015). Patients are usually concerned about their life expectancies and would not want additional burden from any complications. Patients believe the greater the number of complications the higher their chances of dying. As such they will prefer to adhere to their medication to prevent more complications.

The odds of participants who have not been admitted due to hypertension being adherent was 0.48 times the adherence amongst those who have been admitted on account of hypertension. Admission to the hospital comes along with both emotional and financial stress for the individual as well as his or her family and friends. Admission on account of hypertension may originate from poorly controlled blood pressure (Butler et al., 2017).

The odds of participants with any no co-morbidity being adherent was 0.48 times the adherence amongst those who have co-morbidity. Co-morbidities tend to affect how patients respond to therapy. In as much as patients are willing to take care of themselves because of these co-morbidities, they are more likely to forget about their antihypertensive medications due to complex treatment routines. This reduces their adhere to their medications. This is similar to what was reported by (Ambaw et al., 2012) that co-morbidities result in an

increase in the number of pills taken by the patient and possibly increases the fear of side effects and as such decreases patients' desire to be consistent with their treatment.

There is 0.05 odds of participants being adherent if waiting time at the hospital is acceptable. How long it takes for a patient to see a doctor or health professional can affect their patronage of healthcare services. Patients consider long waiting time as a hindrance in getting services and unnecessary prolongation of waiting time can cause stress for both patients and health professionals. A study conducted in South India by (Navya et al., 2015) showed that an increase in the waiting for consultation was significantly associated with poor adherence or moderate adherence.

There is 5.49 odds of participants being adherent if participants are given the chance to ask questions about their medications. Asking questions help patients to understand their condition and the need to adhere to their medication. It helps give them insight into how to increase life expectancy despite their illness. A study conducted by Sarfo et al., (2018) showed that low adherence was associated with low literacy of patients concerning their condition.

There is 15.67 odds of participants being adherent if they are confident in the health professionals. Confidence in health professionals enables these professionals to influence the patients to adhere strictly to their medications. This is supported by the study by Heydari, et al, (2014) which indicated that patients are more likely to adhere to treatment they hold their health professionals in high esteem and have a high perception about them being experts in the field of health.

When all other factors were controlled for, acceptability of waiting time at the hospital and difficulty in reaching the hospital were the only significant factors with odds of 0.04 ($p<0.001$) and 3.518 ($p=0.004$) respectively.

Hypertension can co-exist with other morbidities. In this study, diabetes, high cholesterol and heart attack were high amongst all the co-morbidities participants have. This is similar to what was seen the study conducted by Hirani, Zaninotto, & Primatesta, (2008). Hypertension is known to have correlation with these disease, that is there is a high likelihood of a person living with hypertension will have any of these co-morbidities especially diabetes (Mannino, Thorn, Swensen, & Holguin, 2008).

Cost of therapy was identified as one of the single factors that was a challenge to adherence. The socioeconomic statuses of individuals in the society have a toll on the amount they are willing to spend on their health. Following the cost of therapy was forgetfulness. Many people living with chronic diseases tend to forget about their illness whenever they feel better and less likely to remember to take their medications (Odegard et al., 2008).

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The findings of this study show that antihypertensive medication adherence amongst OPD attendants of the Tema General Hospital is low. Cost of therapy, forgetfulness, fear and experience of side effects were the most challenging situations to adherence. In the final analysis after adjusting for confounders, acceptability of waiting time at the hospital and difficulty in reaching the hospital were found to be significantly associated with antihypertensive medication adherence amongst residents in the Tema General Hospital.

6.2 Limitations

This study was a cross sectional study, and such was able to establish only association and not causality of low adherence. Furthermore, there could be an overestimation of adherence since a self-report was employed to measure participant adherence and its associated factors. Participant may give responses based on resentment.

6.3 Recommendation

The cost of antihypertensive medications should be subsidized to reduce the cost of therapy for patients so they can easily afford and adhere to therapy.

The Director of the Tema General Hospital in conjunction with the pharmacy department should come out with electronic reminders to help deal with the issue of forgetfulness.

The social support systems for hypertensive patients should be strengthened by educating caregivers as well as relatives and friends so that patients may be encouraged by relatives and friend to adhere to their medications.

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APPENDICES

Appendix A: Participants' Information Sheet

Research Title: "Factors Associated with Adherence to Antihypertensive Therapy Amongst OPD Attendants of the Tema General Hospital".

Introduction: I am Amos Amoako – Adusei. A postgraduate student of the University of Ghana (UG) reading Master's in Public Health (MPH). My address is P.O.BOX CE 11483, Tema. Phone number is 020 261 2069 and my e-mail is adusei2011@gmail.com.

Background and Purpose of the Study: Cardiovascular related diseases and its deaths have increased over the years with hypertension being a precursor to these diseases. Proper management of the condition has proven to increase the life expectancy of patients. Adherence appears to be one of the important factors that influence the outcome of therapy greatly.

Nature of Study: This is an exploratory study with the aim of finding out using questionnaires if people are adherent to their antihypertensive therapy and the factors associated with adherence. It will involve at least330 participants who visit the hypertensive clinic at the Tema General Hospital.

Duration of Study: As a participant, you will be required to answer some few questions which will take less than 20 minutes of your time.

Potential Risks and Discomforts: In participating in this study, I will be asking you to share some personal views and experiences concerning hypertension and the medication used for its treatment You do not have to answer every question or take part in the research if you don't wish to do so.

Benefits: There will be no monetary rewards or benefits for participating in this study. The results of the study will however help in informing decisions in the management of hypertension in the country.

Costs: There will be no cost involved should you decide to participate in this research.

Compensation: You will not have to spend money in partaking in this study and you will not be compensated for participating. You will only have to spare about 15 minutes of your precious time to answer the questions I will ask.

Confidentiality: No name will be recorded. Your name and identity will not be needed in the study. No information shared with me will be disclosed to anyone who is not part of the student team. The information that I will collect from this study will be used only for academic purposes.

Voluntary Participation/Withdrawal: Participation in this survey is completely voluntary and you are free to withdraw your participation anytime without giving any reason for doing so. I will give you an opportunity at the end of the interview to review your responses, and you can ask to change any responses that you want.

Outcome and Feedback: The outcome of the Study will be shared with the Administrator of the Tema General Hospital and propose some interventions if needs be.

Funding Information: This study is solely funded by me the Principal researcher.

Sharing of Participant Information/Data: All the information gathered from the study is owned by me, the principal investigator and will not be shared except for academic purposes.

Provision of a Copy of the Information sheet/Consent forms: A Copy of the signed or thumb-printed information sheet and consent form will be made available to you upon request.

Contacts for Additional Information: If you have any questions, you can ask them now or later. If you wish to ask questions later, you may contact me Mr. Amoako-Adusei Amos, School of Public Health, University of Ghana, Legon adusei2011@gmail.com. Tel: 0202612069; Dr. Francis Anto, School of Public Health, University of Ghana, fanto@ug.edu.gh. You can also contact the Ghana Health Service-Ethical Review Committee Administrator, Madam Hannah Frimpong on 0507041223 for any clarifications on this research.

Appendix B: Consent Forms

Study Title: Factors Associated with Adherence to Antihypertensive Therapy Amongst OPD attendants of the Tema General Hospital.

PARTICIPANTS STATEMENT

I acknowledge that I have read or have had the purpose and contents of the Participants' Information Sheet read and satisfactorily explained to me in a language I understand (English □ /Twi □/ Ga □). I fully understand the contents and any potential implications as well as my right to change my mind (i.e. withdraw from the research) even after I have signed this form.

I voluntarily agree to be part of this research.

Full name or Initials of Participant ……. ID Code……

Participants' Signature…….OR Thumb print ……

Date……

INTERPRETERS' STATEMENT

I interpreted the purpose and contents of the Participants Information Sheet to the afore named participant to the best of my ability in the (Twi □/ Ga □) language to his proper understanding.

All questions, appropriate clarifications sought by the participant and answers were also duly interpreted to his/her satisfaction.

Name of Interpreter……..

Signature of Interpreter…….. Date……

Contact Details…….

STATEMENT OF WITNESS

I was present when the purpose and contents of the Participant Information Sheet was read and explained satisfactorily to the participant in the language he/she understood (English □/Twi □/Ga □).

I confirm that he/she was given the opportunity to ask questions/seek clarifications and same were duly answered to his/her satisfaction before voluntarily agreeing to be part of the research.

Name …….

Signature……OR Thumb print……OR Mark (Please Specify)……..

Date……

INVESTIGATOR STATEMENT AND SIGNATURE

I certify that the participant has been given ample time to read and learn about the study. All questions and clarifications raised by the participant have been addressed.

Researcher's name……..

Signature……

Date…….

Appendix C: Questionnaire

I am post graduate student of the School of Public Health, University of Ghana and conducting research on the topic: **Factors associated with adherence to antihypertensive therapy amongst OPD attendants of the Tema General Hospital.** 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 factors associated with adherence to antihypertensive medication amongst OPD attendants of the Tema General Hospital. **Confidentiality of the answers given is assured**. Thank you very much for your participation.

PARTICIPANT ID: ……

DATE: …….

SECTION A: Socio-Demographic Data

Participants ID		**Response**	**Code**
Question Number	Questions		
1	Sex : 1. Male 2. Female		sex
2	Age		age
3	Marital status 1. Single 2. Married 3. Divorced/Separated 4. Widowed 5. Co-habiting		maristat
4	What is your educational level? 1. No formal education 2. Primary 3. Secondary 4. Tertiary		education
5	What is your religion? 1. Christian 2. Muslim 3. Traditionalist 4. Others, specified……		religion
6	How many children do you have?		children
7	How many children are dependent?		dependent
8	How many children are supportive?		supportive

SECTION B: Socio-economic

Participants ID		**Response**	**Code**
Question Number	Questions		
9	What is your occupation? 1. Businessperson 2. Farmer/Fisherman 3. Housewife 4. Professional 5. Trader/shop assistant 6. Retired 7. Tradesman 8. Clerical worker 9. unskilled labourer 10. Student 11. Unemployed		occupation
10	What is your average monthly income? 1. Less than GHS 200 2. GHS 200-GHS 600 3. GHS 601-GHS 1000 4. GHS 1001- GHS 2000 5. More than GHS 2000		monthly
11	How do you pay for your hypertensive drug? 1. Out of pocket 2. Health insurance specify……. 3. Others…… ……		drugpay
12	If out of pocket, how much do you spend on your drug monthly?		drugspend
13	If insured, do you get all your drugs from the Health Insurance? 1. Yes 2. No 3. Not applicable		druginsure
14	If No to Q14, how much do you spend monthly on your drugs that are not gotten from Health Insurance?		

SECTION C: Measurement of Adherence (Moriskys 8 Item Measurement Adherence Scale) [morisadh]

Question number	Question	Yes(1)	No (2)
14	Do you sometimes forget to take your medicines?		
15	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?		
16	Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?		
17	When you travel or leave home, do you sometimes forget to bring along your medicine?		
18	Did you take all your medicines yesterday?		
19	When you feel like your blood pressure is under control, do you sometimes stop taking your medicine?		
20	Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?		
21	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 D: Disease and Therapy related factors

Participants ID		**Response**	**Code**
Question Number	Questions		
22	How long ago were you diagnosed as hypertensive?		hypertension
23	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 ……		diagnosis
24	Were you told you had developed complications already? 1. Yes 2. No		complication
25	Have you ever been admitted on account of very high blood pressures since diagnosis? 1. Yes 2. No		admission
26	Were you consistent with therapy at the time? 1. Yes 2. No		therapyconst
27	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		oraldrug
28	What is the total number of anti-hypertensive tablets you take daily?		numbtab

29	How many times in a day do you take your medicine? Drug 1: ……. Drug 2: ……. Drug 3: …….. Drug 4: ……..		drugfreq
30	Have your medications been changed since you were started on therapy? 1. Yes 2. No		medchange
31	If yes, what was the reason? 1. Side-effects 2. Poor control 3. To help adherence 4. Other, specify …….……. 5. Not Applicable		changeres
32	Have you ever experienced any side effect to any of your medications? 1. Yes 2. No		sideeffect
33	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 6. Not applicable		effectaction
34	Apart from hypertension, are you being managed for any other chronic condition? 1. Yes 2. No		comorbidity
35	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)….... 10. Not applicable		co-morbid
36	If yes to Q37 what are the total number of pills you take for that/ those condition(s) in a day?		addpillnumb

37	Do you take unprescribed medications/Supplements/ Mixtures? 1. Yes 2. No		unprescribed
38	If yes are they 1. Orthodox 2. Herbal 3. Both 4. Not applicable		unprescribedkind

SECTION E: Health Care Systems

Participants ID		**Response**	**Code**
Question Number	Questions		
39	Is this your regular health facility? 1. Yes 2. No		regfac
40	If yes, for how long?		regfacyrs
41	Were you referred to this facility? 1. Yes 2. No		referral
42	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: …….)		refreason
43	How far is your house from the hospital?		hospdist
44	What means of transportation do you come by? 1. Own vehicle 2. Public Transport 3. Walk 4. Other, specify ……..		hosptrans
45	Any difficulty reaching facility? 1. Yes 2. 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 ……		facdiff

SECTION F: Quality of Care

Question number	Question on Quality of care	Yes =1	No=2	Don't Know=3	Code
46	Do you find waiting time at the clinic acceptable?				wait
47	Do your doctors and other health professionals show interest during consultations?				profinterest
48	Are you given the chance to state your problems and ask questions about your disease?				probchance
49	Are you satisfied with the health information and advice provided by your doctor and other health professionals?				satadvice
50	Do you spend enough time with your doctor and other health professionals during consultation?				proftime
51	Do you have confidence in your doctor and other health professionals?				confprof

Participants ID		**Response**	**Code**
Question Number	Questions		
52	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 ……		adhchallenge
53	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 ……		adhassist
54	Do you have a care giver? 1. Yes 2. No		caregiv
55	If yes, does the care giver sometimes forget to give you your medication? 1. Yes 2. No 3. Not applicable		carefgt
56	Is the care giver sometimes stressed with taking care of you? 1. Yes 2. No		carestress

Appendix D: Morisky 8-Item Medication Adherence Scale (MMAS)

Question	Patient Answer (Yes/No)	Score Y=1; N=0
Do you sometimes forget to take your medicine?		
People sometimes miss taking their medicines for reasons other than forgetting. Thinking over the past 2 weeks, were there any days when you did not take your medicine?		
Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?		
When you travel or leave home, do you sometimes forget to bring along your medicine?		
Did you take all your medicines yesterday?		
When you feel like your symptoms are under control, do you sometimes stop taking your medicine?		
Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?		
How often do you have difficulty remembering to take all your medicine? __ A. Never/rarely __ B. Once in a while __ C. Sometimes __ D. Usually __ E. All the time		A = 0; B-E = 1
	Total score	
Scores: >2 = low adherence 1 or 2 = medium adherence 0 = high adherence		

Morisky DE, Green LW, Levine DM. Concurrent and predictive validity of a self-reported measure of medication adherence. *Med Care.* 1986;24:67-74.

Appendix E: Ethical Clearance

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: 233-302-681109
Fax – 233-302-685424
Email: ghserc@gmail.com

MyRef. GHS/RDD/ERC/Admin/App 19/65
Your Ref. No.

20th February, 2019

Amos Amoako-Adusei
P.O. Box 11483
Tema

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	GHS-ERC029/02/19
Project Title	Factors Associated with Adherence to Antihypertensive Therapy amongst Residents in the Tema Metropolis
Approval Date	20th February, 2019
Expiry Date	19th February, 2020
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months.
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.
- Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
PROFESSOR MOSES AIKINS
(GHS-ERC VICE CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra